Global Environment Facility

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July 7, 2009

Dear LDCF/SCCF Council Member:

The World Bank as the Implementing Agency for the project entitled ***Mexico: Adaptation to Climate Change Impacts on the Coastal Wetlands*** has submitted the attached proposed project document for CEO endorsement prior to final Agency approval of the project document in accordance with the World Bank procedures.

The Secretariat has reviewed the project document. It is consistent with the project concept approved by the LDCF/SCCF Council in July 2008 and the proposed project remains consistent with the Instrument and SCCF/GEF policies and procedures. The attached explanation prepared by the World Bank satisfactorily details how Council's comments have been addressed.

We have today posted the proposed project document on the GEF website at www.TheGEF.org for your information. We would welcome any comments you may wish to provide by August 4, 2009 before I endorse the project. You may send your comments to gcoordination@TheGEF.org .

If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Attachment: Project Document

cc: Alternates, GEF Agencies, STAP, Trustee

REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project
THE SPECIAL CLIMATE CHANGE FUND (SCCF)[1]

Submission Date: April 29, 2009
Resubmission Date: June 18, 2009

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 3159
GEF AGENCY PROJECT ID: P100438
COUNTRY(IES): Mexico
PROJECT TITLE: ADAPTATION TO CLIMATE CHANGE IMPACTS ON THE COASTAL WETLANDS IN THE GULF OF MEXICO
GEF AGENCY(IES): WORLD BANK
OTHER EXECUTING PARTNER(S): SEMARNAT (THROUGH THE INSTITUTO NACIONAL DE ECOLOGIA (INE)), INSTITUTO MEXICANO DE TECNOLOGIA DEL AGUA (IMTA)
GEF FOCAL AREA: Climate Change

Expected Calendar (mm/dd/yy)	
Milestones	**Dates**
Work Program (for FSP)	March 2008
Agency Approval Date	July 2009
Implementation Start	August 2009
Mid-term Review (if planned)	January 2012
Project Closing Date	July 2014

A. PROJECT FRAMEWORK

Project Objective: The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability, assessing also the overall impacts of climate change on national water resource planning, with a focus on coastal wetlands and associated watersheds.

Project Components	**Indicate whether Investment, TA, or STA**[b]	**Expected Outcomes**	**Expected Outputs**	**SCCF Financing**[a]		**Co-financing**[a]		**Total ($)** c = a+b
				($) a	%	($) b	%	
1. Design of key selected adaptation measures	STA	Experience gained in incorporating climate change in developing wetland management plans and designing interventions to increase resilience	At least 6 pilot adaptation measures with sound technical design documents including analysis of financial, economic, social and environmental aspects ready for implementation	0.5	17%	2.5	83%	3.0
		Wetland monitoring capabilities strengthened as input to improved management of sensitive and vulnerable ecosystems	Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[2] satellite)					

[1] This template is for the use of SCCF Adaptation projects only. For other SCCF projects under Technology Transfer, Sectors and Economic Diversification windows, other templates will be provided.

[2] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

		Facilitate the development of long term management and monitoring of selected ecosystems	Technical report on sustainability strategy for pilot adaptation measures					
2. Implementation of pilot adaptation measures in highly vulnerable wetlands	Investment/STA	Increased knowledge of cost and benefits of adaptation in coastal wetlands in Mexico Increased ability to mainstream climate change considerations in land use plans Increased competence to incorporate wetlands protection in municipal land use plans	**Panuco:** 10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities **Papaloapan:** Alvarado Lagoon under management plan incorporating CC impacts Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise **Tabasco:** Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors 4 km of Sandbars separating the coastal lagoons from the sea stabilized. **Siam Ka'an:** Protected area	3.5	19%	15.0	71%	18.5

			monitoring system strengthened including climate change parameters Land use plans including climate change considerations developed for buffer area An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.					
3. Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options.	STA	Support the strengthening of the knowledge base required to mainstream climate change in water resources management and planning	Climate change impact scenarios developed for selected basins and for coastal wetlands Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options	0.4	40%	0.6	60%	1.0
4. Project management				0.1	10%	0.9	90%	1.0
Total project costs				4.5		19.0		23.5

[a] List the $ by project components. The percentage is the share of SCCF and Co-financing respectively to the total amount for the component.

[b] TA = Technical Assistance; STA = Scientific & Technical Analysis

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT (expand the table line items as necessary)

Name of Co-financier (source)	***Classification***	***Type***	***Project***	***%****
Meteorological Research Institute of Japan (MRI)	Government Agency	Grant	1	5%
Japanese Space Agency	Government Agency	Grant	0.3	2%
Climate Change Implementation Grant from the PHRD (Japanese government)	Bilateral Agency	Grant	0.5	3%
Local governments	Local Governments	In kind	1.8	9%
NAWCA	Government Agency	Grant	0.7	4%
CONAGUA	Government Agency	In kind	12.4	65%
PEMEX	Government Agency	In kind	0.8	4%

SEMARNAT/INE	Government Agency	In kind	1	5%
IMTA	Government Agency	In kind	0.5	3%
Total Co-financing			19.00	100%

* Percentage of each co-financier's contribution at CEO endorsement to total co-financing.

C. CONFIRMED FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Project Preparation Amount (a)	Project (b)	Total C = a + b	Agency Fee	For comparison: SCCF Grant and Co-financing at PIF
SCCF Grant	300,000	4,500,000	4,800,000	480,000	5,280,000
Co-financing		19,000,000	19,000,000		19,000,000
Total	300,000	23,500,000	23,800,000	480,000	24,280,000

D. FOR MULTI AGENCIES/COUNTRIES (IN $)[1]

GEF Agency	Country Name	(in $)		
		Project (a)	Agency Fee (b)[2]	Total (c) c=a+b
(select)				
(select)				
(select)				
(select)				
(select)				
(select)				
Total SCCF Resources		0	0	0

1 No need to provide information for this table if it is a single country and/or single GEF Agency project.

2 Relates to the project and any previous project preparation funding that have been provided and for which no Agency fee has been requested from Trustee.

E. PROJECT MANAGEMENT BUDGET/COST

Cost Items	*Total Estimated person weeks/months*	*SCCF ($)*	*Co-financing ($)*	*Project total ($)*
*Local consultants**	850	0.08	0.5	**0.58**
*International consultants**				
*Office facilities, equipment, vehicles and communications**		0.01	**0.1**	0.11
*Travel**		0.01	**0.3**	0.31
Total	850	0.1	**0.9**	**1.0**

* Details to be provided in Annex C.

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	*Estimated person weeks*	*SCCF($)*	*Co-financing ($)*	*Project total ($)*
*Local consultants**	2000	900,000	1,100,000	2,000,000
*International consultants**				
Total	2000	900,000	1,100,000	2,000,000

* Details to be provided in Annex C.

The numbers provided in the previous table are best estimates as real *person-weeks* can only be known after the bidding processes are completed. All bidding processes will follow the Bank's procurement guidelines. Also, it is expected that some of the consultancies will be awarded to firms. The previous table considers only technical assistance components, including those not co-financed by GEF-SCCF.

G. DESCRIBE THE BUDGETED M&E PLAN: The results framework and arrangements for monitoring are described in Annex 3 of the Project Document (PD).

Arrangements for results monitoring

Institutional issues:
INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist. Monitoring and evaluation of project outcomes/results (both intermediate and end-of-project) will be coordinated by the project staff in the GPS. The project manager will be responsible for monitoring project performance with the assistance of the regional institutions.

The project will be guided by semiannual learning reviews of project results to coincide with Bank supervision missions on which basis the GPS and the Bank will identify specific measures to: (i) address any areas of implementation weakness, and (ii) adapt project design to ensure that objectives are met. These measures for improvement will be reflected in GPS's semiannual learning reports and its proposal for the forthcoming year's Annual Implementation Plan including project budget.

INE-SEMARNAT will monitor financial and procurement management for the project. Financial information on inputs, outputs, budgeting, treasury, accounting, and audits will be monitored. The latter activity will be performed by an externally hired consultant. The project will send to the Bank quarterly financial management and procurement reports. Monitoring and processing of procurement for services, goods, works, and subprojects will be carried out by INE-SEMARNAT's project staff. The annual planning processes will be monitored with specific indicators on planning performance defined in the Results Framework. The project's physical implementation will be monitored based on the specific outputs and monitoring indicators for project components as defined in the Results Framework. Information from the monitoring system will be analyzed by project management and disseminated according to the project's communication strategy to appropriate stakeholders. The project will provide the Bank with quarterly progress reports and an update on legal covenants compliance every six months.

The monitoring and evaluation process will function as a mechanism for assessing project impacts and as a day-to-day management tool. A baseline study will be carried out at inception, and follow-up evaluations at both midterm and project closing. Site-specific baseline studies, as required will be complemented before work begins in the pilot areas; baseline studies will be shared with local NGOs and other national institutions. Specific project implementation monitoring data will be provided in agreed-upon report formats, included in the operational manual, and will be required for the twice-yearly supervision missions. INE, with the help of the Steering Committee, will develop the project monitoring system that will record planning, physical implementation, performance of local technical assistance and development objective indicators from the project's Results Framework.

Data collection
Project activities will be reported to the GPS. INE-SEMARNAT will be responsible for compiling data and reporting to the World Bank.

Semiannual evaluations
Semiannual discussions are planned to coincide with supervision missions to identify and discuss lessons learned during project implementation with project stakeholders and beneficiaries. Project staff will submit semiannual reports on lessons learned and plans for incorporating those lessons into future activities.

Midterm Evaluation
The Bank's supervision team, together with a team of external reviewers and key stakeholders, will conduct a midterm evaluation of project execution. It will be conducted no later than three years after the first disbursement. The external review will focus on: (i) progress in achieving project outcomes, (ii) institutional arrangements for project implementation, (iii) operational manual for payments, (iv) review of both the project implementation plan and general project operational manual. In preparation for the midterm review (MTR), the Steering Committee, together with the local implementing agencies, will prepare a working book containing the following information: (i) executive summary of the overall project status, (ii) up-to-date description of the overall components' development and indicators; and (iii) detailed description of the status of the proposed adaptation pilots by catchments.

Final Evaluation
A final evaluation will be conducted in the last semester of project execution. The key objectives of the final evaluation will be to: (i) assess attainment of the project's expected results, (ii) use the results to design a strategy for replication in future projects, and (iii) design a strategy for mainstreaming future adaptation activities in the participating countries.

PART II: PROJECT JUSTIFICATION

Please see Project Document (PD)

A. DESCRIBE THE PROJECT RATIONALE AND THE EXPECTED MEASURABLE ADAPTATION BENEFITS:

Mexico is particularly vulnerable to the impacts of global climate change (National Communications, NC1/NC2/NC3 to the UNFCCC, IPCC 2007; PECC, 2009), many of which may be irreversible. Mexico's NCs have assessed vulnerabilities to climate change focusing on areas and sectors seen as particularly fragile to climate impacts. These include water resources, drought and desertification, and coastal zones, in particular the wetlands in the Gulf of Mexico. At a national scale, Mexico is already confronting serious water management challenges and facing a threat of droughts. Despite significant progress by the government in addressing these challenges, current water sector planning and investments do not explicitly include consideration of climate impacts. Data published on projected hydro-climatic changes, as part of IPCC assessments[3], indicate that Mexico may experience significant decreases in runoff on the order of minus 10 to 20% nationally, and up to 40% in Gulf Coast wetlands, as a result of global climate change (NC3, pp XXIX, 2007). At a regional scale, the ecosystems to be most affected by climate change impacts are the coastal wetlands in the Gulf of Mexico. Mexico's NCs have identified the wetlands in the Gulf as an immediate priority for adaptation. Mexico has several regulatory tools that protect wetlands, in particular mangroves. However, Mexico faces challenges in effectively implementing such conservation tools. The gains in regulating coastal wetland protection are compromised by weak enforcement, poor coordination between national, state and local actions, the lack of supporting regulations and land use planning at some locations, and other emerging challenges such as climate change impacts. It is important, therefore, to design measures that will initiate and inform the

[3] P. C. D. Milly1, K. A. Dunne1 & A. V. Vecchia. Global pattern of trends in streamflow and water availability in a changing climate. Nature: November 17, 2005 pp

process of adaptation in order to protect the environmental and economic services (i.e. water supply, fisheries, agriculture) of the Gulf of Mexico wetlands while simultaneously addressing key drivers that adversely impact their sustainability.

The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability. The project also seeks to assess the overall impacts of climate change on national water resource planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds. The experience from the project pilots is intended to inform the government's future adaptation strategy and development programs in the Gulf region**.**

Expected adaptation benefits include: (i) Reduction of ecosystem vulnerability to climate impacts; (ii) Reduction of unsustainable land use changes; (iii) Protection of resource base of local economic activities such as fisheries, tourism; (iv) Habitat for migratory species strengthened; (v) Decreased erosion; (vi) Reduced flooding; (vii) Maintenance of environmental services of wetlands; (viii) Protection of urban areas; (ix) Benefits for other coral dependent species; (x) Strengthened buffer function.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL/REGIONAL PRIORITIES/PLANS:

The project is part of Mexico's strategy to cope with the consequences of climate change. The National Communications to the UNFCCC identify the project as a measure to address a region very vulnerable to the impacts of global climate change. The project constitutes an important element of the national adaptation strategy. The project, along with the identification of pilot sites and measures, is incorporated into the PECC, under the National Strategy on Climate Change. At a regional level, INE together with the University of Veracruz, Universidad Nacional Autonoma de Mexico (UNAM), and the Ecological Institute of Veracruz are currently developing a Climate Change Action Plan for the State of Veracruz, with funding from the British embassy (Strategic Programme Fund). Similar plans are envisioned for the states of Tamaulipas, Tabasco and Quintana Roo. These states plan to include in their adaptation strategies the lessons learned in the preparation of the proposed project. Mexico ratified the UN Framework Convention on Climate Change (UNFCCC) on March 11, 1993. Mexico's Congress ratified the Kyoto Protocol (April 2000) by unanimous consent. It has already submitted its Third National Communication (2007) and is preparing to submit its fourth by the end of 2009. Mexico has also launched an effort to strengthen its institutional capacity through the development of a Climate Change Office (CCO). The CCO has been supported through an IDF (Institutional Development Fund) grant. Mexico signed the Ramsar treaty on conservation of wetlands in 1986, recognizing the need to preserve its wetland ecosystems. It also ratified the Convention on Biological Diversity in 1993. In 2005, the National Committee on High-priority Wetlands was created in CONANP to produce guidelines and recommendations for their management. Municipalities have a great potential to influence the management of wetlands in Mexico. According to the Mexican Constitution (art. 115) municipalities have exclusive competence for land use planning.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH SCCF ELIGIBILITY CRITERIA AND PRIORITIES:

The ninth session of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) in December 2003 provided guidance to the GEF for the operation of the Special Climate Change Fund (SCCF). In particular, the guidance provides that the fund should give priority to supporting activities related to adaptation. The guidance identifies activities in priority adaptation areas, such as water resources management, fragile ecosystems and integrated coastal zone management. The

project will also support the GEF Operational Programs 12 (Integrated Approach to Ecosystem Management) and 15 (Sustainable Land Management) by promoting adaptation measures in the coastal region of the Gulf of Mexico.

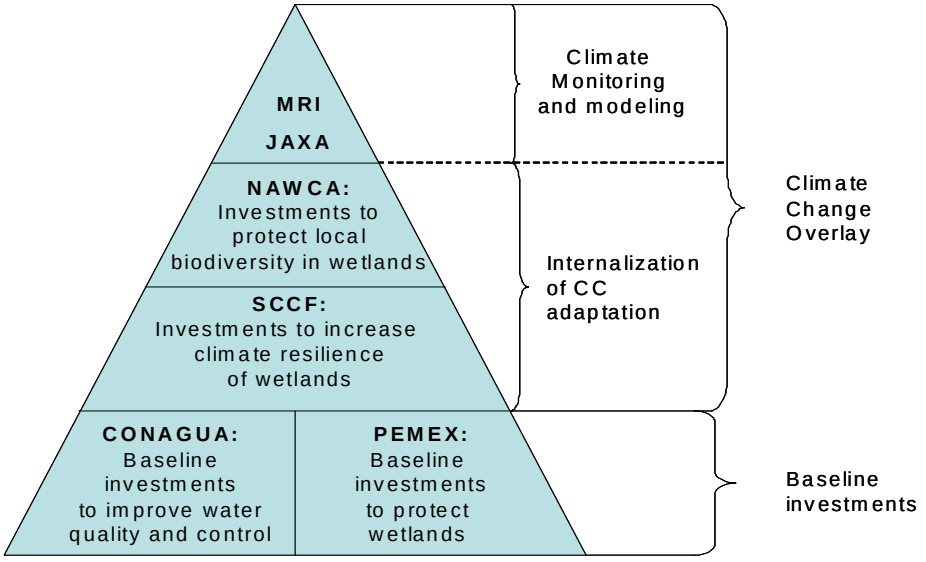
D. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

Linkage with other projects, supported by the WB or the GEF. The proposed project will be implemented in coordination with Colombia's Integrated National Adaptation Program (INAP) and Caribbean Implementation of Adaptation Measures in Coastal Zones (SPACC) projects, and the Trinidad and Tobago: Restoration of the Nariva Wetland Project (P093012) which deal with similar issues in coastal areas. The project will also benefit from results and recommendations from the GEF Consolidation of the Protected Areas System Project and the Mexico Mesoamerican Biological Corridor Project. The Bank is also providing technical assistance to the National Water Commission (CONAGUA) on the implementation of its Flagship Local interventions in the Water Sector Program (*Proyectos Emblemáticos*), which aims to promote integrated management of water resources in local areas. The project will link and provide support to CONAGUA in coordination with the Bank's current technical assistance program. Finally, the project complements and consolidates the Environmental and Climate Change DPLs in that it adds the dimension of adaptation. The Government has indicated that adaptation in the Gulf of Mexico will inform the evolving national adaptation strategy as reflected in the Special Program on Climate Change (PECC) program currently under consultation.

E. DESCRIBE ADDITIONAL COST REASONING:

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 North American Wetland Conservation Commission (NAWCA) funding add a climate overlay and influence the type of interventions made with counterpart funding. The modeling and monitoring efforts will be supported through the instruments already signed with Meteorological Research Institute (MRI) and the Japanese Space Agency (JAXA) (figure 3).

Figure 3. Funding structure of the project.



Without SCCF financing the integration of long term climate change adaptation considerations in wetland management strategies and policies would most likely not occur. SCCF is an integral part of the

overall funding strategy to address current and future local and global threats to the functioning of coastal wetlands.

F. **INDICATE THE RISK THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MITIGATION MEASURES:**

Risk	**Rtg**	**Mitigation**	**Residual Risk**
Local drivers for wetland destruction impede long term sustainability programs.	H	The actions foreseen under the project represent a harmonized approach to address local drivers as well as anticipated climate change impacts affecting the functioning of coastal ecosystems. A long-term sustainability strategy will be designed as a result of the project.	M
Lanholders may impede development of land management plans	M	Land management plans will seek support from local landholders who will be consulted during the design, adoption and implementation of land management plans..	M
Broad geographical focus will dilute the impact of the project activities	M	Selection of project areas has undergone a thorough selection process to maximize chances of success and efficient deployment of project resources by focusing on a few pilots in each site. Strong coordination between national and local authorities is key factor for success.	L
Measures identified under the project may not be implemented	M	The project is a priority for INE. It is part of the national CC strategy and the basis for a future adaptation strategy for the Gulf Coast. Federal and local authorities are committed to project implementation and the project will be used as a basis for a wider effort under the PECC.	L
Given the long-term nature of the challenges, there is a risk that future administrations may not support its goals.	H	Strong involvement of state administrations (which will support the implementation locally) and local communities (which will be actively involved in the implementation) will strengthen the long term project goals. Agreements between INE and the municipalities in the areas of project intervention will be entered into as a covenant in the legal agreement seeking long term support by municipalities and maximization of social benefits. No project funds will be managed by the municipalities.	M
Coordination of pilot activities will be complicated by involvement of national and local agencies.	M	Implementation arrangements consider one coordinating agency supported by local agencies. An overall project coordinator will ensure the continuous liaison between the federal and local level.	L
Pilots consider strengthening of conservation status and zoning tools which may be compromised by limited coordination between federal, state and local levels.	M	The project will work with agencies in charge of defining protected areas and land use plans and zoning: CONANP, SEMARNAT/INE and the municipalities. At the same time project activities provide opportunity to engage the local, state and federal levels in wetland conservation and to improve coordination.	M

G. **EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:**

Given the long-term nature of the proposed project with its focus on integrating climate change considerations into the management of vulnerable ecosystems, it is difficult to identify one meaningful quantitative outcome indicator that best reflects the outcome(s) of the project. For that reason a qualitative

approach was taken. During project formulation the project followed the approach recommended by GEF[4] for biodiversity projects and assessed various adaptation alternatives best suited to achieve the project's development objective. This process began with an extensive pilot site and measures selection effort.. After an initial list of pilot activities had been identified (as listed in the PIF) based on the specific vulnerabilities of each pilot site, the project team conducted public consultations and field visit at each site in order to agree on the final set of supported adaptation measures. This consultation process looked into the feasibility and the expected impacts of the selected measures, as well as into the available resources and ultimately into the potential of achieving the project objective. As a result of this process final adaptation pilots were agreed upon that would simultaneously address local and global threats to the functioning of coastal ecosystems and that would have positive implications for the various sectors that depend upon these ecosystems. This ecosystem approach enables tackling several issues and sectors at the same time and focusing on the resource base of economic activities. A functioning and strengthened ecosystem would be more resilient to climate change impacts and would likely continue to provide its environmental services thus benefiting fisheries, tourism, coastal protection, biodiversity, and water supply and quality. At the same time this approach allows the strong involvement of local stakeholders.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. PROJECT IMPLEMENTATION ARRANGEMENT:

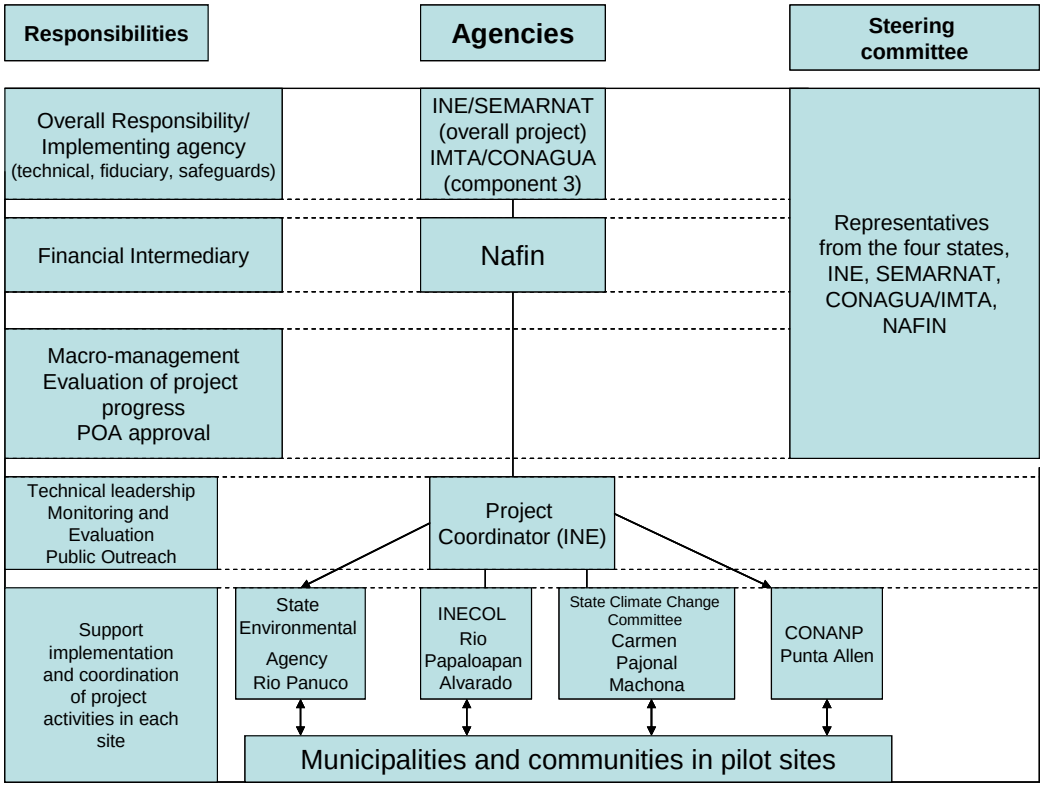
General implementation arrangements: INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist and will be in charge of all fiduciary responsibilities, including financial management, procurement of goods and services and the application of environmental and social safeguards.INE-SEMARNAT will manage the entirety of the project funds and no funds will be managed by municipalities. NAFIN will be the financial intermediary. The implementation of pilot activities will be supported and implemented through the participation of local agencies in each pilot site. Local agencies have confirmed their support to the project. INE with the support of CONAGUA/IMTA will implement the assessment of options to address climate issues in water resources planning. CONAGUA and IMTA have pledged technical and financial resources to the project activities. Oversight of the project will be responsibility of a steering committee.

Technical implementation arrangements:

Steering Committee. The main responsibility of the Steering Committee (involving representatives from the four participating states, INE, SEMARNAT, CONAGUA, and NAFIN) is to assure political and strategic support for the implementation of the selected adaptation pilots and the coordination with counterpart resources. The Steering Committee will also provide guidance on the implementation of the project and make high level recommendations regarding the project's development, technical difficulties and management issues. The Steering Committee will approve the Annual Operating Plans (AOP) of the project. Additionally, a Scientific Advisory Panel, appointed by INE will be convened regularly, to advise on project implementation. A **group of professional staff (GPS)** from SEMARNAT and INE will be responsible for project implementation including one general project coordinator in charge of the operational coordination of the project activities in each site. The GPS will prepare the POA[5] in consultation with the local agencies in each site, and be responsible for its execution as well as for the operational coordination of the project activities in each site. The GPS will ensure the financial, conceptual and methodological coherence among all activities and the integrity of the project. Specifically the GPS will provide technical leadership, monitoring and evaluation of project activities and public outreach.

[4] GEF/C.25/11; April 29, 2005: COST EFFECTIVENESS ANALYSIS IN GEF PROJECTS

[5] The AOP will include statement of specific objectives for the year, a description of the activities, expected outputs, monitoring indicators, detailed budgets, and a procurement plan, indicating the sources of financing in the budget.



PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The project's conceptual framework, general design, scope and objectives are consistent with the original project proposal submitted for GEF Pipeline entry and the Council Work Program approval.

Changes made since Work Program inclusion include:

The wording of the objective now emphasizes the main focus of the project on pilot interventions in wetlands towards which the majority of the financial resources continue to be designated. At PIF stage the objective was to reduce the vulnerability to the anticipated impacts from climate change on the country's water resources, with a primary focus on coastal wetlands and associated inland basins. The project still includes a component focusing on water resources management (component 3) and does so on two levels: On a physical level, co-financing arrangements with CONAGUA will help to coordinate their plans with project activities and to consider the results of the climate change assessments in their planning. On a more macro level the project has already started to work with IMTA on defining the scope of the assessment of climate change on water resources and on potential responses. Through a companion CCIG grant an assessment of the expected impacts of global climate change in the hydrologic response of Gulf of Mexico watersheds will be conducted.

The project reflects a recommendation made by Bank management during the appraisal process to reduce the scope and ambitions of then component one (now component three). Given the limited GEF resources available to the project, the nature of the counterpart agencies and the complexity of the policy making process in Mexico, a more conservative goal was recommended by the Bank management. The revised goal is considered achievable. The reduced scope requires less of counterpart financing and this is now more focused on an assessment of the climate change impacts on water resources and basins that are related to the pilot wetland sites.

However, discussions with CONAGUA demonstrated a strong interest to consider the projects' results in the planning process of their activities and as basis for future policy work. This expression of interest has been translated into counterpart contributions of approximately US$12 million to the project. As the project generates results the team will seek to reach a stronger level of consideration of climate change into water resources management planning.

Following GEF-SCCF guidance, most of the project resources are channeled into the implementation of specific adaptation measures (nearly 80%).

The project will be working now on four pilot sites instead of eight at PIF stage in order to use the limited grant resources in a more focused way so as to achieve a higher impact in each site. The reduction in the number of pilot sites will reduce significantly the transaction cost involved in managing pilot activities that are geographically dispersed and doubles the resources for specific implementation and learning purposes. The four final pilot sites were selected out of a list that was the result of an extensive pilot site selection process including the use of selection criteria such as: a) vulnerability to climate impacts; b) status of conservation; c) biological value; d) degree of anthropogenic intervention; e) local implementation capacity. The final pilot sites cover geographically well the Gulf of Mexico (including one site in the north, one in the center and 2 in the south of the Gulf of Mexico and the Caribbean) and represent sites with high vulnerabilities to climate change, important anthropogenic impacts, and a rich natural capital. The fourth site in Punta Allen has been selected for reference purposes since it is well conserved and managed.

The final pilot activities will focus now on strengthening the conservation status of coastal wetlands thereby increasing their resilience to climate change. At PIF stage the considered adaptation measures included several additional activities such as the installation of early warning systems, the expansion of civil protection systems, the improvement of drainage systems, the strengthening of coastal infrastructure, rainwater harvesting measures, and climate resilient agricultural activities. Some of these activities are still being supported under parallel initiatives. The SCCF resources assigned to the adaptation pilots range from approximately US$ 0.8 million for Panuco-Altamira, US$ 1.0 million for Alvarado, US$ 1.0 Carmen-Pajonal- Machona, and US$ 0.7 Punta Allen. With eight sites these resources would have been insufficient to yield a siginificant impact and the costs of coordination and logistics would have doubled.

The measures included in the PIF were identified based on an initial assessment of site-specific vulnerabilities to climate change and covered a broad range of sectors.

During completion of project formulation and appraisal, and through field visits and extensive consultation with local communities, with regional and local authorities, and other stakeholders (CONAGUA, IMTA), a much more comprehensive assessment was made which resulted in the selection of measures to be supported. This process resulted in the selection of the pilot measures that are most likely to achieve the project objective (promote climate resilience of wetlands and of associated inland basins). Thus, the original project objective is not affected. In fact the combination of land zoning, land use plans and physical investments to protect the wetlands are judged to be the most adequate and cost-effective mix to achieve the project objective.

The final measures were also selected taking into account the level of synergy in simultaneously addressing local challenges. We are satisfied that as a result of the appraisal and consultation process the final list of measures is the most adequate, given the level of resources, time available for project execution and nature of the challenges.

Most of the other measures originally included in the PIF and not included here are now covered under the state climate change plans (e.g. the Veracruz State CC plan includes climate resilient agricultural activities, early warning systems, improvement of coastal infrastructure; the plan has been submitted for public consultation by the Secretaría de Protección Civil) as well as under the co-financing of the project partners.

As an example of co-financing, NAWCA will cover rainwater harvesting measures. Also, the CCIG companion grant will fund a number of technical assistance activities that complement the GEF grant with generation of data on climate change impact scenarios of relevance for wetlands, inland basins, water resources and coastal areas. The data generated through the implementation of the CCIG-funded studies, will also be of relevance for revising building codes and for strengthening coastal infrastructure.

PART V: AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with SCCF policies and procedures and meets the SCCF criteria for project endorsement.

Agency Coordinator, Agency name	Signature	Date *(Month, day, year)*	Project Contact Person	Telephone	Email Address
Steve Gorman GEF Executive Coordinator The World Bank		April 29, 2009	Jocelyne Albert	(202) 473-3458	Jalbert@worldbank.org

ANNEX A: PROJECT RESULTS FRAMEWORK

PDO	Project Outcome Indicators	Use of Project Outcome Information
The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability, assessing also the overall impacts of climate change on national water resource planning, with a focus on coastal wetlands and associated watersheds.	• Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions • Four Wetland management plans and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions. • 15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals • 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 CC into water resources and wetland management and planning	
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
Component 1: Experience gained in incorporating climate change in developing wetland management plans and designing interventions to increase resilience Wetland monitoring capabilities strengthened as input to improved management of sensitive and vulnerable ecosystems Facilitate the development of long term management and monitoring of selected ecosystems	• At least 6 pilot adaptation measures count with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation • Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[6] satellite) • Technical report on sustainability strategy for pilot adaptation measures •	Basis for definition of pilot adaptation activities to be implemented.
Component 2 (Investment).	**Panuco:**	Provides the

[6] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

Increased knowledge of cost and benefits of adaptation in coastal wetlands in Mexico Increased ability to mainstream climate change considerations in land use plans Increased competence to incorporate wetlands protection in municipal land use plans	10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities **Papaloapan:** Alvarado Lagoon under management plan incorporating CC impacts Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise **Tabasco:** Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors 4 km of Sandbars separating the coastal lagoons from the sea stabilized. **Siam Ka'an:** Protected area monitoring system strengthened including climate change parameters Land use plans including climate change considerations developed for buffer area An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.	basis for costs and benefits of adaptation measures in coastal wetland ecosystems.
Component 3 Support the strengthening of the knowledge base required to mainstream climate change in water resources management and planning	• Climate change impact scenarios developed for national water resources and for coastal wetlands including identification of response options.	Supporting information for definition of response options

Arrangements for results monitoring

		Target Values					Data Collection and Reporting		
Project Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions	No adaptation measures in selected coastal wetlands	At least one measure is ready to start implementation; monitoring data generated; sustainability aspects included in pilot measure design.	At least 2 ready under implementation	At least 5 under implementation	At least 6 under implementation	Implemented measures provide results on adaptation approaches in wetlands; monitoring system fully operating and generating continuous data.	Bi annual supervision reports	Supervision visits, ALOS images, land cover and land use data, GIS	INE with local coordi-nators
Four Wetland management plans (WMP) prepared and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions.	Limited availability of WMP (exception Sian Ka'an); existing ones do not consider CC information or expected impacts	WMP including CC impacts designed for at least one site	2 WMP prepared and submitted for approval to deciding authorities	1 WMP considered for its adoption		At least one WMP updated based on relevant climate change data. At least t three WMP prepared.	Annual report, management plan	Annual review, ALOS images, land cover and land use data, GIS	INE with local coordi-nators
15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested	no adaptation measures in pilot sites	Conservation, forestry, stabilization, coral repopulation	2000 ha reforested with native species; land use plans	Conservation plans implemented in 10000 ha;	Conservation plans implemented in 15000 ha; 4000 ha	Conservation plans implemented in up to 20,000 ha,	Annual report, conservation strategy,	Annual review, ALOS images, land	INE with local coordi-nators CONA-

with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals		measures designed	reviewed and adjusted considering cc impacts on wetlands;	3000 ha reforested with native species; coral nurseries completed	reforested with native species; coastal stabilization works under execution	5000 ha reforested with native species; coastal stabilization works finished on up to 4000 m; up to 10,000 km2 of reefs repopulated;	reforestation plan, land use plans	cover and land use data, GIS	FOR, CONANP
Production and dissemination of practical guidance document on cost and benefits of adaptation measures in coastal wetlands as a basis for replication efforts					implemented measures provide data on cost and benefits of adaptation approaches in wetlands and are compiled in a guidance document	Guidance document is being disseminated and serves as basis for replication efforts	Draft and final Guidance document	Supervision visits, data generated from implemented pilots	INE
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	no response options defined yet on cc impacts in national water resources management	Scenarios of CC impacts on national water resources developed	Response options identified	Supporting studies at one emblematic basin concluded.	At least one national water resources management response option identified that considers CC impact scenarios		Annual report, minutes of meetings with IMTA/CONAGUA	List of viable policy options	IMTA/ CONAGUA
Intermediate Outcome Indicators									
Component 1: Detailed design of key selected adaptation measures									

At least 6 pilot adaptation measures with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation	Pilot sites don't consider adaptation yet	at least one measure designed	at least 2 designed measures under execution	at least 5 designed measures under execution	at least 6 designed measures under execution	implemented measures provide results on adaptation approaches in wetlands	Annual report, design progress reports, costs and benefits	Final design	INE with local coordi-nators
Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[7] satellite)	Limited monitoring of pilot wetlands, limited monitoring of CC data in pilot site areas	Availability of ALOS images and capacity to store and assess data and images	Modeling, generation of data, analysis, and access to information and long-term remote sensing	Pilot wetlands count with operating monitoring tool		Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[8] satellite)	wetland monitoring plans	ALOS images, other monitoring data	INE
Technical report on sustainability strategy for pilot adaptation measures	no adaptation pilots	sustainability aspects incorporated into pilot measures design	Sustainability strategy developed			Sustainability strategy updated based on project results seeking continuation of results	Sustainability strategy report	Preparation and supervision reports	INE
Component 2: Implementation of pilot adaptation measures in four selected wetlands highly vulnerable to the effects of climate change									
Site 1 Panuco: 10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened	Lagoon la Escondida has limited adaptation efforts	Design completed	Adaptation measures implemented benefiting 2000 ha and strengthening of natural barrier initiated	Adaptation measures implemented on 5000 ha	Adaptation measures implemented on 8000 ha	Adaptation measures implemented on 10,000 ha; 10 km of natural barrier strengthened	Conservation and reforestation plans; semi-annual reports	supervision, annual review	INE with local coordi-nator

[7] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.
[8] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

Site 1 Panuco: Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities	Coastal zoning does not take CC impacts into consideration and unsustainable practices continue weakening ecosystem's resilience	Studies for the development of coastal zoning plans concluded including relevant CC data and sustainable management practices	Coastal zoning regulation formally submitted to deciding authorities.	Climate resilient coastal zoning regulation considered for adoption by deciding authorities			Updated Coastal zoning regulation with CC scenarios and practices that strengthen wetland functioning; Semiannual reports	supervision, annual review	INE with local coordi-nator
Site 2. Papaloapan Alvarado Lagoon under management plan incorporating CC impacts	Conservation management plans do not take CC impacts into consideration unsustainable land use practices in the buffer zone prevail	Technical studies supporting a conservation management plans prepared for the Alvarado Lagoon and its buffer zone	Conservation management plan prepared, socialized and submitted to deciding authorities	Conservation management plan considered for adoption by deciding authorities			Updated conservation management plans for wetlands; Semiannual reports	supervision, annual review	INE with local coordi-nator
Site 2. Papaloapan Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha	no buffer zone around lagoon	buffer zone identified and designed;	10% of the buffer zone engaged	25% of the buffer zone engaged	40% of the buffer zone under recommende d practice	50% of the buffer zone under recommended practices	Buffer zone plans; semiannual reports	supervision, annual review, ALOS images	INE with local coordi-nator
Site 2. Papaloapan Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise	Surveys indicate active erosion along coastal bar	Coastal stabilization options identified	Technical design of coastal bar stabilization concluded.	Works for the stabilization barrier initiated	Stabilization barrier finalized	Cost and benefits of stabilization barrier assessed	Design of barrier; Semiannual reports	Supervision , annual review flood control monitoring	INE with local coordi-nator
Site 3 Tabasco	fragmentati	Corridors	Financial	2000 ha under	4,000 ha	5000 ha	Semiannual	Annual	INE with

Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors	on between protected areas	designed taking into consideration CC scenarios and migration routes	instruments and procedures to promote reforestation along biological corridors defined	contract for conservation reforestation with native species;	under contract for conservation reforestation with native species	under contract for conservation reforestation with native species;	reports, reforestation plan	review, ALOS images, land cover and land use data, GIS	local coordi-nators
Site 3 Tabasco 4 km of Sandbars separating the coastal lagoons from the sea stabilized.	Sandbar in process of destabilizati on	Strengthening of sandbar designed	Procurement process for strengthening of sandbar initiated	Strengthening of sandbar under construction and erosion monitored	Sandbar stabilization finalized and erosion parameters monitored	Performance evaluation of activities to strengthen sandbar conducted and recommendat ions shared among participating agencies and stake-holders.	Design of strengthening measures; erosion monitoring reports, Lagoon salinity level monitoring reports, Semiannual reports	Supervision , annual review, ALOS	INE with local coordi-nator
Site 4. Siam Ka'an Protected area monitoring system strengthened including climate change parameters	Monitoring of wetland does not include CC data.	CC data identified and collection program and protocols defined.	CC data part of monitoring program of wetland				Monitoring plan with CC data; Semiannual project reports	supervision, annual review; climate models	INE with local coordinato r
Site 4. Siam Ka'an Land use plans including climate change considerations developed for buffer area	Neighboring communities do not have land use plans;	Data and information for land use plans updated;	Update of land use plans through participatory processes;	At least on land use plan under consideration by deciding authorities;			updated land use plans, Semiannual project reports	supervision, annual review	INE with local coordinato r
Site 4. Siam Ka'an	Repopulatio	Design of	Nursery sites	Coral	up to 10,000		repopulation	supervision,	INE with

An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.	n not included in coral reef conservatio n programs.	repopulation plan and selection of adequate native species and nursery sites	developed	repopulation pilot initiated	m2 of reef under repopulation and monitored		plans; semiannual progress reports	annual review	local coordinato r
Component 3: Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options.									
Climate change impact scenarios developed for selected basins and for coastal wetlands Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options	National policies do not yet incorporate cc impacts on water availability.	Scenarios of CC impacts on national water resources developed	Response options designed	Supporting studies at one emblematic basin concluded.	At least one national water resources management response option identified that considers CC impact scenarios		Annual report, Studies, CC data on national and priority watershed level	List of viable policy options	IMTA/CO NAGUA

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, Responses to Comments from the Convention Secretariat made at PIF)

Recommendations received	World Bank response
7. Is the project design sound, its framework consistent sufficiently clear? Secretariat Comment at PIF/Work Program Inclusion: (…) The coherence between the individual pilot interventions and the overall project objective, however, should be clarified by CEO there are three different outcomes envisioned from the project: 1. Reduced vulnerability of the water supply for domestic and agricultural purposes in the coastal region, 2. Protection of coastal habitats for economically important species, and 3. Protection of vulnerable ecosystems (storm buffer zone and tourism). While these are not mutually exclusive goals, it is not, in the current proposal, clear how these fairly different outcomes will be integrated into one coherent project. It is essential that all pilot interventions work toward the same overall objective, and that it does not become '3 projects under one'.	The project objective has been tightened and is to promote adaptation to the consequences of climate impacts in the coastal wetlands of the Gulf of Mexico, through the implementation of pilots that would provide information on the costs and benefits of alternative approaches to reduce their vulnerability. Thus, the identified pilots seek to reduce the vulnerability of the selected wetlands by strengthening the conservation status of the wetlands and of their buffer zones through land use planning and zoning plans that integrate conservation and climate change considerations, as well as through reforestation and restoration measures. The supported strengthening of barriers will protect the wetlands and their hydrological balance as well as urban areas from sea level rise and intensified extreme weather events. The coordination with Conagua activities in the area of influence of the pilot sites will help control and improve the quality and quantity of water flows to the lagoons. All the considered measures work towards reducing the vulnerability of one lagoon in of each pilot site focusing on increasing their resilience.
Secretariat comment at CEO Endorsement (FSP)/ Approval (MSP) - May 14, 2009: (…) However, please address the following issues in the Project Framework: 1) Project Objective. The presented project objective in the framework is effectively a project summary. It should be a short statement of the objective. The summary of the project can be put in the Item A of the Part II (Project Justification) of the CEO endorsement request. The same comment is applied to the Annex A (Project Results Framework).	The description of the project objective has been shortened in the framework as well as in the Annex A. The project summary has been added to Item A of Part II.
2) Expected Outcome for the Component 1 The second paragraph of this cell "At least 6 pilot interventions ready for implementation Coastal wetland monitoring system Sustainability strategy for pilot adaptation measures" is not a complete sentence and is hard to understand. Please revisit.	The expected outcomes for component 1 have been edited in order to be better understandable.
Additionally, in the framwork of the Annex A, Intermidiate Outcomes are not really the outcome statements, but are the names of each component. They need to be revised.	The intermediate outcomes in Annex A have been revised and reflect now the expected outcome of the specific component.
May 27, 2009 The above issues have been addressed. However, there are still issues in the Project Result Framework in Annex A (and the Table A in the CEO endorsement request) as summarized below. Please address them as appropriate: Project Outcome Indicators: It woud appear that the four Project Outcome indicators are the same as the Expected Outputs for the Component 2 in the Table A. In other words, there are no indicators related to the Component 1 and 3. Thus, with these indicators, the project objective can be regarded as achieved only if the project accomplishes the Component 2, irrespective of the other two components. Given its budget allocation (nearly 80%), it is understandable that the Project Outcome indicators are mainly related with the Component 2. However, the Program Objective should be the effects of the achievement of all the three Expected Outcomes. Therefore, the indicators should reflect the elements of other two components as well.	The table includes now outcome indicators for components 1 and 3.

In addition, please also review and make sure the consistency between the Project Results Framework and the table of Arrangements for results monitoring. For example, the Project Outcome Indicators of these two tables are not consistent. Intermediate Outcome Indicators for the Component 2: In relation to the issue above, please also consider the consistency between the Intermediate Outcome Indicators for the Component 2 in the Annex A and Expected Outputs for the Component 2 in the Table A. Intermediate Outcome Indicators for the Component 3: Comparing with the Expected Outputs in the Table A and the IO indicators in the table of Arrangements for results monitoring, the IO Indicators for the Component 3 in the Project Results Framework in Annex A seems to lack the second indicator: "Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options." Please ensure the consistency between the three tables; otherwise please provide a justification for inconsistency.	This has been corrected accordingly. This has been corrected accordingly.
9. Is the project consistent and properly coordinated with other related initiatives in the country Secretariat Comment at PIF/Work Program Inclusion: Yes. The PIF identifies a comprehensive list of region and sector related World Bank projects in Mexico, as well as other Bank implemented adaptation projects in the LAC region. The list is satisfactory for the current stage of project development, but would have to be expanded by CEO endorsement to include relevant national and nonbank development activities as well as a description of coordination arrangements with such activities.	The project document includes the description of the coordination with relevant bank projects, with programs on a state level (state CC action plans), and on a federal level (PECC), with CONAGUA and PEMEX programs in the pilot site area.
12. Is the project structure sufficiently close to what was presented at PIF? Secretariat comment at CEO Endorsement (FSP)/ Approval (MSP) - May 14, 2009: As mentioned in the item 7 above, the WB has narrowed down the project scope to reducing vulnerability of wetlands of the Gulf of Mexico. This revision has clarified the coherence between the pilot interventions and the project objective. However, the CEO endorsement request and the project document do not fully justify the reason for reducing the number of pilot sites from eitht at the PIF stage to four. While it is understandable that the "WB management" has recommended for doing so in order to achieve a higher impact in each site, such a change should be justified with cost imlications of planned activities for the four pilot sites (inc. co-financing). This is particularly necessary as the project has narrowed down the types of adaptation measures from the PIF stage that will be piloted.	The CEO endorsement request includes now an explanation for reducing the number of pilot sites. Basically, the inclusion of fewer pilot sites reduces significantly the transaction cost involved in managing pilot activities that are geographically dispersed and doubles the resources available for specific implementation and learning purposes. With eight sites these resources would have been insufficient to yield a significant impact and the costs of coordination and logistics would have doubled. The final pilot sites cover geographically well the Gulf of Mexico and represent sites with high vulnerabilities to climate change, important anthropogenic impacts, and a rich natural capital. The request includes now also an indication of the available resources for adaptation pilots at each site. WB Management's recommendation refers to the component on assessing the impacts of CC on water resources planning (now component 3). See Answer to question No. 19 below.
14. Is the value -added of GEF involvement in the project clearly demonstrated through additional cost reasoning? Secretariat Comment at PIF/Work Program Inclusion: Yes. The additional cost reasoning is straightforward as it states that the adaptation interventions to be integrated into development activities in the water sector would not be	The GEF resources would primarily go to the implementation of specific adaptation measures and therefore there is no risk of overlapping. The National Communication does not have resources to invest in adaptation measures. The efforts are complementary. The project's focus on coastal wetlands has been selected based on

implemented in the absence of this project. Furthermore, with current levels of co-financing the project would clearly qualify under the sliding scale of the SCCF for projects between $1M and $5M. However, it is not clear, in the current proposal, how component 2 is coordinated with work and studies conducted as part of the national communications. There seem to be significant risk of overlapping activities. By CEO endorsement there should be a clear additional cost argument for the individual activities proposed under component 2, with special reference to the preparation of national communications.	the assessments made through the national communications. The project is thus addressing an area that has been identified as particularly vulnerable to climate change in the national communications. The selection process benefited from the analysis and data supported under the national communication. Most of the project resources will be invested in pilot interventions and not in studies. Component 2 will support the specific design of these interventions and monitoring arrangements for the project activities and the wetlands. The last national communication specifically mentions the project (Third National Communication, pp 110) and the GEF support provided to it.
19. Are the confirmed co-financing amounts adequate for each project component? Secretariat comment at CEO Endorsement (FSP)/ Approval (MSP) - May 14, 2009: Each component has adequate co-financing amount. However, the document do not fully describe the reason why the co-financing of policy-related component has reduced from $3.6 million (Component 1) to $0.6 million (Component 3) nor justify if this amount is sufficient. Please clarify.	The CEO endorsement request includes an explanation on the reduction in co-financing. The component on assessing the CC impacts on water resources planning reflects a recommendation made by Bank management during the appraisal process to reduce the scope and ambitions of then component one (now component three). Given the limited GEF resources available to the project, the nature of the counterpart agencies and the complexity of the policy making process in Mexico, a more conservative goal was recommended by the Bank management. The revised goal is considered achievable. The reduced scope requires less of counterpart financing and this is now more focused on an assessment of the climate change impacts on water resources and basins that are related to the pilot wetland sites.
Additional comments provided by reviewer by mail on the 19th of May, 2009: **1) Inconsistency between Expected Outcomes and Intermediate Outcomes (Annex A)** My understanding is that Intermediate Outcomes (IOs) in the Annex A are equivalent with Expected Outcomes of the Table A. Given that the Table A is the official result framework, please make sure that all the EOs are reflected in the Annex A. For instance, if there are multiple EOs for the component 1, each of them should be reflected in the table of Annex A, including the table of Arrangements for results monitoring. (Note: My understanding is that the Intermediate Outcomes are the terminology of the World Bank.) **2) The Expected Outcomes for Component 1** As I indicated above, please make sure that the EOs for the Component 1 is reflected in the Annex A, or vice versa. Given that you have already clear IO indicators in the table of Arrangements for results monitoring, it makes more sense to me to use the statement of the IO in the Table A too, rather than four detailed outcomes (These four are effectively outputs level). In the meantime, please also consider a causal relationship between the Expected Outcomes and Expected Outputs. Given that the GEF result based management follows the glossary terms of OECD-DAC, Expected Outcomes can be defined as *the likely or achieved short-term and medium-term effects of the Expected Outputs.* Currently, the IO and the Expected Output for the Component 1 are essentially the same.	ad 1) Intermediate Outcomes in Annex A and expected outcomes in Table A are now the same. ad 2) This has been revised now for component 1 in Annex A. The causal relationship between expected outcomes and outputs has been strengthened.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT

Position / Titles	*$/ person week**	*Estimated person weeks***	*Tasks to be performed*
For Project Management			
Local			
Project coordinator, adaptation specialist	1000	250	General management, coordination and strategic planning
Technical Assistant	750	250	Supervise and coordinate project technical activities
Procurement specialist	725	125	Supervise consistency with procurement rules overall program, coordinate bidding process
Project Accountant	725	125	Manage financial flows/project financial statements/status
External consultants	725	50	Local experts will carry out sporadic specific supervision tasks during the implementation of adaptation pilots
Administrative assistant	600	50	Administrative support to the regional coordinator
Total person weeks for local consultants		**850**	
International			
Total person weeks for international consultants			
Total person weeks		**850**	
Justification for Travel, if any: USD 0.31. Travel will be required to ensure coordination between pilot sites and implementing agency			
For Technical Assistance			
Local			
Technical coordinator, Panuco	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Technical coordinator,	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Technical coordinator, Carmen Pajonal	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Technical Coordinator, Punta Allen	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Wetland specialist	1000	250	Technical support of adaptation pilots in wetlands
Water resources specialist	1000	250	Technical support of related water resources management activities
Climate change and adaptation specialist	1000	250	Technical support of integration of CC aspects into local land use plans and wetland management plans
Climate model specialist	1000	250	Technical support of climate change projections
Justification for Travel, if any:			

* Provide dollar rate per person weeks or months as applicable; ** Total person weeks/months needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

DESCRIPTION OF PROPOSED PDF ACTIVITIES (see D1 Financing Plan)

The PDF B activities have achieved the objective to obtain necessary information required for project preparation, including a detailed assessment of the investment and technical assistance needed under each component of the project. The main outcome is the project design which also complies with all the requirements of the World Bank and GEF. The following specific outcomes have been achieved and become the basis for the Project Document:

- define relevant characteristics of the pilot sites
- selection of criteria to determine sites
- identification of potential sites
- definition of threats due to climate change
- definition of adaptation measures and identification of appropriate measures for each site

The studies also included a socio-economic analysis of the sites, the analysis of anthropogenic impacts in the sites resulting in defining the baseline for land use changes and water use, and the diagnosis of their bio-physical and ecological conditions. Once the pilot sites were defined, their specific vulnerability to GCC associated threats was analyzed, including identification of vulnerable populations, reasons for vulnerability, degree of vulnerability, suggested adaptation measures to the identified vulnerability and elements that should be considered; in parallel a set of measures were defined to respond to the general threats and, finally, a list of possible measures for the eight specific sites were defined. During the Veracruz workshop, priority criteria were applied to the set of adaptation measures, which yielded three categories of measures: preparation, institutional strengthening and implementation measures. These categories were considered for the definition of the work-plan or chronogram.

The following describes the achievements from each PDF B activity:

PDF-B Project Components

<u>Activity I:</u> Institutional arrangements and assessment of management needs

The objective was to reach close coordination with local environmental authorities and communities in the pilot adaptation components, and with CONAGUA on the water policy component. This objective has been achieved. Furthermore, the local implementing agency in each site (with exception of Punta Allen with Conanp) is the local environmental authority itself which will coordinate the project activities in coordination with local communities. Local agencies have confirmed their commitment to the project. With regard to CONAGUA, the project will be coordinated with CONAGUA'S specific activities in the project sites as well as with the national policy level. INE will be in charge of the overall technical coordination.

<u>Activity II:</u> Technical Studies

The objective of this activity was to support technical studies that would provide the information needed to identify specific adaptation measures for immediate implementation. The supported technical studies helped to identify adequate project sites based on their vulnerability to climate change impacts, their ecological value, the degree of anthropogenic impacts, their economic and social importance. Furthermore, the assessments conducted under this activity helped identify priority adaptation measures for each site that were consulted locally and agreed upon. Climate scenarios for the pilot sites were developed.

<u>Activity III:</u> Stakeholder analysis and identification of sources of co-financing.

A stakeholder analysis has been undertaken under this activity to identify beneficiaries, partners and other potential stakeholders at the proposed project sites. Partners and interested agencies and institutions for the

co-financing of the specific adaptation activities as well as for the studies supported were identified. Confirmed partners include: MRI, JAXA, NAWCA, CONAGUA, PEMEX, local governments.

Activity IV: Consultations
A consultation process has been undertaken at the four project sites. At each site, meetings and forums were held with local authorities (municipalities, state environmental authorities), communities' grass-root organizations such as fishermen cooperatives, farmer cooperatives, and local and regional NGOs and university development institutions as well as the participating institutions (SEMARNAT, CONAMP, CONAFOR and CONABIO). A list of participants at each site has been filed in the project files. The consultation process has resulted in a confirmation of the measures that will be undertaken at each site.

Activities V: Preparation of Cost Estimates and Financing plan
Cost estimates for project implementation were prepared. By effectiveness a detailed procurement plan will be developed.

Activities VI : Formulation of Project Proposal
Beside the preparation of a detailed project proposal, INE is about to publish a book of 800 pages that assembles all the studies supported under the PDF B and that is expected to guide policy makers on wetland conservation. All the studies and assessments supported under the PDF B have been conducted for a total of eight pilot sites out of which four have been selected for the pilot interventions.

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY.

The PDF B phase provided the project with an opportunity to explore and assess the climate change scenarios and the pre-feasibility of adaptation measures for the selected sites. This has allowed the project to narrow down options. The project design has been not been changed, rather has been refined.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*SCCF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To-date*	*Amount Committed*	*Uncommitted Amount**	
Project coordination	completed	$ 40,000	$ 40,000			$ 10000
Assessment adaptation measures	completed	$ 36,000	$ 36,000			$ 10000
Socioeconomic assessment	completed	$ 23,000	$ 23,000			$ 10000
Project log-frame	completed	$ 23,000	$ 23,000			$ 10000
Bio-physical diagnosis	completed	$ 46,000	$ 46,000			$ 10000
Climate change scenarios	completed	$ 27,000	$ 27,000			$ 10000
Anthropogenic impacts – land use change	completed	$ 18,000	$ 18,000			$ 10000
Institutional analysis	completed	$ 32,000	$ 32,000			$ 10000
Anthropogenic impacts – Water use	completed	$ 23,000	$ 23,000			$ 10000
Project lawyer	completed	$ 7,000	$ 7,000			
Project administration	completed	$ 7,000	$ 7,000			
Safeguard analysis	completed	$ 15,000	$ 15,000			$ 5000

Dissemination activities	completed	$ 3,000	$ 3,000			$ 5000
Total		$ 300,000	$ 300,000	0	0	$ 100,000

* Uncommitted amount should be returned to the SCCF Trust Fund. Please indicate expected date of refund transaction to Trustee.

REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project
THE SPECIAL CLIMATE CHANGE FUND (SCCF)[1]

Submission Date: April 29, 2009
Resubmission Date: June 18, 2009

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 3159
GEF AGENCY PROJECT ID: P100438
COUNTRY(IES): Mexico
PROJECT TITLE: ADAPTATION TO CLIMATE CHANGE IMPACTS ON THE COASTAL WETLANDS IN THE GULF OF MEXICO
GEF AGENCY(IES): WORLD BANK
OTHER EXECUTING PARTNER(S): SEMARNAT (THROUGH THE INSTITUTO NACIONAL DE ECOLOGIA (INE)), INSTITUTO MEXICANO DE TECNOLOGIA DEL AGUA (IMTA)
GEF FOCAL AREA: Climate Change

Expected Calendar (mm/dd/yy)	
Milestones	**Dates**
Work Program (for FSP)	March 2008
Agency Approval Date	July 2009
Implementation Start	August 2009
Mid-term Review (if planned)	January 2012
Project Closing Date	July 2014

A. PROJECT FRAMEWORK

Project Objective: The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability, assessing also the overall impacts of climate change on national water resource planning, with a focus on coastal wetlands and associated watersheds.

Project Components	**Indicate whether Investment, TA, or STA**[b]	**Expected Outcomes**	**Expected Outputs**	**SCCF Financing**[a]		**Co-financing**[a]		**Total ($)** c = a+b
				($) a	%	($) b	%	
1. Design of key selected adaptation measures	STA	Experience gained in incorporating climate change in developing wetland management plans and designing interventions to increase resilience	At least 6 pilot adaptation measures with sound technical design documents including analysis of financial, economic, social and environmental aspects ready for implementation	0.5	17%	2.5	83%	3.0
		Wetland monitoring capabilities strengthened as input to improved management of sensitive and vulnerable ecosystems	Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[2] satellite)					

[1] This template is for the use of SCCF Adaptation projects only. For other SCCF projects under Technology Transfer, Sectors and Economic Diversification windows, other templates will be provided.

[2] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

		Facilitate the development of long term management and monitoring of selected ecosystems	Technical report on sustainability strategy for pilot adaptation measures					
2. Implementation of pilot adaptation measures in highly vulnerable wetlands	Investment/STA	Increased knowledge of cost and benefits of adaptation in coastal wetlands in Mexico Increased ability to mainstream climate change considerations in land use plans Increased competence to incorporate wetlands protection in municipal land use plans	**Panuco:** 10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities **Papaloapan:** Alvarado Lagoon under management plan incorporating CC impacts Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise **Tabasco:** Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors 4 km of Sandbars separating the coastal lagoons from the sea stabilized. **Siam Ka'an:** Protected area	3.5	19%	15.0	71%	18.5

			monitoring system strengthened including climate change parameters Land use plans including climate change considerations developed for buffer area An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.					
3. Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options.	STA	Support the strengthening of the knowledge base required to mainstream climate change in water resources management and planning	Climate change impact scenarios developed for selected basins and for coastal wetlands Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options	0.4	40%	0.6	60%	1.0
4. Project management				0.1	10%	0.9	90%	1.0
Total project costs				4.5		19.0		23.5

[a] List the $ by project components. The percentage is the share of SCCF and Co-financing respectively to the total amount for the component.

[b] TA = Technical Assistance; STA = Scientific & Technical Analysis

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT (expand the table line items as necessary)

Name of Co-financier (source)	***Classification***	***Type***	***Project***	***%****
Meteorological Research Institute of Japan (MRI)	Government Agency	Grant	1	5%
Japanese Space Agency	Government Agency	Grant	0.3	2%
Climate Change Implementation Grant from the PHRD (Japanese government)	Bilateral Agency	Grant	0.5	3%
Local governments	Local Governments	In kind	1.8	9%
NAWCA	Government Agency	Grant	0.7	4%
CONAGUA	Government Agency	In kind	12.4	65%
PEMEX	Government Agency	In kind	0.8	4%

SEMARNAT/INE	Government Agency	In kind	1	5%
IMTA	Government Agency	In kind	0.5	3%
Total Co-financing			19.00	100%

* Percentage of each co-financier's contribution at CEO endorsement to total co-financing.

C. CONFIRMED FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Project Preparation Amount (a)	Project (b)	Total C = a + b	Agency Fee	For comparison: SCCF Grant and Co-financing at PIF
SCCF Grant	300,000	4,500,000	4,800,000	480,000	5,280,000
Co-financing		19,000,000	19,000,000		19,000,000
Total	300,000	23,500,000	23,800,000	480,000	24,280,000

D. FOR MULTI AGENCIES/COUNTRIES (IN $)[1]

GEF Agency	Country Name	(in $)		
		Project (a)	Agency Fee (b)[2]	Total (c) c=a+b
(select)				
(select)				
(select)				
(select)				
(select)				
(select)				
Total SCCF Resources		0	0	0

1 No need to provide information for this table if it is a single country and/or single GEF Agency project.

2 Relates to the project and any previous project preparation funding that have been provided and for which no Agency fee has been requested from Trustee.

E. PROJECT MANAGEMENT BUDGET/COST

Cost Items	*Total Estimated person weeks/months*	*SCCF ($)*	*Co-financing ($)*	*Project total ($)*
*Local consultants**	850	0.08	0.5	**0.58**
*International consultants**				
*Office facilities, equipment, vehicles and communications**		0.01	**0.1**	0.11
*Travel**		0.01	**0.3**	0.31
Total	850	0.1	**0.9**	**1.0**

* Details to be provided in Annex C.

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	*Estimated person weeks*	*SCCF($)*	*Co-financing ($)*	*Project total ($)*
*Local consultants**	2000	900,000	1,100,000	2,000,000
*International consultants**				
Total	2000	900,000	1,100,000	2,000,000

* Details to be provided in Annex C.

The numbers provided in the previous table are best estimates as real *person-weeks* can only be known after the bidding processes are completed. All bidding processes will follow the Bank's procurement guidelines. Also, it is expected that some of the consultancies will be awarded to firms. The previous table considers only technical assistance components, including those not co-financed by GEF-SCCF.

G. DESCRIBE THE BUDGETED M&E PLAN: The results framework and arrangements for monitoring are described in Annex 3 of the Project Document (PD).

Arrangements for results monitoring

Institutional issues:
INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist. Monitoring and evaluation of project outcomes/results (both intermediate and end-of-project) will be coordinated by the project staff in the GPS. The project manager will be responsible for monitoring project performance with the assistance of the regional institutions.

The project will be guided by semiannual learning reviews of project results to coincide with Bank supervision missions on which basis the GPS and the Bank will identify specific measures to: (i) address any areas of implementation weakness, and (ii) adapt project design to ensure that objectives are met. These measures for improvement will be reflected in GPS's semiannual learning reports and its proposal for the forthcoming year's Annual Implementation Plan including project budget.

INE-SEMARNAT will monitor financial and procurement management for the project. Financial information on inputs, outputs, budgeting, treasury, accounting, and audits will be monitored. The latter activity will be performed by an externally hired consultant. The project will send to the Bank quarterly financial management and procurement reports. Monitoring and processing of procurement for services, goods, works, and subprojects will be carried out by INE-SEMARNAT's project staff. The annual planning processes will be monitored with specific indicators on planning performance defined in the Results Framework. The project's physical implementation will be monitored based on the specific outputs and monitoring indicators for project components as defined in the Results Framework. Information from the monitoring system will be analyzed by project management and disseminated according to the project's communication strategy to appropriate stakeholders. The project will provide the Bank with quarterly progress reports and an update on legal covenants compliance every six months.

The monitoring and evaluation process will function as a mechanism for assessing project impacts and as a day-to-day management tool. A baseline study will be carried out at inception, and follow-up evaluations at both midterm and project closing. Site-specific baseline studies, as required will be complemented before work begins in the pilot areas; baseline studies will be shared with local NGOs and other national institutions. Specific project implementation monitoring data will be provided in agreed-upon report formats, included in the operational manual, and will be required for the twice-yearly supervision missions. INE, with the help of the Steering Committee, will develop the project monitoring system that will record planning, physical implementation, performance of local technical assistance and development objective indicators from the project's Results Framework.

Data collection
Project activities will be reported to the GPS. INE-SEMARNAT will be responsible for compiling data and reporting to the World Bank.

Semiannual evaluations
Semiannual discussions are planned to coincide with supervision missions to identify and discuss lessons learned during project implementation with project stakeholders and beneficiaries. Project staff will submit semiannual reports on lessons learned and plans for incorporating those lessons into future activities.

Midterm Evaluation
The Bank's supervision team, together with a team of external reviewers and key stakeholders, will conduct a midterm evaluation of project execution. It will be conducted no later than three years after the first disbursement. The external review will focus on: (i) progress in achieving project outcomes, (ii) institutional arrangements for project implementation, (iii) operational manual for payments, (iv) review of both the project implementation plan and general project operational manual. In preparation for the midterm review (MTR), the Steering Committee, together with the local implementing agencies, will prepare a working book containing the following information: (i) executive summary of the overall project status, (ii) up-to-date description of the overall components' development and indicators; and (iii) detailed description of the status of the proposed adaptation pilots by catchments.

Final Evaluation
A final evaluation will be conducted in the last semester of project execution. The key objectives of the final evaluation will be to: (i) assess attainment of the project's expected results, (ii) use the results to design a strategy for replication in future projects, and (iii) design a strategy for mainstreaming future adaptation activities in the participating countries.

PART II: PROJECT JUSTIFICATION

Please see Project Document (PD)

A. DESCRIBE THE PROJECT RATIONALE AND THE EXPECTED MEASURABLE ADAPTATION BENEFITS:

Mexico is particularly vulnerable to the impacts of global climate change (National Communications, NC1/NC2/NC3 to the UNFCCC, IPCC 2007; PECC, 2009), many of which may be irreversible. Mexico's NCs have assessed vulnerabilities to climate change focusing on areas and sectors seen as particularly fragile to climate impacts. These include water resources, drought and desertification, and coastal zones, in particular the wetlands in the Gulf of Mexico. At a national scale, Mexico is already confronting serious water management challenges and facing a threat of droughts. Despite significant progress by the government in addressing these challenges, current water sector planning and investments do not explicitly include consideration of climate impacts. Data published on projected hydro-climatic changes, as part of IPCC assessments[3], indicate that Mexico may experience significant decreases in runoff on the order of minus 10 to 20% nationally, and up to 40% in Gulf Coast wetlands, as a result of global climate change (NC3, pp XXIX, 2007). At a regional scale, the ecosystems to be most affected by climate change impacts are the coastal wetlands in the Gulf of Mexico. Mexico's NCs have identified the wetlands in the Gulf as an immediate priority for adaptation. Mexico has several regulatory tools that protect wetlands, in particular mangroves. However, Mexico faces challenges in effectively implementing such conservation tools. The gains in regulating coastal wetland protection are compromised by weak enforcement, poor coordination between national, state and local actions, the lack of supporting regulations and land use planning at some locations, and other emerging challenges such as climate change impacts. It is important, therefore, to design measures that will initiate and inform the

[3] P. C. D. Milly1, K. A. Dunne1 & A. V. Vecchia. Global pattern of trends in streamflow and water availability in a changing climate. Nature: November 17, 2005 pp

process of adaptation in order to protect the environmental and economic services (i.e. water supply, fisheries, agriculture) of the Gulf of Mexico wetlands while simultaneously addressing key drivers that adversely impact their sustainability.

The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability. The project also seeks to assess the overall impacts of climate change on national water resource planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds. The experience from the project pilots is intended to inform the government's future adaptation strategy and development programs in the Gulf region**.**

Expected adaptation benefits include: (i) Reduction of ecosystem vulnerability to climate impacts; (ii) Reduction of unsustainable land use changes; (iii) Protection of resource base of local economic activities such as fisheries, tourism; (iv) Habitat for migratory species strengthened; (v) Decreased erosion; (vi) Reduced flooding; (vii) Maintenance of environmental services of wetlands; (viii) Protection of urban areas; (ix) Benefits for other coral dependent species; (x) Strengthened buffer function.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL/REGIONAL PRIORITIES/PLANS:

The project is part of Mexico's strategy to cope with the consequences of climate change. The National Communications to the UNFCCC identify the project as a measure to address a region very vulnerable to the impacts of global climate change. The project constitutes an important element of the national adaptation strategy. The project, along with the identification of pilot sites and measures, is incorporated into the PECC, under the National Strategy on Climate Change. At a regional level, INE together with the University of Veracruz, Universidad Nacional Autonoma de Mexico (UNAM), and the Ecological Institute of Veracruz are currently developing a Climate Change Action Plan for the State of Veracruz, with funding from the British embassy (Strategic Programme Fund). Similar plans are envisioned for the states of Tamaulipas, Tabasco and Quintana Roo. These states plan to include in their adaptation strategies the lessons learned in the preparation of the proposed project. Mexico ratified the UN Framework Convention on Climate Change (UNFCCC) on March 11, 1993. Mexico's Congress ratified the Kyoto Protocol (April 2000) by unanimous consent. It has already submitted its Third National Communication (2007) and is preparing to submit its fourth by the end of 2009. Mexico has also launched an effort to strengthen its institutional capacity through the development of a Climate Change Office (CCO). The CCO has been supported through an IDF (Institutional Development Fund) grant. Mexico signed the Ramsar treaty on conservation of wetlands in 1986, recognizing the need to preserve its wetland ecosystems. It also ratified the Convention on Biological Diversity in 1993. In 2005, the National Committee on High-priority Wetlands was created in CONANP to produce guidelines and recommendations for their management. Municipalities have a great potential to influence the management of wetlands in Mexico. According to the Mexican Constitution (art. 115) municipalities have exclusive competence for land use planning.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH SCCF ELIGIBILITY CRITERIA AND PRIORITIES:

The ninth session of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) in December 2003 provided guidance to the GEF for the operation of the Special Climate Change Fund (SCCF). In particular, the guidance provides that the fund should give priority to supporting activities related to adaptation. The guidance identifies activities in priority adaptation areas, such as water resources management, fragile ecosystems and integrated coastal zone management. The

project will also support the GEF Operational Programs 12 (Integrated Approach to Ecosystem Management) and 15 (Sustainable Land Management) by promoting adaptation measures in the coastal region of the Gulf of Mexico.

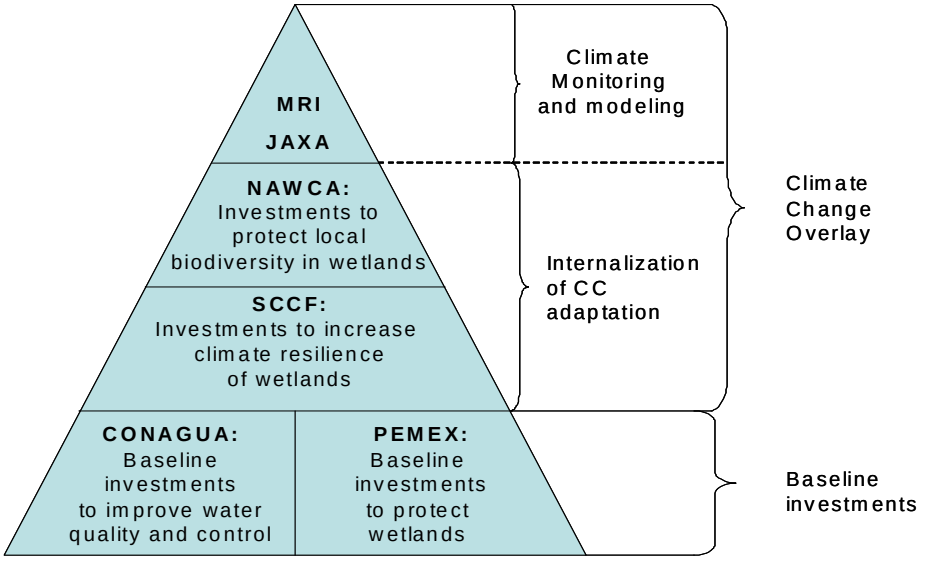
D. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

Linkage with other projects, supported by the WB or the GEF. The proposed project will be implemented in coordination with Colombia's Integrated National Adaptation Program (INAP) and Caribbean Implementation of Adaptation Measures in Coastal Zones (SPACC) projects, and the Trinidad and Tobago: Restoration of the Nariva Wetland Project (P093012) which deal with similar issues in coastal areas. The project will also benefit from results and recommendations from the GEF Consolidation of the Protected Areas System Project and the Mexico Mesoamerican Biological Corridor Project. The Bank is also providing technical assistance to the National Water Commission (CONAGUA) on the implementation of its Flagship Local interventions in the Water Sector Program (*Proyectos Emblemáticos*), which aims to promote integrated management of water resources in local areas. The project will link and provide support to CONAGUA in coordination with the Bank's current technical assistance program. Finally, the project complements and consolidates the Environmental and Climate Change DPLs in that it adds the dimension of adaptation. The Government has indicated that adaptation in the Gulf of Mexico will inform the evolving national adaptation strategy as reflected in the Special Program on Climate Change (PECC) program currently under consultation.

E. DESCRIBE ADDITIONAL COST REASONING:

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 North American Wetland Conservation Commission (NAWCA) funding add a climate overlay and influence the type of interventions made with counterpart funding. The modeling and monitoring efforts will be supported through the instruments already signed with Meteorological Research Institute (MRI) and the Japanese Space Agency (JAXA) (figure 3).

Figure 3. Funding structure of the project.



Without SCCF financing the integration of long term climate change adaptation considerations in wetland management strategies and policies would most likely not occur. SCCF is an integral part of the

overall funding strategy to address current and future local and global threats to the functioning of coastal wetlands.

F. **INDICATE THE RISK THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MITIGATION MEASURES:**

Risk	**Rtg**	**Mitigation**	**Residual Risk**
Local drivers for wetland destruction impede long term sustainability programs.	H	The actions foreseen under the project represent a harmonized approach to address local drivers as well as anticipated climate change impacts affecting the functioning of coastal ecosystems. A long-term sustainability strategy will be designed as a result of the project.	M
Lanholders may impede development of land management plans	M	Land management plans will seek support from local landholders who will be consulted during the design, adoption and implementation of land management plans..	M
Broad geographical focus will dilute the impact of the project activities	M	Selection of project areas has undergone a thorough selection process to maximize chances of success and efficient deployment of project resources by focusing on a few pilots in each site. Strong coordination between national and local authorities is key factor for success.	L
Measures identified under the project may not be implemented	M	The project is a priority for INE. It is part of the national CC strategy and the basis for a future adaptation strategy for the Gulf Coast. Federal and local authorities are committed to project implementation and the project will be used as a basis for a wider effort under the PECC.	L
Given the long-term nature of the challenges, there is a risk that future administrations may not support its goals.	H	Strong involvement of state administrations (which will support the implementation locally) and local communities (which will be actively involved in the implementation) will strengthen the long term project goals. Agreements between INE and the municipalities in the areas of project intervention will be entered into as a covenant in the legal agreement seeking long term support by municipalities and maximization of social benefits. No project funds will be managed by the municipalities.	M
Coordination of pilot activities will be complicated by involvement of national and local agencies.	M	Implementation arrangements consider one coordinating agency supported by local agencies. An overall project coordinator will ensure the continuous liaison between the federal and local level.	L
Pilots consider strengthening of conservation status and zoning tools which may be compromised by limited coordination between federal, state and local levels.	M	The project will work with agencies in charge of defining protected areas and land use plans and zoning: CONANP, SEMARNAT/INE and the municipalities. At the same time project activities provide opportunity to engage the local, state and federal levels in wetland conservation and to improve coordination.	M

G. **EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:**

Given the long-term nature of the proposed project with its focus on integrating climate change considerations into the management of vulnerable ecosystems, it is difficult to identify one meaningful quantitative outcome indicator that best reflects the outcome(s) of the project. For that reason a qualitative

approach was taken. During project formulation the project followed the approach recommended by GEF[4] for biodiversity projects and assessed various adaptation alternatives best suited to achieve the project's development objective. This process began with an extensive pilot site and measures selection effort.. After an initial list of pilot activities had been identified (as listed in the PIF) based on the specific vulnerabilities of each pilot site, the project team conducted public consultations and field visit at each site in order to agree on the final set of supported adaptation measures. This consultation process looked into the feasibility and the expected impacts of the selected measures, as well as into the available resources and ultimately into the potential of achieving the project objective. As a result of this process final adaptation pilots were agreed upon that would simultaneously address local and global threats to the functioning of coastal ecosystems and that would have positive implications for the various sectors that depend upon these ecosystems. This ecosystem approach enables tackling several issues and sectors at the same time and focusing on the resource base of economic activities. A functioning and strengthened ecosystem would be more resilient to climate change impacts and would likely continue to provide its environmental services thus benefiting fisheries, tourism, coastal protection, biodiversity, and water supply and quality. At the same time this approach allows the strong involvement of local stakeholders.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. PROJECT IMPLEMENTATION ARRANGEMENT:

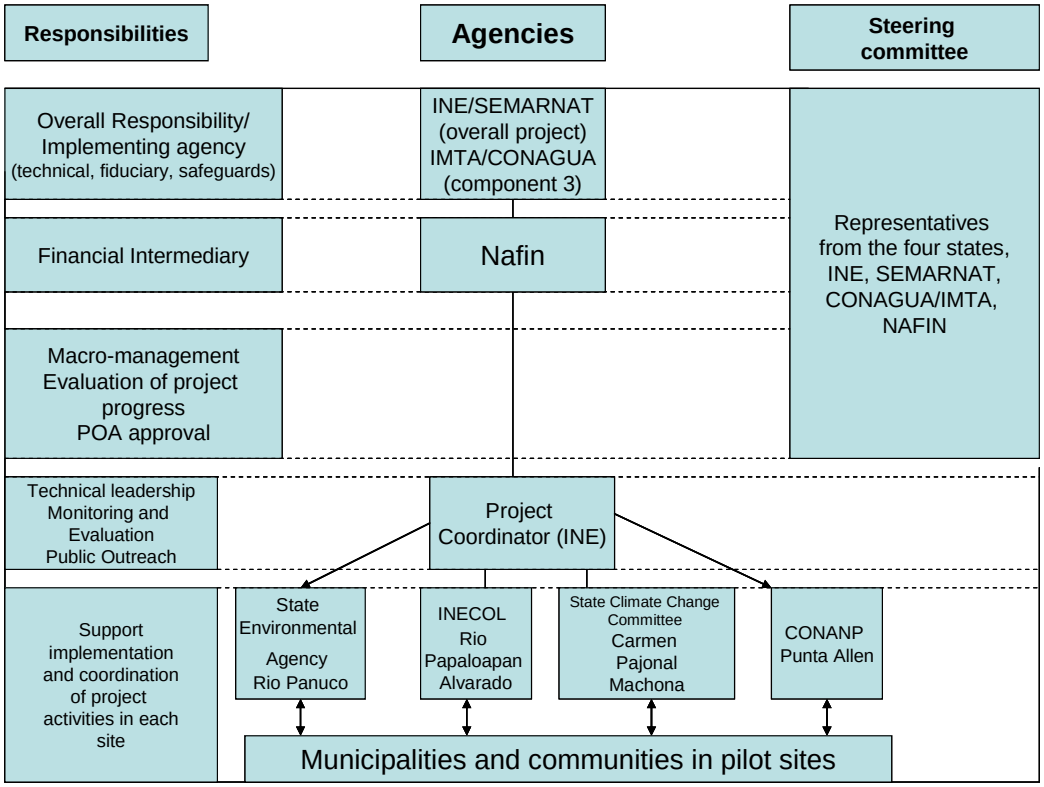
General implementation arrangements: INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist and will be in charge of all fiduciary responsibilities, including financial management, procurement of goods and services and the application of environmental and social safeguards.INE-SEMARNAT will manage the entirety of the project funds and no funds will be managed by municipalities. NAFIN will be the financial intermediary. The implementation of pilot activities will be supported and implemented through the participation of local agencies in each pilot site. Local agencies have confirmed their support to the project. INE with the support of CONAGUA/IMTA will implement the assessment of options to address climate issues in water resources planning. CONAGUA and IMTA have pledged technical and financial resources to the project activities. Oversight of the project will be responsibility of a steering committee.

Technical implementation arrangements:

Steering Committee. The main responsibility of the Steering Committee (involving representatives from the four participating states, INE, SEMARNAT, CONAGUA, and NAFIN) is to assure political and strategic support for the implementation of the selected adaptation pilots and the coordination with counterpart resources. The Steering Committee will also provide guidance on the implementation of the project and make high level recommendations regarding the project's development, technical difficulties and management issues. The Steering Committee will approve the Annual Operating Plans (AOP) of the project. Additionally, a Scientific Advisory Panel, appointed by INE will be convened regularly, to advise on project implementation. A **group of professional staff (GPS)** from SEMARNAT and INE will be responsible for project implementation including one general project coordinator in charge of the operational coordination of the project activities in each site. The GPS will prepare the POA[5] in consultation with the local agencies in each site, and be responsible for its execution as well as for the operational coordination of the project activities in each site. The GPS will ensure the financial, conceptual and methodological coherence among all activities and the integrity of the project. Specifically the GPS will provide technical leadership, monitoring and evaluation of project activities and public outreach.

[4] GEF/C.25/11; April 29, 2005: COST EFFECTIVENESS ANALYSIS IN GEF PROJECTS

[5] The AOP will include statement of specific objectives for the year, a description of the activities, expected outputs, monitoring indicators, detailed budgets, and a procurement plan, indicating the sources of financing in the budget.



PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The project's conceptual framework, general design, scope and objectives are consistent with the original project proposal submitted for GEF Pipeline entry and the Council Work Program approval.

Changes made since Work Program inclusion include:

The wording of the objective now emphasizes the main focus of the project on pilot interventions in wetlands towards which the majority of the financial resources continue to be designated. At PIF stage the objective was to reduce the vulnerability to the anticipated impacts from climate change on the country's water resources, with a primary focus on coastal wetlands and associated inland basins. The project still includes a component focusing on water resources management (component 3) and does so on two levels: On a physical level, co-financing arrangements with CONAGUA will help to coordinate their plans with project activities and to consider the results of the climate change assessments in their planning. On a more macro level the project has already started to work with IMTA on defining the scope of the assessment of climate change on water resources and on potential responses. Through a companion CCIG grant an assessment of the expected impacts of global climate change in the hydrologic response of Gulf of Mexico watersheds will be conducted.

The project reflects a recommendation made by Bank management during the appraisal process to reduce the scope and ambitions of then component one (now component three). Given the limited GEF resources available to the project, the nature of the counterpart agencies and the complexity of the policy making process in Mexico, a more conservative goal was recommended by the Bank management. The revised goal is considered achievable. The reduced scope requires less of counterpart financing and this is now more focused on an assessment of the climate change impacts on water resources and basins that are related to the pilot wetland sites.

However, discussions with CONAGUA demonstrated a strong interest to consider the projects' results in the planning process of their activities and as basis for future policy work. This expression of interest has been translated into counterpart contributions of approximately US$12 million to the project. As the project generates results the team will seek to reach a stronger level of consideration of climate change into water resources management planning.

Following GEF-SCCF guidance, most of the project resources are channeled into the implementation of specific adaptation measures (nearly 80%).

The project will be working now on four pilot sites instead of eight at PIF stage in order to use the limited grant resources in a more focused way so as to achieve a higher impact in each site. The reduction in the number of pilot sites will reduce significantly the transaction cost involved in managing pilot activities that are geographically dispersed and doubles the resources for specific implementation and learning purposes. The four final pilot sites were selected out of a list that was the result of an extensive pilot site selection process including the use of selection criteria such as: a) vulnerability to climate impacts; b) status of conservation; c) biological value; d) degree of anthropogenic intervention; e) local implementation capacity. The final pilot sites cover geographically well the Gulf of Mexico (including one site in the north, one in the center and 2 in the south of the Gulf of Mexico and the Caribbean) and represent sites with high vulnerabilities to climate change, important anthropogenic impacts, and a rich natural capital. The fourth site in Punta Allen has been selected for reference purposes since it is well conserved and managed.

The final pilot activities will focus now on strengthening the conservation status of coastal wetlands thereby increasing their resilience to climate change. At PIF stage the considered adaptation measures included several additional activities such as the installation of early warning systems, the expansion of civil protection systems, the improvement of drainage systems, the strengthening of coastal infrastructure, rainwater harvesting measures, and climate resilient agricultural activities. Some of these activities are still being supported under parallel initiatives. The SCCF resources assigned to the adaptation pilots range from approximately US$ 0.8 million for Panuco-Altamira, US$ 1.0 million for Alvarado, US$ 1.0 Carmen-Pajonal- Machona, and US$ 0.7 Punta Allen. With eight sites these resources would have been insufficient to yield a siginificant impact and the costs of coordination and logistics would have doubled.

The measures included in the PIF were identified based on an initial assessment of site-specific vulnerabilities to climate change and covered a broad range of sectors.

During completion of project formulation and appraisal, and through field visits and extensive consultation with local communities, with regional and local authorities, and other stakeholders (CONAGUA, IMTA), a much more comprehensive assessment was made which resulted in the selection of measures to be supported. This process resulted in the selection of the pilot measures that are most likely to achieve the project objective (promote climate resilience of wetlands and of associated inland basins). Thus, the original project objective is not affected. In fact the combination of land zoning, land use plans and physical investments to protect the wetlands are judged to be the most adequate and cost-effective mix to achieve the project objective.

The final measures were also selected taking into account the level of synergy in simultaneously addressing local challenges. We are satisfied that as a result of the appraisal and consultation process the final list of measures is the most adequate, given the level of resources, time available for project execution and nature of the challenges.

Most of the other measures originally included in the PIF and not included here are now covered under the state climate change plans (e.g. the Veracruz State CC plan includes climate resilient agricultural activities, early warning systems, improvement of coastal infrastructure; the plan has been submitted for public consultation by the Secretaría de Protección Civil) as well as under the co-financing of the project partners.

As an example of co-financing, NAWCA will cover rainwater harvesting measures. Also, the CCIG companion grant will fund a number of technical assistance activities that complement the GEF grant with generation of data on climate change impact scenarios of relevance for wetlands, inland basins, water resources and coastal areas. The data generated through the implementation of the CCIG-funded studies, will also be of relevance for revising building codes and for strengthening coastal infrastructure.

PART V: AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with SCCF policies and procedures and meets the SCCF criteria for project endorsement.

Agency Coordinator, Agency name	Signature	Date *(Month, day, year)*	Project Contact Person	Telephone	Email Address
Steve Gorman GEF Executive Coordinator The World Bank		April 29, 2009	Jocelyne Albert	(202) 473-3458	Jalbert@worldbank.org

ANNEX A: PROJECT RESULTS FRAMEWORK

PDO	Project Outcome Indicators	Use of Project Outcome Information
The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability, assessing also the overall impacts of climate change on national water resource planning, with a focus on coastal wetlands and associated watersheds.	• Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions • Four Wetland management plans and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions. • 15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals • 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 CC into water resources and wetland management and planning	
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
Component 1: Experience gained in incorporating climate change in developing wetland management plans and designing interventions to increase resilience Wetland monitoring capabilities strengthened as input to improved management of sensitive and vulnerable ecosystems Facilitate the development of long term management and monitoring of selected ecosystems	• At least 6 pilot adaptation measures count with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation • Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[6] satellite) • Technical report on sustainability strategy for pilot adaptation measures •	Basis for definition of pilot adaptation activities to be implemented.
Component 2 (Investment).	**Panuco:**	Provides the

[6] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

Increased knowledge of cost and benefits of adaptation in coastal wetlands in Mexico Increased ability to mainstream climate change considerations in land use plans Increased competence to incorporate wetlands protection in municipal land use plans	10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities **Papaloapan:** Alvarado Lagoon under management plan incorporating CC impacts Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise **Tabasco:** Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors 4 km of Sandbars separating the coastal lagoons from the sea stabilized. **Siam Ka'an:** Protected area monitoring system strengthened including climate change parameters Land use plans including climate change considerations developed for buffer area An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.	basis for costs and benefits of adaptation measures in coastal wetland ecosystems.
Component 3 Support the strengthening of the knowledge base required to mainstream climate change in water resources management and planning	• Climate change impact scenarios developed for national water resources and for coastal wetlands including identification of response options.	Supporting information for definition of response options

Arrangements for results monitoring

		Target Values					Data Collection and Reporting		
Project Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions	No adaptation measures in selected coastal wetlands	At least one measure is ready to start implementation; monitoring data generated; sustainability aspects included in pilot measure design.	At least 2 ready under implementation	At least 5 under implementation	At least 6 under implementation	Implemented measures provide results on adaptation approaches in wetlands; monitoring system fully operating and generating continuous data.	Bi annual supervision reports	Supervision visits, ALOS images, land cover and land use data, GIS	INE with local coordi-nators
Four Wetland management plans (WMP) prepared and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions.	Limited availability of WMP (exception Sian Ka'an); existing ones do not consider CC information or expected impacts	WMP including CC impacts designed for at least one site	2 WMP prepared and submitted for approval to deciding authorities	1 WMP considered for its adoption		At least one WMP updated based on relevant climate change data. At least t three WMP prepared.	Annual report, management plan	Annual review, ALOS images, land cover and land use data, GIS	INE with local coordi-nators
15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested	no adaptation measures in pilot sites	Conservation, forestry, stabilization, coral repopulation	2000 ha reforested with native species; land use plans	Conservation plans implemented in 10000 ha;	Conservation plans implemented in 15000 ha; 4000 ha	Conservation plans implemented in up to 20,000 ha,	Annual report, conservation strategy,	Annual review, ALOS images, land	INE with local coordi-nators CONA-

with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals		measures designed	reviewed and adjusted considering cc impacts on wetlands;	3000 ha reforested with native species; coral nurseries completed	reforested with native species; coastal stabilization works under execution	5000 ha reforested with native species; coastal stabilization works finished on up to 4000 m; up to 10,000 km2 of reefs repopulated;	reforestation plan, land use plans	cover and land use data, GIS	FOR, CONANP
Production and dissemination of practical guidance document on cost and benefits of adaptation measures in coastal wetlands as a basis for replication efforts					implemented measures provide data on cost and benefits of adaptation approaches in wetlands and are compiled in a guidance document	Guidance document is being disseminated and serves as basis for replication efforts	Draft and final Guidance document	Supervision visits, data generated from implemented pilots	INE
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	no response options defined yet on cc impacts in national water resources management	Scenarios of CC impacts on national water resources developed	Response options identified	Supporting studies at one emblematic basin concluded.	At least one national water resources management response option identified that considers CC impact scenarios		Annual report, minutes of meetings with IMTA/CONAGUA	List of viable policy options	IMTA/ CONAGUA
Intermediate Outcome Indicators									
Component 1: Detailed design of key selected adaptation measures									

At least 6 pilot adaptation measures with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation	Pilot sites don't consider adaptation yet	at least one measure designed	at least 2 designed measures under execution	at least 5 designed measures under execution	at least 6 designed measures under execution	implemented measures provide results on adaptation approaches in wetlands	Annual report, design progress reports, costs and benefits	Final design	INE with local coordi-nators
Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[7] satellite)	Limited monitoring of pilot wetlands, limited monitoring of CC data in pilot site areas	Availability of ALOS images and capacity to store and assess data and images	Modeling, generation of data, analysis, and access to information and long-term remote sensing	Pilot wetlands count with operating monitoring tool		Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[8] satellite)	wetland monitoring plans	ALOS images, other monitoring data	INE
Technical report on sustainability strategy for pilot adaptation measures	no adaptation pilots	sustainability aspects incorporated into pilot measures design	Sustainability strategy developed			Sustainability strategy updated based on project results seeking continuation of results	Sustainability strategy report	Preparation and supervision reports	INE
Component 2: Implementation of pilot adaptation measures in four selected wetlands highly vulnerable to the effects of climate change									
Site 1 Panuco: 10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened	Lagoon la Escondida has limited adaptation efforts	Design completed	Adaptation measures implemented benefiting 2000 ha and strengthening of natural barrier initiated	Adaptation measures implemented on 5000 ha	Adaptation measures implemented on 8000 ha	Adaptation measures implemented on 10,000 ha; 10 km of natural barrier strengthened	Conservation and reforestation plans; semi-annual reports	supervision, annual review	INE with local coordi-nator

[7] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.
[8] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

Site 1 Panuco: Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities	Coastal zoning does not take CC impacts into consideration and unsustainable practices continue weakening ecosystem's resilience	Studies for the development of coastal zoning plans concluded including relevant CC data and sustainable management practices	Coastal zoning regulation formally submitted to deciding authorities.	Climate resilient coastal zoning regulation considered for adoption by deciding authorities			Updated Coastal zoning regulation with CC scenarios and practices that strengthen wetland functioning; Semiannual reports	supervision, annual review	INE with local coordi-nator
Site 2. Papaloapan Alvarado Lagoon under management plan incorporating CC impacts	Conservation management plans do not take CC impacts into consideration unsustainable land use practices in the buffer zone prevail	Technical studies supporting a conservation management plans prepared for the Alvarado Lagoon and its buffer zone	Conservation management plan prepared, socialized and submitted to deciding authorities	Conservation management plan considered for adoption by deciding authorities			Updated conservation management plans for wetlands; Semiannual reports	supervision, annual review	INE with local coordi-nator
Site 2. Papaloapan Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha	no buffer zone around lagoon	buffer zone identified and designed;	10% of the buffer zone engaged	25% of the buffer zone engaged	40% of the buffer zone under recommende d practice	50% of the buffer zone under recommended practices	Buffer zone plans; semiannual reports	supervision, annual review, ALOS images	INE with local coordi-nator
Site 2. Papaloapan Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise	Surveys indicate active erosion along coastal bar	Coastal stabilization options identified	Technical design of coastal bar stabilization concluded.	Works for the stabilization barrier initiated	Stabilization barrier finalized	Cost and benefits of stabilization barrier assessed	Design of barrier; Semiannual reports	Supervision , annual review flood control monitoring	INE with local coordi-nator
Site 3 Tabasco	fragmentati	Corridors	Financial	2000 ha under	4,000 ha	5000 ha	Semiannual	Annual	INE with

Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors	on between protected areas	designed taking into consideration CC scenarios and migration routes	instruments and procedures to promote reforestation along biological corridors defined	contract for conservation reforestation with native species;	under contract for conservation reforestation with native species	under contract for conservation reforestation with native species;	reports, reforestation plan	review, ALOS images, land cover and land use data, GIS	local coordi-nators
Site 3 Tabasco 4 km of Sandbars separating the coastal lagoons from the sea stabilized.	Sandbar in process of destabilizati on	Strengthening of sandbar designed	Procurement process for strengthening of sandbar initiated	Strengthening of sandbar under construction and erosion monitored	Sandbar stabilization finalized and erosion parameters monitored	Performance evaluation of activities to strengthen sandbar conducted and recommendat ions shared among participating agencies and stake-holders.	Design of strengthening measures; erosion monitoring reports, Lagoon salinity level monitoring reports, Semiannual reports	Supervision , annual review, ALOS	INE with local coordi-nator
Site 4. Siam Ka'an Protected area monitoring system strengthened including climate change parameters	Monitoring of wetland does not include CC data.	CC data identified and collection program and protocols defined.	CC data part of monitoring program of wetland				Monitoring plan with CC data; Semiannual project reports	supervision, annual review; climate models	INE with local coordinato r
Site 4. Siam Ka'an Land use plans including climate change considerations developed for buffer area	Neighboring communities do not have land use plans;	Data and information for land use plans updated;	Update of land use plans through participatory processes;	At least on land use plan under consideration by deciding authorities;			updated land use plans, Semiannual project reports	supervision, annual review	INE with local coordinato r
Site 4. Siam Ka'an	Repopulatio	Design of	Nursery sites	Coral	up to 10,000		repopulation	supervision,	INE with

An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.	n not included in coral reef conservatio n programs.	repopulation plan and selection of adequate native species and nursery sites	developed	repopulation pilot initiated	m2 of reef under repopulation and monitored		plans; semiannual progress reports	annual review	local coordinato r
Component 3: Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options.									
Climate change impact scenarios developed for selected basins and for coastal wetlands Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options	National policies do not yet incorporate cc impacts on water availability.	Scenarios of CC impacts on national water resources developed	Response options designed	Supporting studies at one emblematic basin concluded.	At least one national water resources management response option identified that considers CC impact scenarios		Annual report, Studies, CC data on national and priority watershed level	List of viable policy options	IMTA/CO NAGUA

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, Responses to Comments from the Convention Secretariat made at PIF)

Recommendations received	World Bank response
7. Is the project design sound, its framework consistent sufficiently clear? Secretariat Comment at PIF/Work Program Inclusion: (…) The coherence between the individual pilot interventions and the overall project objective, however, should be clarified by CEO there are three different outcomes envisioned from the project: 1. Reduced vulnerability of the water supply for domestic and agricultural purposes in the coastal region, 2. Protection of coastal habitats for economically important species, and 3. Protection of vulnerable ecosystems (storm buffer zone and tourism). While these are not mutually exclusive goals, it is not, in the current proposal, clear how these fairly different outcomes will be integrated into one coherent project. It is essential that all pilot interventions work toward the same overall objective, and that it does not become '3 projects under one'.	The project objective has been tightened and is to promote adaptation to the consequences of climate impacts in the coastal wetlands of the Gulf of Mexico, through the implementation of pilots that would provide information on the costs and benefits of alternative approaches to reduce their vulnerability. Thus, the identified pilots seek to reduce the vulnerability of the selected wetlands by strengthening the conservation status of the wetlands and of their buffer zones through land use planning and zoning plans that integrate conservation and climate change considerations, as well as through reforestation and restoration measures. The supported strengthening of barriers will protect the wetlands and their hydrological balance as well as urban areas from sea level rise and intensified extreme weather events. The coordination with Conagua activities in the area of influence of the pilot sites will help control and improve the quality and quantity of water flows to the lagoons. All the considered measures work towards reducing the vulnerability of one lagoon in of each pilot site focusing on increasing their resilience.
Secretariat comment at CEO Endorsement (FSP)/ Approval (MSP) - May 14, 2009: (…) However, please address the following issues in the Project Framework: 1) Project Objective. The presented project objective in the framework is effectively a project summary. It should be a short statement of the objective. The summary of the project can be put in the Item A of the Part II (Project Justification) of the CEO endorsement request. The same comment is applied to the Annex A (Project Results Framework).	The description of the project objective has been shortened in the framework as well as in the Annex A. The project summary has been added to Item A of Part II.
2) Expected Outcome for the Component 1 The second paragraph of this cell "At least 6 pilot interventions ready for implementation Coastal wetland monitoring system Sustainability strategy for pilot adaptation measures" is not a complete sentence and is hard to understand. Please revisit.	The expected outcomes for component 1 have been edited in order to be better understandable.
Additionally, in the framwork of the Annex A, Intermidiate Outcomes are not really the outcome statements, but are the names of each component. They need to be revised.	The intermediate outcomes in Annex A have been revised and reflect now the expected outcome of the specific component.
May 27, 2009 The above issues have been addressed. However, there are still issues in the Project Result Framework in Annex A (and the Table A in the CEO endorsement request) as summarized below. Please address them as appropriate: Project Outcome Indicators: It woud appear that the four Project Outcome indicators are the same as the Expected Outputs for the Component 2 in the Table A. In other words, there are no indicators related to the Component 1 and 3. Thus, with these indicators, the project objective can be regarded as achieved only if the project accomplishes the Component 2, irrespective of the other two components. Given its budget allocation (nearly 80%), it is understandable that the Project Outcome indicators are mainly related with the Component 2. However, the Program Objective should be the effects of the achievement of all the three Expected Outcomes. Therefore, the indicators should reflect the elements of other two components as well.	The table includes now outcome indicators for components 1 and 3.

In addition, please also review and make sure the consistency between the Project Results Framework and the table of Arrangements for results monitoring. For example, the Project Outcome Indicators of these two tables are not consistent. Intermediate Outcome Indicators for the Component 2: In relation to the issue above, please also consider the consistency between the Intermediate Outcome Indicators for the Component 2 in the Annex A and Expected Outputs for the Component 2 in the Table A. Intermediate Outcome Indicators for the Component 3: Comparing with the Expected Outputs in the Table A and the IO indicators in the table of Arrangements for results monitoring, the IO Indicators for the Component 3 in the Project Results Framework in Annex A seems to lack the second indicator: "Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options." Please ensure the consistency between the three tables; otherwise please provide a justification for inconsistency.	This has been corrected accordingly. This has been corrected accordingly.
9. Is the project consistent and properly coordinated with other related initiatives in the country Secretariat Comment at PIF/Work Program Inclusion: Yes. The PIF identifies a comprehensive list of region and sector related World Bank projects in Mexico, as well as other Bank implemented adaptation projects in the LAC region. The list is satisfactory for the current stage of project development, but would have to be expanded by CEO endorsement to include relevant national and nonbank development activities as well as a description of coordination arrangements with such activities.	The project document includes the description of the coordination with relevant bank projects, with programs on a state level (state CC action plans), and on a federal level (PECC), with CONAGUA and PEMEX programs in the pilot site area.
12. Is the project structure sufficiently close to what was presented at PIF? Secretariat comment at CEO Endorsement (FSP)/ Approval (MSP) - May 14, 2009: As mentioned in the item 7 above, the WB has narrowed down the project scope to reducing vulnerability of wetlands of the Gulf of Mexico. This revision has clarified the coherence between the pilot interventions and the project objective. However, the CEO endorsement request and the project document do not fully justify the reason for reducing the number of pilot sites from eitht at the PIF stage to four. While it is understandable that the "WB management" has recommended for doing so in order to achieve a higher impact in each site, such a change should be justified with cost imlications of planned activities for the four pilot sites (inc. co-financing). This is particularly necessary as the project has narrowed down the types of adaptation measures from the PIF stage that will be piloted.	The CEO endorsement request includes now an explanation for reducing the number of pilot sites. Basically, the inclusion of fewer pilot sites reduces significantly the transaction cost involved in managing pilot activities that are geographically dispersed and doubles the resources available for specific implementation and learning purposes. With eight sites these resources would have been insufficient to yield a significant impact and the costs of coordination and logistics would have doubled. The final pilot sites cover geographically well the Gulf of Mexico and represent sites with high vulnerabilities to climate change, important anthropogenic impacts, and a rich natural capital. The request includes now also an indication of the available resources for adaptation pilots at each site. WB Management's recommendation refers to the component on assessing the impacts of CC on water resources planning (now component 3). See Answer to question No. 19 below.
14. Is the value -added of GEF involvement in the project clearly demonstrated through additional cost reasoning? Secretariat Comment at PIF/Work Program Inclusion: Yes. The additional cost reasoning is straightforward as it states that the adaptation interventions to be integrated into development activities in the water sector would not be	The GEF resources would primarily go to the implementation of specific adaptation measures and therefore there is no risk of overlapping. The National Communication does not have resources to invest in adaptation measures. The efforts are complementary. The project's focus on coastal wetlands has been selected based on

implemented in the absence of this project. Furthermore, with current levels of co-financing the project would clearly qualify under the sliding scale of the SCCF for projects between $1M and $5M. However, it is not clear, in the current proposal, how component 2 is coordinated with work and studies conducted as part of the national communications. There seem to be significant risk of overlapping activities. By CEO endorsement there should be a clear additional cost argument for the individual activities proposed under component 2, with special reference to the preparation of national communications.	the assessments made through the national communications. The project is thus addressing an area that has been identified as particularly vulnerable to climate change in the national communications. The selection process benefited from the analysis and data supported under the national communication. Most of the project resources will be invested in pilot interventions and not in studies. Component 2 will support the specific design of these interventions and monitoring arrangements for the project activities and the wetlands. The last national communication specifically mentions the project (Third National Communication, pp 110) and the GEF support provided to it.
19. Are the confirmed co-financing amounts adequate for each project component? Secretariat comment at CEO Endorsement (FSP)/ Approval (MSP) - May 14, 2009: Each component has adequate co-financing amount. However, the document do not fully describe the reason why the co-financing of policy-related component has reduced from $3.6 million (Component 1) to $0.6 million (Component 3) nor justify if this amount is sufficient. Please clarify.	The CEO endorsement request includes an explanation on the reduction in co-financing. The component on assessing the CC impacts on water resources planning reflects a recommendation made by Bank management during the appraisal process to reduce the scope and ambitions of then component one (now component three). Given the limited GEF resources available to the project, the nature of the counterpart agencies and the complexity of the policy making process in Mexico, a more conservative goal was recommended by the Bank management. The revised goal is considered achievable. The reduced scope requires less of counterpart financing and this is now more focused on an assessment of the climate change impacts on water resources and basins that are related to the pilot wetland sites.
Additional comments provided by reviewer by mail on the 19th of May, 2009: **1) Inconsistency between Expected Outcomes and Intermediate Outcomes (Annex A)** My understanding is that Intermediate Outcomes (IOs) in the Annex A are equivalent with Expected Outcomes of the Table A. Given that the Table A is the official result framework, please make sure that all the EOs are reflected in the Annex A. For instance, if there are multiple EOs for the component 1, each of them should be reflected in the table of Annex A, including the table of Arrangements for results monitoring. (Note: My understanding is that the Intermediate Outcomes are the terminology of the World Bank.) **2) The Expected Outcomes for Component 1** As I indicated above, please make sure that the EOs for the Component 1 is reflected in the Annex A, or vice versa. Given that you have already clear IO indicators in the table of Arrangements for results monitoring, it makes more sense to me to use the statement of the IO in the Table A too, rather than four detailed outcomes (These four are effectively outputs level). In the meantime, please also consider a causal relationship between the Expected Outcomes and Expected Outputs. Given that the GEF result based management follows the glossary terms of OECD-DAC, Expected Outcomes can be defined as *the likely or achieved short-term and medium-term effects of the Expected Outputs.* Currently, the IO and the Expected Output for the Component 1 are essentially the same.	ad 1) Intermediate Outcomes in Annex A and expected outcomes in Table A are now the same. ad 2) This has been revised now for component 1 in Annex A. The causal relationship between expected outcomes and outputs has been strengthened.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT

Position / Titles	*$/ person week**	*Estimated person weeks***	*Tasks to be performed*
For Project Management			
Local			
Project coordinator, adaptation specialist	1000	250	General management, coordination and strategic planning
Technical Assistant	750	250	Supervise and coordinate project technical activities
Procurement specialist	725	125	Supervise consistency with procurement rules overall program, coordinate bidding process
Project Accountant	725	125	Manage financial flows/project financial statements/status
External consultants	725	50	Local experts will carry out sporadic specific supervision tasks during the implementation of adaptation pilots
Administrative assistant	600	50	Administrative support to the regional coordinator
Total person weeks for local consultants		**850**	
International			
Total person weeks for international consultants			
Total person weeks		**850**	
Justification for Travel, if any: USD 0.31. Travel will be required to ensure coordination between pilot sites and implementing agency			
For Technical Assistance			
Local			
Technical coordinator, Panuco	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Technical coordinator,	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Technical coordinator, Carmen Pajonal	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Technical Coordinator, Punta Allen	1000	250	1) Technical liaisons, 2) Technical monitoring & evaluation activities, 3) public outreach.
Wetland specialist	1000	250	Technical support of adaptation pilots in wetlands
Water resources specialist	1000	250	Technical support of related water resources management activities
Climate change and adaptation specialist	1000	250	Technical support of integration of CC aspects into local land use plans and wetland management plans
Climate model specialist	1000	250	Technical support of climate change projections
Justification for Travel, if any:			

* Provide dollar rate per person weeks or months as applicable; ** Total person weeks/months needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

DESCRIPTION OF PROPOSED PDF ACTIVITIES (see D1 Financing Plan)

The PDF B activities have achieved the objective to obtain necessary information required for project preparation, including a detailed assessment of the investment and technical assistance needed under each component of the project. The main outcome is the project design which also complies with all the requirements of the World Bank and GEF. The following specific outcomes have been achieved and become the basis for the Project Document:

- define relevant characteristics of the pilot sites
- selection of criteria to determine sites
- identification of potential sites
- definition of threats due to climate change
- definition of adaptation measures and identification of appropriate measures for each site

The studies also included a socio-economic analysis of the sites, the analysis of anthropogenic impacts in the sites resulting in defining the baseline for land use changes and water use, and the diagnosis of their bio-physical and ecological conditions. Once the pilot sites were defined, their specific vulnerability to GCC associated threats was analyzed, including identification of vulnerable populations, reasons for vulnerability, degree of vulnerability, suggested adaptation measures to the identified vulnerability and elements that should be considered; in parallel a set of measures were defined to respond to the general threats and, finally, a list of possible measures for the eight specific sites were defined. During the Veracruz workshop, priority criteria were applied to the set of adaptation measures, which yielded three categories of measures: preparation, institutional strengthening and implementation measures. These categories were considered for the definition of the work-plan or chronogram.

The following describes the achievements from each PDF B activity:

PDF-B Project Components

<u>Activity I:</u> Institutional arrangements and assessment of management needs

The objective was to reach close coordination with local environmental authorities and communities in the pilot adaptation components, and with CONAGUA on the water policy component. This objective has been achieved. Furthermore, the local implementing agency in each site (with exception of Punta Allen with Conanp) is the local environmental authority itself which will coordinate the project activities in coordination with local communities. Local agencies have confirmed their commitment to the project. With regard to CONAGUA, the project will be coordinated with CONAGUA'S specific activities in the project sites as well as with the national policy level. INE will be in charge of the overall technical coordination.

<u>Activity II:</u> Technical Studies

The objective of this activity was to support technical studies that would provide the information needed to identify specific adaptation measures for immediate implementation. The supported technical studies helped to identify adequate project sites based on their vulnerability to climate change impacts, their ecological value, the degree of anthropogenic impacts, their economic and social importance. Furthermore, the assessments conducted under this activity helped identify priority adaptation measures for each site that were consulted locally and agreed upon. Climate scenarios for the pilot sites were developed.

<u>Activity III:</u> Stakeholder analysis and identification of sources of co-financing.

A stakeholder analysis has been undertaken under this activity to identify beneficiaries, partners and other potential stakeholders at the proposed project sites. Partners and interested agencies and institutions for the

co-financing of the specific adaptation activities as well as for the studies supported were identified. Confirmed partners include: MRI, JAXA, NAWCA, CONAGUA, PEMEX, local governments.

Activity IV: Consultations
A consultation process has been undertaken at the four project sites. At each site, meetings and forums were held with local authorities (municipalities, state environmental authorities), communities' grass-root organizations such as fishermen cooperatives, farmer cooperatives, and local and regional NGOs and university development institutions as well as the participating institutions (SEMARNAT, CONAMP, CONAFOR and CONABIO). A list of participants at each site has been filed in the project files. The consultation process has resulted in a confirmation of the measures that will be undertaken at each site.

Activities V: Preparation of Cost Estimates and Financing plan
Cost estimates for project implementation were prepared. By effectiveness a detailed procurement plan will be developed.

Activities VI : Formulation of Project Proposal
Beside the preparation of a detailed project proposal, INE is about to publish a book of 800 pages that assembles all the studies supported under the PDF B and that is expected to guide policy makers on wetland conservation. All the studies and assessments supported under the PDF B have been conducted for a total of eight pilot sites out of which four have been selected for the pilot interventions.

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY.

The PDF B phase provided the project with an opportunity to explore and assess the climate change scenarios and the pre-feasibility of adaptation measures for the selected sites. This has allowed the project to narrow down options. The project design has been not been changed, rather has been refined.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*SCCF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To-date*	*Amount Committed*	*Uncommitted Amount**	
Project coordination	completed	$ 40,000	$ 40,000			$ 10000
Assessment adaptation measures	completed	$ 36,000	$ 36,000			$ 10000
Socioeconomic assessment	completed	$ 23,000	$ 23,000			$ 10000
Project log-frame	completed	$ 23,000	$ 23,000			$ 10000
Bio-physical diagnosis	completed	$ 46,000	$ 46,000			$ 10000
Climate change scenarios	completed	$ 27,000	$ 27,000			$ 10000
Anthropogenic impacts – land use change	completed	$ 18,000	$ 18,000			$ 10000
Institutional analysis	completed	$ 32,000	$ 32,000			$ 10000
Anthropogenic impacts – Water use	completed	$ 23,000	$ 23,000			$ 10000
Project lawyer	completed	$ 7,000	$ 7,000			
Project administration	completed	$ 7,000	$ 7,000			
Safeguard analysis	completed	$ 15,000	$ 15,000			$ 5000

Dissemination activities	completed	$ 3,000	$ 3,000			$ 5000
Total		$ 300,000	$ 300,000	0	0	$ 100,000

* Uncommitted amount should be returned to the SCCF Trust Fund. Please indicate expected date of refund transaction to Trustee.

Document of
The World Bank

Report No:

PROJECT DOCUMENT

ON A

PROPOSED GRANT FROM THE
SPECIAL CLIMATE CHANGE FUND (SCCF)

IN THE AMOUNT OF US$ 4.5 MILLION

FOR THE BENEFIT OF

UNITED MEXICAN STATES

THROUGH NAFIN

FOR THE

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

June 17, 2009

CURRENCY EQUIVALENTS

(Exchange Rate Effective {April 2009})

Currency Unit	=	Mexican Pesos
MXN$ 1.0	=	US$ 0.07
US$ 1.0	=	MXN$ 13.7

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ALOS	Advanced Land Observing Satellite
AOP	Annual Operating Plan
CAS	Country Assistance Strategy
CCIG	Climate Change Implementation Grant
CEO	Chief Executive Officer
CONAGUA	National Water Commission
CPS	Country Partnership Strategy
DA	Designated Account
EOP	End of Project
FAO	Food and Agriculture Organization
FY	Fiscal Year
GCC	Global Climate Change
GEF	Global Environmental Facility
GHG	Greenhouse gasses
GPS	Group of Professional Staff
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IDB	Interamerican Development Bank
IDEAM	Meteorological, Hydrological and Environmental Studies Institute
IMTA	Instituto Mexicano de Tecnologia del Agua
INAP	Integrated National Adaptation Project
IPCC	Intergovernmental Panel for Climate Change
IRD	Institut de Recherche por le Développement
IUCN	International Union for the Conservation of Nature
JAMSTEC	Japanese Agency for Marine Earth-science and Technology
JAXA	Japan Aerospace Exploration Agency
MDG	Millennium Development Goals
MRI	Meteorological Research Institute of Japan
MTR	Midterm Review
NAWCA	
NGO	Non Governmental Organization
NAFIN	Nacional Financiera
PDF-B	Program Development Facility B
PEEC	Special Program on Climate Change of the Government of Mexico

POA (AOP)	Annual Operational Plan
SC	Steering Committee
SCCF	Special Climate Change Fund
SFB	Selection under a fixed budget
TBD	To be determined
TF	Trust Fund
TOR	Terms of Reference
UAM	Mexico Autonomous University
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WB	World Bank
WMP	Wetland Management Plan

Vice President:	Pamela Cox
Country Director:	Axel van Trotsenburg
Country Manager	Mark Hagerstrom
Sector Manager:	Laura Tlaiye
Task Team Leader:	Walter Vergara

MEXICO

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

CONTENTS

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A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

1. The global path of CO_2 emissions already surpasses the worst case scenario (SRES)[1]. Thus, the current trend may result in a situation that exceeds the direst of anticipated consequences by the UN Intergovernmental Panel on Climate Change (IPCC). Although there are uncertainties with regard to exact consequences, there is high confidence (IPCC 2007) that impacts from climate change even under significantly more modest emission scenarios, will affect the functioning and integrity of key ecosystems worldwide. These impacts will add to the stress already resulting from local anthropogenic effects (Millennium Ecosystem Assessment 2007) and when combined with them represent a serious challenge to the global biosphere. While the consequences are being felt globally, some regions will be more affected than others. In particular, climate change impacts will likely affect Latin America and the Caribbean where there remains a substantial, but intrinsically fragile, natural capital and where there are a number of climate sensitive regions (hotspots).

2. **Mexico is particularly vulnerable to the impacts of global climate change (National Communications, NC1/NC2/NC3 to the UNFCCC, IPCC 2007; PECC, 2009), many of which may be irreversible.** 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, net decreases in water run off among others. Given the long term irreversible character of many of these changes and the nature of the impacts, it is critical for Mexico to begin a process of adaptation. Mexico's NCs have assessed vulnerabilities to climate change focusing on areas and sectors seen as particularly fragile to climate impacts. These include water resources, drought and desertification, and coastal zones, in particular the wetlands in the Gulf of Mexico.

3. **At a national scale, Mexico is already confronting serious water management challenges and facing a threat of droughts.** Demand for water continues to grow and in some areas it has already become a bottleneck for economic activity, limiting growth and improvements in welfare for local communities. Overexploitation of groundwater has increased steadily over the last decades leading to the depletion of many aquifers. Surface water resources are also overexploited resulting in reduced water ecosystem functioning, including wetlands. Water quality has also deteriorated.

4. At present, water resources planning and management (while in need of further regulatory reform to address sustainability concerns), have necessary building blocks in place. In the past few years, CONAGUA has focused its efforts on: (a) legally registering and regularizing all water users; (b) developing mechanisms for approving new water rights and water rights transfers; (c) establishing River Basin Organizations (under CONAGUA), River Basin Councils (RBCs) with representatives from federal, regional governments and other stakeholders, and Aquifer Committees with representatives from the various water users; (d)

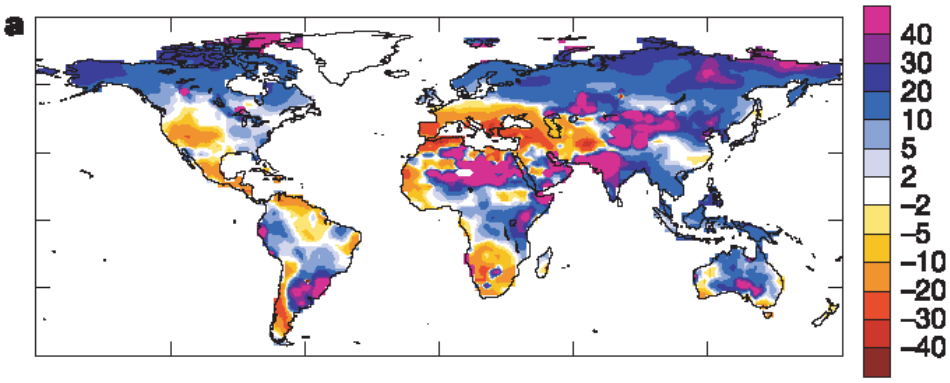
[1] SRES (Standard Reference Emission Scenarios) were prepared by the IPCC in 2001. The worst case scenario, A1FI, assumed business as usual and runaway expansion in the use of fossil fuels.

preparing national and regional water plans; (e) improving groundwater and surface water monitoring, modeling and assessment; (f) improving meteorological services; and (g) improving the operation of hydraulic infrastructure. Legislation now establishes water concessions, permits to discharge effluents and the Public Register of Water Rights.

5. As part of the GOM's efforts to address the challenges in the water sector, CONAGUA has developed the 2007-2012 National Water Program (NWP), which describes the objectives, strategies and targets in line with a 2030 vision of sustainable human development[2]. The NWP is divided by region in each of which different priorities have been identified. For example, in the Gulf of Mexico CONAGUA has developed and funded a plan of action consistent with the objectives of rationalizing water use, improving its quality and strengthening flood control infrastructure.

6. **Despite this progress, current water sector planning and investments do not explicitly include consideration of climate impacts.** Data published on projected hydro-climatic changes, as part of IPCC assessments[3], indicate that Mexico may experience significant decreases in runoff on the order of minus 10 to 20% nationally, and up to 40% in Gulf Coast wetlands, as a result of global climate change (Third National Communication, pp XXIX, 2007). These estimates have been confirmed by high resolution modeling, using the MRI-GCM[4] as part of an agreement between the MRI of Japan, SEMARNAT-INE and the World Bank (World Bank, 2007) and by independent ensemble modeling (Nature, 2005, figure 1). These anticipated changes would aggravate the water budget of the country and will require urgent efforts to better understand the net impacts and identify adaptation measures.

Figure 1. Relative change in runoff in the twenty-first century mean of relative change (percentage) in runoff for the period 2041–60 compared to 1900-1970. Mexico is amongst the most affected areas (P. C. D. Milly1 2005)



[2] The Program's objectives are: (i) improving water productivity in agriculture; (ii) increasing the coverage and quality of drinking water, sewerage, and sanitation; (iii) promoting an integrated and sustainable management of water in basins and aquifers; (iv) improving technical, administrative and financial developments in the water sector; (v) consolidating public participation and promoting a water culture; (vi) decreasing risks and effects of floods and droughts through organizational arrangements and drought management plans; (vii) evaluating the impacts of climate change in water resources; and (viii) creating a culture of compliance with the National Water Law (NWL). The NWL (ammended in 2004) includes the environment as a legal water use.

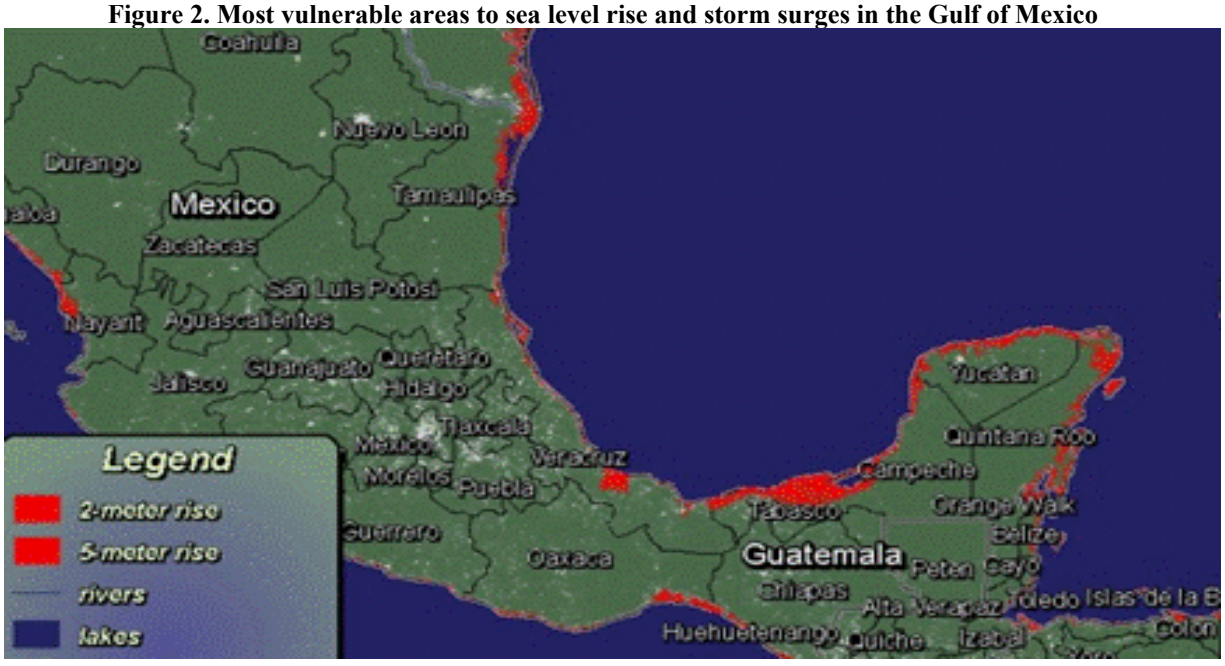
[3] P. C. D. Milly1, K. A. Dunne1 & A. V. Vecchia. Global pattern of trends in streamflow and water availability in a changing climate. Nature: November 17, 2005 pp

[4] Also referred to as the Earth Simulator.

7. **At a regional scale, the ecosystems to be most affected by climate change impacts are the coastal wetlands in the Gulf of Mexico.** Mexico's National Communications have identified the wetlands in the Gulf as an immediate priority for adaptation. Located in the lower reach of the Gulf's main water tributaries, these wetlands constitute a very productive ecosystem in the country[5]. These wetlands also provide many environmental services, including regulation of the hydrological regime; human settlement protection through flood control, and buffering of storm impacts; control of erosion; conservation and replenishment of coastal groundwater; reduction of pollutants; regulation and protection of water quality; and habitats for fish, crustaceans, waterfowl and wild life, including migratory birds.

8. **Recent analysis identifies the Gulf of Mexico wetlands as a regional climate hotspot in Latin America (World Bank, 2009),** requiring immediate attention in the face of current, large and irreversible impacts. Key climate impacts on these wetlands include sea level rise, salt intrusion, reduction on annual surface water input, increases in sea surface temperature and intensification of extreme weather events, all likely to affect the ability of wetlands to deliver economic and environmental services. Of particular concern is the process of salination caused by sea level rise, reduced surface water input and droughts, and high exposure to extreme weather events (hurricanes, sea surges, extreme precipitation), affecting both ecosystems and resident populations. Also, changes in the distribution and characteristics of river flows may affect the biological functioning of the wetlands and impact the economy of coastal areas. While other coastal areas are also prone to similar impacts, the magnitude and concentration of localized impacts and the limited resources available in the Gulf region justify the selection of the Gulf wetlands as focal point for this project. Most vulnerable coastal areas are in the central part of the Gulf and Yucatan peninsula (Figure 2).

Figure 2. Most vulnerable areas to sea level rise and storm surges in the Gulf of Mexico



[5] Caso, M., I. Pisanty y E. Ezcurra 2004: Diagnóstico ambiental del Golfo de México. Vol. I y II. INE/Semarnat

Source: UNAM project preparation studies (2008), based on university of Arizona: http://www.geo.arizona.edu/dgesl/research/other/climate_change_and_sea_level/sea_level_rise/sea_level_rise_guide.htm#MapDisplayArea , CONSIDERADO POR LA UNAM project preparation studies (2008

9. **Mexico has several regulatory tools that protect wetlands, in particular mangroves.** The recently amended General Wildlife Law (GWL, February 2007) emphasizes the importance of wetlands, in particular the importance of mangroves. It prohibits any activity that affects mangroves, their natural productivity, or affects the interaction between mangroves, rivers, dunes, the neighboring maritime zone and corals, or any other action that provokes changes in their characteristics and ecological services.[6] The GWL is complemented by a national regulation (NOM-022-SEMARNAT-2003) which mandates the protection of the integrity of coastal wetlands, including where necessary, the restoration of hydrology, contiguity, water supply, and coastal stabilization. Early results from the implementation of the amended GWL have gained praise from the NGO community (Conservation International, 2009). In parallel, Mexico has made use of the declaration of Protected Natural Areas (PNAs) as a policy tool for conservation of critical ecosystems, including wetlands. PNAs are created by presidential decree, under the General Law of Ecological Equilibrium and Environmental Protection (LGEEPA) and have effectively contributed to the conservation of coastal wetlands (and other ecosystems) as in the case of the Punta Allen PNA in Quintana Roo.

10. **However, Mexico faces challenges in effectively implementing such conservation tools.** The gains in regulating coastal wetland protection are compromised by weak enforcement, poor coordination between national, state and local actions, the lack of supporting regulations and land use planning at some locations, and other emerging challenges such as climate change impacts. Weak enforcement of existing regulations and poor or non-existent land use planning has led to increased vulnerability and loss of wetlands. Poorly regulated tourism activities on the coast and extension of agricultural activities in buffer zones are the key drivers for loss of wetland area.

11. **It is important, therefore, to design measures that will initiate and inform the process of adaptation** in order to protect the environmental and economic services (i.e. water supply, fisheries, agriculture) of the Gulf of Mexico wetlands while simultaneously addressing key drivers that adversely impact their sustainability. Mexico's federal and regional governments recognize this need Efforts to develop adaptation measures in these wetlands will illustrate how to develop policies in the region and will provide data on cost and benefits needed to develop a coastal adaptation strategy. Response capacity to expected climate change impacts in these coastal zones will, to a great extent, depend on the degree of conservation of the wetlands and the ability to develop climate resilient land zoning.

2. Rationale for Bank involvement.

12. **The Country Partnership Strategy FY2008-2013 (CPS)** for Mexico was endorsed by the Board in April 2008. It identifies air and water pollution, greenhouse gas emissions, deforestation and loss of biodiversity as key environmental sustainability issues in Mexico, and

[6] Amended General Wildlife Law (2007).

notes critical and urgent water related problems including the overexploitation and contamination of surface water and groundwater resources in the regions where most of the people reside and where the great majority of the GDP is generated.

13. Environmental sustainability is a main pillar of the National Development Plan (NDP) to be supported through the CPS. It seeks to turn the concept of environmental sustainability into a transversal element of public policies and assure that all public and private investments are compatible with environmental protection. Objectives and strategies are structured in areas such as water, forests, climate change, biodiversity, solid waste and cross-cutting environmental sustainability policy instruments. Among the country development objectives the CPS includes reforestation, reduction in GHG emissions, increasing the Natural Protected Areas and integrated Water Resources Management Programs. The project contributes to the CPS' strategic focus on a*ssuring environmental sustainability*, particularly by supporting reforestation and conservation efforts in wetlands, by increasing the conservation status of vulnerable coastal ecosystems, and by assessing response options that internalize climate change considerations on water resources planning, particularly in coastal wetlands.

14. Banks's involvement is expected to trigger a significant level of cooperation between local and federal authorities as CONAGUA's plans are coordinated with project activities and will consider information generated in the planning of their programs in project sites.

15. **The World Bank in Latin America is playing a leading role in the adaptation field.** It has identified adaptation to climate change impacts as priority one in a regional climate change strategy (World Bank, 2004). It has also proposed an adaptation strategy emphasizing an ecosystem approach and addressing long-term trends rather than climate variability (World Bank, 2005). The region has the largest portfolio of any developing agency on adaptation (Colombia: Integrated National Adaptation Program, P083075; Dominica, St. Lucia and St. Vincent: Implementation of Adaptation Measures in Coastal Zones, P090731; Regional Andes Adaptation Program for Glacier Dependent Ecosystems, P098248; CARICOM: Mainstreaming Adaptation to Climate Change P073389, and Central America: Addressing Impacts of Extreme Weather Events, P099457). The project would benefit from extensive experience in World Bank-assisted activities that dwell on adaptation issues.

16. **In Mexico, the Bank is also involved in the development of a strategy for low carbon growth, the development of mitigation programs in the waste management and transport sectors and the first DPL in the region on Climate Change** and has also been active in fostering national institutional capabilities to deal with the consequences of climate change. The Bank has assisted the GOM with institutional capacity building and knowledge management on adaptation issues as well as in mitigation activities. The proposed project would complement these activities as an investment in specific adaptation measures facilitated by the Mexican government and regional administrations, with the participation of several agencies.

17. **Linkage with other projects, supported by the WB or the GEF.** The proposed project will be implemented in coordination with Colombia's INAP and Caribbean SPACC projects, and the Trinidad and Tobago: Restoration of the Nariva Wetland Project (P093012) which deal with similar issues in coastal areas. The project will also benefit from results and recommendations from the GEF Consolidation of the Protected Areas System Project (GEF) and the Mexico

Mesoamerican Biological Corridor Project. The Bank is also providing technical assistance to the National Water Commission (CONAGUA) on the implementation of its Flagship Local interventions in the Water Sector Program (*Proyectos Emblemáticos*), which aims to promote integrated management of water resources in local areas. The project will link and provide support to CONAGUA in coordination with the Bank's current technical assistance program. Finally, the project complements and consolidates the Environmental and Climate Change DPLs in that it adds the dimension of adaptation. The Government has indicated that adaptation in the Gulf of Mexico will inform the evolving national adaptation strategy as reflected in the Special Program on Climate Change (PECC) program currently under consultation.

Government Policies and Strategies.

18. The project is part of Mexico's strategy to cope with the consequences of climate change. The National Communications to the UNFCCC identify the project as a measure to address a region very vulnerable to the impacts of global climate change. The third National Communication describes the project in more detail (3NC, pp 110) and acknowledges the support provided by the World Bank for project preparation. It also includes the cooperation agreement between the World Bank and Japan's Meteorological Research Institute (MRI) on the application of the Earth Simulator in Mexico, which provides a high resolution tool to assess climate change scenarios.

19. The project constitutes an important element of the national adaptation strategy. One of the objectives of the PECC is the identification and implementation of adaptation options. The studies supported during project preparation help to promote better and more sustainable management practices of natural resources along the Gulf coast and help to increase the region's capacity to respond to anticipated climate impacts. The adaptation pilots supported under this project are part of the strategy to conserve and recuperate marine, coastal and water dependent ecosystems. The project, along with the identification of pilot sites and measures, is incorporated into the PECC, under the National Strategy on Climate change (INE).

20. At a regional level, INE together with the University of Veracruz, UNAM, and the Ecological Institute of Veracruz are currently developing a Climate Change Action Plan for the State of Veracruz, with funding from the British embassy (Strategic Programme Fund). This plan is coordinated by the State's climate change technical committee that includes representatives from the state government, municipalities, NGOs, the private sector and PEMEX and intends to mainstream climate change into the programs of the state's secretaries. This plan includes several actions focused on the reforestation, restoration, conservation and recuperation of wetlands. The project is a strategic effort to reduce the vulnerability of forestry ecosystems. Similar plans are envisioned for the states of Tamaulipas, Tabasco and Quintana Roo. These states plan to include in their adaptation strategies the lessons learned in the preparation of the proposed project. Close coordination with them in the development of these plans will strengthen the sustainability of the measures and opportunities to scale them up.

21. Mexico ratified the UN Framework Convention on Climate Change (UNFCCC) on March 11, 1993. Mexico's Congress ratified the Kyoto Protocol (April 2000) by unanimous consent. It has already submitted its Third National Communication (2006) and is preparing to submit its fourth by the end of 2009. Mexico has also launched an effort to strengthen its

institutional capacity through the development of a Climate Change Office (CCO). The CCO has been supported through an IDF (Institutional Development Fund) grant.

22. Mexico signed the Ramsar treaty on conservation of wetlands in 1986, recognizing the need to preserve its wetland ecosystems. It also ratified the Convention on Biological Diversity in 1993. CONANP is the focal point in Mexico for the Ramsar Treaty. The Resolution VIII.3 of the 8th Meeting of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar) regarding "Climate change and wetlands: impacts, adaptation and mitigation" calls to manage wetlands such as to increase their resilience to climate change and extreme climatic events, and to reduce the risk of flooding and drought in vulnerable countries.[7]

23. In 2005, the National Committee on High-priority Wetlands was created in CONANP to produce guidelines and recommendations for their management. For its part, the National Forest Commission (CONAFOR), together with CONAGUA, the National Institute of Statistics, Geography and Informatics (INEGI), the Ministry of the Environment and Natural Resources (SEMARNAT), the National Institute of Ecology (INE), and CONABIO, are promoting a National Wetlands Inventory to help locate, quantify and ascertain the state of the wetlands and to assist in decision-making (CONAFOR, 2006c) for their protection.

24. Municipalities have a great potential to influence the management of wetlands in Mexico. According to the Mexican Constitution (art. 115) municipalities have exclusive competence for land use planning. They have the authority to (i): formulate, approve and manage zoning and municipal development plans; (ii) authorize, control and monitor land use; (iii) participate in the creation and management of ecological reserves and in the elaboration and application of planning programs in that regard; and (iv) develop ecological land use plans, enabled through entry into force of the amendments to the General Wildlife Law (GWL, February 2007).

3. Higher level objectives to which the project contributes

25. The ninth session of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) in December 2003 provided guidance to the GEF for the operation of the Special Climate Change Fund (SCCF). In particular, the guidance provides that the fund should give priority to supporting activities related to adaptation. The guidance identifies activities in priority adaptation areas, such as water resources management, fragile ecosystems and integrated coastal zone management. The project will also support the GEF Operational Programs 12 (Integrated Approach to Ecosystem Management) and 15 (Sustainable Land Management) by promoting adaptation measures in the coastal region of the Gulf of Mexico.

B. PROJECT DESCRIPTION

1. Lending instrument

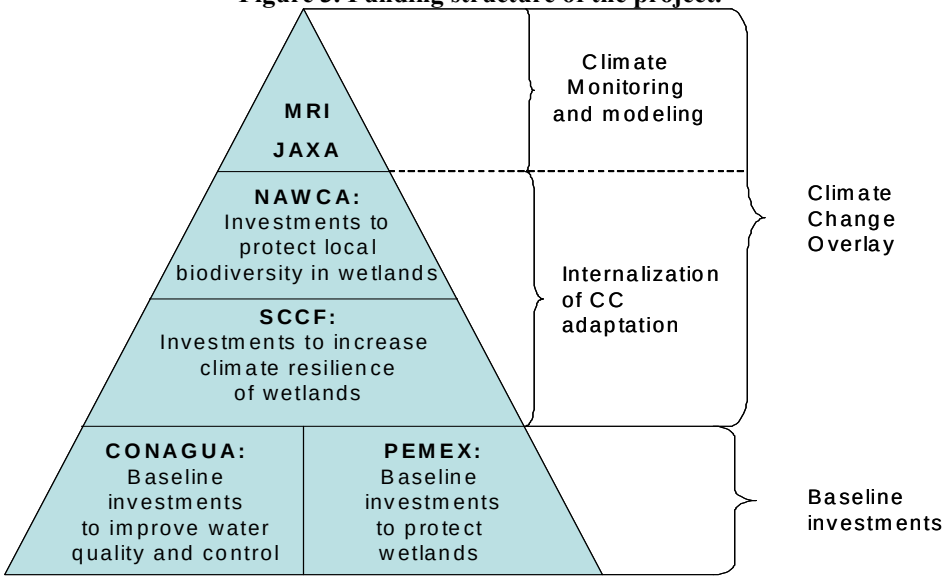
[7] by, *inter alia*, promoting wetland and watershed protection and restoration. It invites Parties to pay attention to the need for strengthening institutional capacity and synergies to address the linkages between climate change and wetlands.

26. The project would be financed by a GEF-SCCF (Special Climate Change Fund) grant in the amount of US$ 4.5 million, with co-financing and counterpart resources from: (i) the Meteorological Research Institute of Japan (MRI) (US$1 million); (ii) the Japanese Space Agency (JAXA) (US$0.3 million); (iii) the North American Wetland Conservation Commission (NAWCA) (US$0.7 million); (iv) CONAGUA (US$ 12.4 million); (v) PEMEX (US$ 0.8 million); (vi) Instituto Nacional de Ecologia (US$ 1.0 million); (vii) IMTA (US$ 0.5 million); and, (viii) an already signed Climate Change Implementation Grant (CCIG) (US$ 0.5 million; TF090326); In addition, the local executing agencies are expected to provide counterparts in the amount of US$ 1.8 million, most of it as in-kind contributions over the five years of duration of the project. The level of counterpart funding meets the guidelines of the SCCF securing a better than 4:1 ratio of total to SCCF 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 (see paragraph 48), to which the SCCF and NAWCA funding add a climate overlay and influence the type of interventions made with counterpart funding. The modeling and monitoring efforts will be supported through the instruments already signed with MRI and the Japanese Space Agency (figure 3).

27.

Figure 3. Funding structure of the project.



28. Without SCCF financing the integration of long term climate change adaptation considerations in wetland management strategies and policies would most likely not occur. SCCF is an integral part of the overall funding strategy to address current and future local and global threats to the functioning of coastal wetlands.

2. Program objective and phases

N/A

3. Project development objective and key indicators

29. **The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability.** The project also seeks to assess the overall impacts of climate change on national water resource planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds. The experience from the project pilots is intended to inform the government's future adaptation strategy and development programs in the Gulf region**.**

30. The adaptation measures will be implemented in the wetlands of a) Río Panuco Corredor Sistema Lagunar, focused on Laguna La Escondida (Tamaulipas); b) Laguna de Alvarado (Veracruz); c) Carmen-Pajonal-Machona (Tabasco); and d) Punta Allen (Quintana Roo)**.** These wetlands were selected during the formulation phase of the project through a process that responds to the magnitude of the impacts induced by climate change; the value of the compromised economic and environmental services; its global biodiversity value; the availability and readiness of local institutional capacity, and the participation of the local community (Annexes 4 and 13 provide information on the characteristics of these sites and the selection process). The areas around these wetlands do not have comprehensive land zoning and all except Punta Allen lack wetland management plans.

Key performance indicators:

- Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions
- Four Wetland management plans and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions.
- 15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals
- 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 CC into water resources and wetland management and planning

Project Description. Components and Activities

Component 1. Detailed design of key selected adaptation measures (GEF contribution US$ 0.5 million; total cost US$ 3.0 million). The objective is to complete, where required, the design of adaptation measures to be implemented under the project taking into consideration federal programs with implications for local wetland management. This component will also support technical activities to facilitate modeling, generation of data, analysis, and access to information

and long-term remote sensing (though the ALOS[8] satellite) of the project areas as well as the design of long-term sustainability strategies in support of the project activities. Most of these activities will be funded under the CCIG grant and MRI/JAXA contributions.

Component 2. Implementation of pilot adaptation measures in highly vulnerable wetlands (GEF contribution US$ 3.5 million; total cost US$ 18.5 million). The component will support the development and adoption of comprehensive wetland management plans and land zoning for the pilot sites, and other pilot adaptation measures that would contribute to strengthen resilience of the wetlands to climate impacts. The pilot interventions will also generate information for the design of policy options for climate-resilient wetland management.

Sub-component 2.1: Wetlands Panuco-Altamira (Tamaulipas). The project will support the development and submission to deciding authorities of a climate resilient coastal zoning regulation in the area, including the expansion of conservation area around the Lagoon La Escondida, essential to maintain surface hydrology balance on the land side of the city of Tamaulipas (this would also include the strengthening of land barriers and other conservation measures) and the conservation of biodiversity of global value.

Sub-component 2.2: Wetlands of the Papaloapan Rivershed, Alvarado Lagoon (Veracruz). The (i) integration of climate concerns in the conservation and management strategy of the Alvarado Lagoon including the adoption of a buffer zone around the lagoon; (ii) construction of a pilot stabilization barrier to buffer extreme weather events and future sea level rise; (iii) measures to protect biodiversity of global value.

Sub-component 2.3: Wetlands of Carmen-Pajonal- Machona (Tabasco). The (i) development of a wetland conservation and management strategy and revamping of land zoning regulations; (ii) restoration and reforestation efforts with native species along biological corridors; and (iii) the strengthening of the sandbars that separate the lagoons from the sea.

Sub-component 2.4: The Siam Ka'an nature conservancy site (Punta Allen, Quintana Roo). (i) Strengthening the protected area monitoring system to include climate change impacts; (ii) support the development of land use plans around its buffer zone; and, (iii) pilot repopulation of coastal reefs to maintain their buffering capability and protection of the coastal wetland.

Figure 4. Relative location of wetlands considered for inclusion in the project (with photos of selected sites).

[8] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

Component 3: Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options. (GEF contribution 0.5 US$ million; total cost US$ 1.0 million): This component will support the development of climate change impact scenarios on national water resources and the identification of response options and measures that could be adopted at a national level and in coastal wetlands to incorporate the anticipated impacts of climate change on water resource planning.

Component 4: Project management (GEF contribution US$ 0.1 million; total cost US$ 1.0 million): This component will support the overall technical coordination of project activities (including the implementation of a technical monitoring system) as well as the administrative and financial management of the project. Most of the cost will be carried by INE. Specifically this component will support the project coordinator, the procurement specialist, other required personnel for the project management, and the project external audits. Incremental GEF co-financing will be used for goods; consultancy services; travel; and operating costs.

4. Sector issues addressed by the project

31. The project intends to assist in the assessment of climate change impacts on water sector planning at a national level with emphasis on coastal wetlands and associated watersheds**.** Under component 3, the project will assist in the assessment of national climate-resilient water resources management responses based on climate change impact studies.

32. The project, under components 2 & 3, will also **address the need for information and on the ground experience with adaptation measures** in the wetlands in the Gulf of Mexico, deemed amongst the most vulnerable ecosystems in the nation.

33. The project will address the issue of wetland vulnerability to climate change by supporting **climate resilient land zoning regulations** that can also reduce the extent of local anthropogenic impacts. The project will generate information useful for climate-resilient wetland management programs in the Gulf of Mexico.

5. Lessons learned and reflected in the project design

34. The successful operation and sustainability of adaptation measures rests on the **generation of local benefits**. The project seeks a maximum involvement of local institutions in the implementation of the adaptation measures. A consultation process has been undertaken at the four project sites with local communities, local and regional agencies and other stakeholders. The consultation process has resulted in a confirmation of the measures that will be undertaken at each site and in specific pledges of local support during implementation.

35. **Adaptation is a long-term activity that demands long-term commitments**. The implementation of adaptation programs to date highlights the need to ensure sustainability and local ownership of any activity. The project is a first step to be continued under the implementation of the PECC, whose involvement has already been confirmed by SEMARNAT.

36. **Visualization of future climate.** A better understanding is required of climate trends in the region. The INE is participating in a MOU with the World Bank and MRI in Japan to visualize future climate in Mexico. This information has proven valuable for the identification and formulation of adaptation strategies.

37. **Ecosystem approach.** The project focuses on the impacts of climate change on coastal ecosystems and on the services these provide. This approach enables tackling several issues and sectors at the same time and to focus on the resource base of economic activities. A functioning and strengthened ecosystem will be more resilient to climate impacts and would likely continue to provide its environmental services thus benefiting fisheries, tourism, coastal protection, biodiversity, and water supply and quality.

6. Alternatives considered and reasons for rejection

38. The project gives **preference to practical, on-the-ground adaptation measures** over the more traditional approach of strengthening institutions and building enabling environments. The project will strengthen capacity only as it is required to implement well-defined adaptation measures, with high probability of success. The adaptation measures that will be implemented are the result of a comprehensive selection process that included replicability, institutional capacity, high probability of success, cost effectiveness, and clear determination of additionality.

39. The project favors a multi-site approach instead of focusing the entirety of the resources on one site and pilot. This will help accelerating the learning process on implementing adaptation

options in coastal wetlands and will involve the engagement of several local and federal actors in that process. The information obtained through several pilots will feed into the definition of a much broader adaptation program for the Gulf of Mexico.

40. Furthermore, the project also looked at the appropriateness of adopting a national versus local approaches (a single central entity implementing the pilots and their corresponding M&E systems or a more comprehensive participatory approach with municipal and local entities directly participating in the selection, design and implementation of the pilot investments) and at the learning process through pilot interventions (small scale well controlled experiments from which to gather information for future scaled-up and replication activities) or through a more focused large scale concentrated investment.

41. **Baseline Investment.** The project's baseline is constituted by interventions already planned by CONAGUA and PEMEX in the region. CONAGUA's program in the Gulf area is designed along the following lines of action: a) wastewater treatment in the areas of influence of the project, including in the Alvarado Lagoon, b) monitoring of water quality in the selected wetlands; c) rationalization of water use practices for economic activities; and d) flood control. PEMEX is providing resources for conservation activities such as: 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 four pilot sites.

42. In wastewater treatment, CONAGUA intends to revamp and or built greenfield wastewater and sanitation plants in the area of the Gulf to provide treatment capacity for key urban centers in the region. In particular, CONAGUA plans to build wastewater treatment facilities in the area of the Panuco-Altamira lagoons (serving Altamira) and in the Veracruz area. These plants will improve surface water quality and reduce the anthropogenic impact on the coastal ecosystem, including the wetlands and mangroves in the vicinity. These investments are expected to take place during the duration of the project.

43. In monitoring of water quality, CONAGUA has already launched a program to monitor surface waters, including BOD, dissolved oxygen, total suspended solids and other parameters that will allow policy makers and technical institutions, to diagnose the situation in the area of the Gulf, including the water inflows into the lagoons targeted by the project. The monitoring network will be expanded by CONAGUA during the duration of the project and constitutes an important investment to ascertain the current situation. As part of the rationalization efforts CONAGUA plans to invest in an awareness campaign for efficient use of water as well as in the revamping and restructuring of waterwells and pumps used for agricultural use. This program also intends to invest in improvements in the infrastructure for potable water in the Gulf Area. In the area of flood control, CONAGUA is investing in infrastructure to prevent floods under extreme weather events. The technical appraisal section indicates how these investments are intended to be influenced by project activities.

44. The investments already programmed by CONAGUA have an estimated cost of US$90.8 million in the Gulf area, out of which an estimated US$6.0 million will be directly invested, under the four programs in the area of the Panuco-Altamira wetlands; US$4.4 million will be

invested in the Papalaopan rivershed, that includes the lagoon of Veracruz; US$2.0 million in the area of influence of the Punta Allen wetland, for a total of US$12.4 million.

C. IMPLEMENTATION

1. Partnership arrangements

45. The project will be implemented in cooperation with several partnership arrangements:

- **Meteorological Research Institute (MRI) of Japan.** Under an agreement already signed technical assistance will be provided to INE and regional agencies. Specifically, MRI will provide data from the Earth Simulator for use in high resolution local climate scenarios and the design of adaptation measures, training, and scientific exchanges.
- **Japanese Space Agency.** Under an agreement already signed, remote sensing of the coastal wetlands would be provided through JAXA.
- **NAWCA** (North American Wetland Conservation Commission) has approved US $ 0.7 million in the project focusing on conservation of habitats for migratory birds in the wetlands supported through the project;
- **CONAGUA** will provide US$12.4 million in counterpart and baseline investments.
- **PEMEX** is investing US$0.8 million in baseline investments through its existing wetland management projects in the areas of influence of the four selected wetlands.
- **IMTA** has confirmed contribution of US$ 0.5 million to support component 3.
- **INE** has confirmed contribution of US$ 1.0 million to support the project, including its management.

2. Institutional and implementation arrangements

46. **Implementation Period:** The Grant is expected to become effective by August 2009 for a five-year period. The expected project completion date is August 2014.

47. **General implementation arrangements:** INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist and will be in charge of all fiduciary responsibilities, including financial management, procurement of goods and services and the application of environmental and social safeguards.INE-SEMARNAT will manage the entirety of the project funds and no funds will be managed by municipalities. NAFIN will be the financial intermediary. The implementation of pilot activities will be supported and implemented through the participation of local agencies in each pilot site. Local agencies have confirmed their support to the project. INE with the support of CONAGUA and IMTA will implement the assessment of options to address climate issues in water resources planning. CONAGUA and IMTA have pledged technical and financial resources to the project activities. Oversight of the project will be responsibility of a steering committee.

Technical implementation arrangements:

48. **Steering Committee.** The main responsibility of the Steering Committee (involving representatives from the four participating states, INE, SEMARNAT, CONAGUA, and NAFIN) is to assure political and strategic support for the implementation of the selected adaptation pilots and the coordination with counterpart resources. The Steering Committee will also provide

guidance on the implementation of the project and make high level recommendations regarding the project's development, technical difficulties and management issues. The Steering Committee will approve the Annual Operating Plans (AOP) of the project. Additionally, a Scientific Advisory Panel, appointed by INE will be convened regularly, to advise on project implementation. A **group of professional staff (GPS)** from SEMARNAT and INE will be responsible for project implementation including one general project coordinator in charge of the operational coordination of the project activities in each site. The GPS will prepare the POA[9] in consultation with the local agencies in each site, and be responsible for its execution as well as for the operational coordination of the project activities in each site. The GPS will ensure the financial, conceptual and methodological coherence among all activities and the integrity of the project. Specifically the GPS will provide technical leadership, monitoring and evaluation of project activities and public outreach.

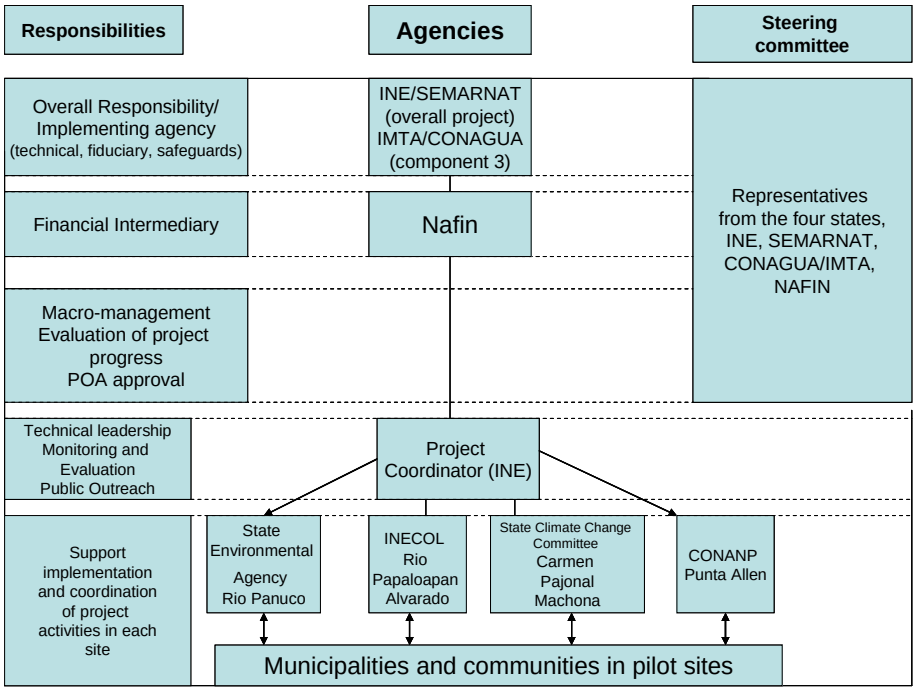
3. Monitoring and evaluation of outcomes/results

49. The GPS will be responsible for overall monitoring and evaluation of the project. A detailed monitoring and evaluation system and guidelines will be included in the project's operational manual which will be produced prior to effectiveness. The GPS will submit to the Bank biannual integrated project progress reports demonstrating project development and financial and physical performance indicators. The Bank will conduct visits to jointly review progress made with regard to objectives and performance indicators. Regular monitoring of project activities will be the responsibility of the GPS with the concourse of key local stakeholders. Monitoring is key both for local purposes as well as for the documentation of global benefits. The project will have a complete monitoring and evaluation system.

50. **Mid Term Review (MTR):** The Bank's supervision team, together with a team of external reviewers and key stakeholders, will conduct a midterm evaluation of project execution, not later than August 2012. The external review will focus on: (i) progress in achieving project outcomes, (ii) institutional arrangements for project implementation, (iii) operational manual, (iv) review of both the project implementation plan and general project operational manual. In preparation for the midterm review (MTR), the Steering Committee, together with the local implementing agencies, will prepare a working book containing the following information: (i) executive summary of the overall project status, (ii) description of the overall components' development and indicators; and (iii) description of the status of the adaptation pilots.

Figure 5. Institutional Framework.

[9] The AOP will include statement of specific objectives for the year, a description of the activities, expected outputs, monitoring indicators, detailed budgets, and a procurement plan, indicating the sources of financing in the budget.



4. Sustainability and Replicability

51. **Sustainability**. Selected adaptation initiatives will generate data for water resources planning and complement ongoing or planned coastal management programs that do still not take climate impacts into consideration. A strategy for long-term sustainability of the adaptation program will be designed as part of component 1. In order for the pilots to be used as a basis for scale up factors, the following information will be collected during their implementation and operation: a) capital, operation and maintenance costs; b) estimate of the anticipated benefits druing the lifetime of the project; c) institutional and regulatory requirments to make the project operation effective; d) social and environmental costs and benefits.

52. The project will be supported through co-financing and counterpart resources from federal, state, local and international institutions. Project synergies between countries that currently prepare or implement adaptation measures will allow for mobilization of additional technical resources and expertise. The adaptation measures in wetlands will illustrate how to formulate climate resilient wetland conservation. Local communities dependent on wetland ecosystems are involved in the selection, implementation and monitoring of adaptation measures.

53. The project is an important activity of the adaptation strategy in Mexico and is expected to play a role in the formulation of a wider national policy on adaptation. Information and experience generated will be the basis of an expansion of project activities under the PECC. Furthermore the project is considered by SEMARNAT key for the definition of a broad adaptation program for coastal wetlands for the Gulf of Mexico and will provide data on costs and benefits of adaptation measures. The adaptation project will add the climate overlay to a number of projects in the Bank portfolio, with activities in a common area of influence. Regionally the project is being integrated in the state climate change action plans currently under

development. This will strengthen sustainability of the pilot measures and facilitate their upscaling on a state level

54. **Replicability**. The implementation of adaptation pilots will provide substantive lessons observed and learned regarding climate impact and adaptive practices. Dissemination of lessons learned, public education and outreach initiatives will ensure ongoing and effective knowledge exchange of accrued adaptive expertise. Projects will be used to disseminate adaptation knowledge. The proposed project is one of the first efforts to implement adaptation measures in wetlands. The information to be obtained and the lessons learned will be of significant value to regional governments and other coastal countries in the Caribbean basin.

5. Critical risks and possible controversial aspects

Risk	Rtg	Mitigation	Residual Risk
Local drivers for wetland destruction impede long term sustainability programs.	H	The actions foreseen under the project represent a harmonized approach to address local drivers as well as anticipated climate change impacts affecting the functioning of coastal ecosystems. A long-term sustainability strategy will be designed as a result of the project.	M
Lanholders may impede development of land management plans	M	Land management plans will seek support from local landholders who will be consulted during the design, adoption and implementation of land management plans..	M
Broad geographical focus will dilute the impact of the project activities	M	Selection of project areas has undergone a thorough selection process to maximize chances of success and efficient deployment of project resources by focusing on a few pilots in each site. Strong coordination between national and local authorities is key factor for success.	L
Measures identified under the project may not be implemented	M	The project is a priority for INE. It is part of the national CC strategy and the basis for a future adaptation strategy for the Gulf Coast. Federal and local authorities are committed to project implementation and the project will be used as a basis for a wider effort under the PECC.	L
Given the long-term nature of the challenges, there is a risk that future administrations may not support its goals.	H	Strong involvement of state administrations (which will support the implementation locally) and local communities (which will be actively involved in the implementation) will strengthen the long term project goals. Agreements between INE and the municipalities in the areas of project intervention will be entered into as a covenant in the legal agreement seeking long term support by municipalities and maximization of social benefits. No project funds will be managed by the municipalities.	M
Coordination of pilot activities	M	Implementation arrangements consider one	L

will be complicated by involvement of national and local agencies.		coordinating agency supported by local agencies. An overall project coordinator will ensure the continuous liaison between the federal and local level.	
Pilots consider strengthening of conservation status and zoning tools which may be compromised by limited coordination between federal, state and local levels.	M	The project will work with agencies in charge of defining protected areas and land use plans and zoning: CONANP, SEMARNAT/INE and the municipalities. At the same time project activities provide opportunity to engage the local, state and federal levels in wetland conservation and to improve coordination.	M

Overall risk assessment: **Moderate; Controversial aspects**: There are no controversial aspects.

6. Loan/credit conditions and covenants: There are no planned Board conditions.

55. INE will sign agreements with the municipalities in the project area to stipulate that zoning regulations and management plans should not cause subsequent physical or economic displacement of population and are consulted at each stage with local stakeholders and communities. INE will sing agreements with local coordination institutions to ensure cooperation in the oversight of project activities at a local level.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

56. Given the long-term nature of the proposed project with its focus on integrating climate change considerations into the management of vulnerable ecosystems, it is difficult to identify one meaningful quantitative outcome indicator that best reflects the outcome(s) of the project. For that reason a qualitative approach was taken. During project formulation the project followed the approach recommended by GEF[10] for biodiversity projects and assessed various adaptation alternatives best suited to achieve the project's development objective. Under B.6 the different alternatives and the reasons for rejection are being described.

57. In addition to these alternatives, by seeking to address local and global threats to wetlands through the integration of conservation and climate change considerations in local land use plans the project makes use of synergies between local and global objectives. The focus on conservation and strengthening of the resilience of these ecosystems also benefits the sectors that depend upon functioning ecosystems such as tourism, fisheries, biodiversity, and coastal protection. The coordination with CONAGUA in the area of the project helps to address overarching issues that affect these ecosystems

2. Technical

58. The project's design is based on technical studies implemented during preparation, partially funded through a PDF-B grant. A full report on the results of these studies is in the project files. These studies allowed the identification of priority pilot sites based on their

[10] GEF/C.25/11; April 29, 2005: COST EFFECTIVENESS ANALYSIS IN GEF PROJECTS

vulnerabilities to the impacts of GCC as well as of adaptation options. In summary the studies focused on: Analysis of adaptation measures; Development of database of adaptation measures in other countries; Vulnerability assessment of the Mexican Gulf coast; Integration of adaptation options; Verification in the field of adaptation options; Program of adaptation measures and policies; Institutional analysis for adaptation measures; Social-economic analysis of pilot sites; Biophysical and ecological analysis, as well as support system for decision taking process; Anthropogenic impacts (Water use, soil use) in pilot sites; Modeling of GCC in pilot sites (the studies are filed in the project files). The results of the studies are archived in the project files and constitute a technical publication in Mexico.

59. **Baseline.** The project adds to a baseline of activities programmed by CONAGUA and PEMEX for the wetlands of the Gulf of Mexico, during the next five years, which includes four focal areas: a) wastewater treatment in the areas of influence of the project, including in the Alvarado Lagoon, b) monitoring of water quality in the selected wetlands; c) rationalization of water use practices for economic activities; and d) flood control. Baseline activities are taking place independently of the project and are part of CONAGUA's long term investment program in the water sector. However, these activities provide a basis and facilitate some of the interventions proposed under the project. Likewise, the project has the potential to influence some of the baseline actions. These synergies, discussed with CONAGUA, are summarized in figure 6 (relationship between the baseline investments and the anticipated adjustments brough about through the participation in the project).

Figure 6. Impact of project in scope of baseline activities

Baseline activities	**Modified activities**
CONAGUA	
Wastewater treatment	Adjustment of location and type of treatment to account for anticipated climate changes affecting their design (sea level rise, changes in physical properties of receiving waters)
Monitoring of water quality	Adjustment of location and scope of monitoring to account for anticipated climate changes including expected increases in salination of coastal inland waters
Rationalization of water use practices	Adjustment of programs and goals to account for changes in net runoffs and water tables
Flood control	Inclusion of consideration of intensification and changes in frequency of extreme weather events.
PEMEX	
Conservation of biodiversity and reforestation including riparian areas	Adjustment of reforestation and conservation programs to take into account expected sea level rise
Deployment of technologies to improve natural resources use	Identification of climate related impacts that would affect the use of natural resources
Community training	Inclusion of climate data and awareness in community training

60. **Selection process of pilot sites:** There are 42 Lagoon-Estuary Systems *(Sistemas Lagunares–Estuarinos)* along the entire coastline of the Gulf of Mexico and the Caribbean. Each of these systems in turn possesses a diversity of coastal wetlands. The selection process focused on systems representative of different ecological regions. During project formulation, selection criteria were defined and weights were assigned which were then applied to a long-list of sites. The selection criteria are described in detail in annex 13, and include: a) vulnerability to climate

impacts; b) status of conservation; c) biological value; d) degree of anthropogenic intervention; e) local implementation capacity.

61. **Identification of pilot measures:** The selection process included a literature review of adaptation case studies and related technical documents such as national communications and adaptation strategies in Mexico and worldwide. General adaptation measures were identified based on the threats and vulnerabilities identified. Measures were selected on the basis of conditions of the pilot sites, including biophysical characteristics, social, economic and ecological trends (land use changes), main threats associated with climate scenarios. The process included a specific vulnerability analysis regarding anticipated climate change impacts at each site. The list of the measures eligible under this GEF window were selected and presented for public consultation at each pilot site, after which final measures were selected.

Figure 7. Selected adaptation measures

Adaptation measure	Baseline	Issues addressed		Wet-lands involved	Benefits	
		Local drivers	Climate related		Global benefits	Local Benefits
Land Use zoning and wetland management: • Land use plans/zoning prepared and socialized	Limited land use planning and wetland manage-ment plans.	Un-sustainable land practices	Sea level rise Salination Extreme weather events	All	Reduction of ecosystem vulnerability to climate impacts Maintenance of critical habitat for migratory species	Reduction of unsustainable land use changes Protection of resource base of local economic activities such as fisheries, tourism,
Reforestation and conservation: • 20,000 ha entered into conservation status in local land use plans. • 5,000 ha reforested	Wetlands are subject to fragmenta-tion, deforesta-tion and degradation	Deforestation Unsustainable land practices	Sea level rise Extreme weather events	Alvarado Panuco Carmen	Increased resilience of wetland ecosystem Habitat for migratory species strengthened	Decreased erosion reduced flooding Maintenance of environmental services of wetlands
Sand bars and land barriers: • strengthening of the sandbars and land barriers	Sea level rise is threatening integrity of coastal wetlands		Sea level rise Extreme weather events	Alvarado Panuco Carmen	Increased protection of ecosystem	Protection of urban areas Reduced flooding Decreased erosion
Coral reef repopulation: • 10,000 m2 repopulated	Climate-induced coral bleaching is leading to coral mortality.		Sea surface temperatu re increase.	Punta Allen	Increased ecosystem resilience	Benefits for local economic activities such as ecotourism Benefits for other coral dependent species Strengthened buffer function

(in addition, though CONAGUA's participation, water quality will be monitored, and activities dealing with wastewater treatment, rationalization of water use and flood control will be implemented in these areas).

3. Fiduciary

62. **Financial management.** NAFIN is the financial intermediary. INE-SEMARNAT will be responsible for FM and procurement actions of activities funded through the SCCF (GEF).

63. **Auditing arrangements.** The audit of project expenditures will be carried out in accordance with terms of reference (TORs) prepared according to the Bank's audit policy in effect since July 1, 2003. The TORs and the appointment of the auditor are the responsibility of NAFIN. Operational, financial, and audit procedures will be detailed in the Operational Manual that will be sent for the Bank's no objection prior to project negotiations.

64. **Disbursement:** a project special account will be opened with the Bank's approval. The account will be managed by NAFIN which will be responsible for sending withdrawal applications together with adequate documentation in accordance with Bank disbursement procedures. The disbursements will be performed based on complete documentation of the expenditures reviewed by the Bank. The disbursement will be executed in accordance with statements of expenditures (SOEs). NAFIN will maintain documentation for the expenditures, clarifying their availability for review by the Bank and by independent auditors.

65. **Procurement:** The procurement arrangements will be included in the operational manual. INE-SEMARNAT will be responsible to follow standard Bank procedures for all project procurement, and will ensure enforcement in procurement by beneficiaries. An 18-month procurement plan and all procurement procedures will be included in the operational manual. Procurement will include consulting services, goods, civil works, and non-consulting services. Annex 8 provides more detail on procurement arrangements.

4. Social.

66. The project will benefit farmers, rural communities, fishermen cooperatives, eco-tourism activities through the implementation of interventions such as reforestation, water resource management, etc. Rural communities will benefit from project interventions and will be actively involved in the implementation and management of these adaptation measures. A consultation process has been undertaken at the four project sites. At each site, meetings and forums were held with local authorities (municipalities, state environmental authorities), communities' grass-root organizations such as fishermen cooperatives, farmer cooperatives, and local and regional NGOs and university development institutions as well as the participating institutions (SEMARNAT, CONANP, CONAFOR and CONABIO). A list of participants at each site is available in the project files. The consultation process has resulted in confirming the measures that will be undertaken at each site.

67. The project is not expected to trigger the social safeguard policies. There are no Indigenous Peoples in the four pilot sites selected for project implementation. The conservation efforts and creation of buffer zones will not restrict access to natural resource use in the case of the Alvarado site. The other adaptation measures are not relevant to the social safeguard policies. See Annex 14 for a more detailed presentation of social issues and project interventions. The preparation of land zoning regulations and management plans will incorporate social analysis to assess potential direct or indirect impacts of these regulations and plans on local population living in the relevant areas. INE will sign agreements with the municipalities in the project area to stipulate that such zoning regulations and management plans should not cause subsequent

physical or economic displacement of population and are consulted at each stage with local stakeholders and communities. The design and preparation of these plans will seek maximum participation and community benefits.

68. An agreement between INE and the municipalities in the areas of the project will be entered into to make sure that supported land use and zoning plans do not cause any physical or economic displacement, and are consulted at each stage with local stakeholders and communities.

5. Environment

69. No major adverse environmental impacts are anticipated. Minor environmental impacts may be expected from some on-the-ground investments. The project is designed to be entirely positive from an environmental point of view, particularly by protecting vulnerable ecosystems from the impact of GCC. Some expected direct positive impacts include: (i) reduced vulnerability of coastal ecosystems in the pilot sites; (ii) reduced uncertainty of impacts of GCC and improved planning of stressed water resources and ecosystem conservation; (iii) mitigation of impacts of unsustainable land uses; (iv) reduced vulnerability of and 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 the ecosystems; and (vi) strengthened resilience of environmental services in the face of climate change impacts. An Environmental Assessment will be performed as part of the design of the adaptation measures.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[x]	[ ]
Natural Habitats (OP/BP 4.04)	[X]	[ ]
Pest Management (OP 4.09)	[ ]	[X]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[x]
Involuntary Resettlement (OP/BP 4.12)	[]	[x]
Indigenous Peoples (OP/BP 4.10)	[]	[x]
Forests (OP/BP 4.36)	[x]	[ ]
Safety of Dams (OP/BP 4.37)	[ ]	[x]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[x]
Projects on International Waterways (OP/BP 7.50)	[ ]	[x]

7. Policy Exceptions and Readiness

70. No policy exceptions are required. The procurement plan for the first 18 months of operation will be ready by effectiveness. The project implementation plan for the first year of operation will be ready by effectiveness.

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.*

Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 1: Country and Sector or Program Background

1. In Mexico, the areas that are most vulnerable to increases in temperature and changes in the water cycle are water, forests and agriculture. In the coastal regions of the Gulf of Mexico, the impact on water resources and specifically, on the wetland regions, may be serious if action is not taken immediately.

2. Wetlands perform very important environmental functions that are critical for the economic activity in a wide area of the country. Wetlands are very productive ecosystems, essential for conserving biodiversity, because they support at least 40% of the species of fish and are major depositories of other fauna and flora. Together with rainforests, wetlands are the most threatened of the ecosystems. According to the Convention on Wetlands, wetlands are "areas of marsh, fen, peatland, or water, whether of natural or artificial regime, permanent or temporary, with water that is stagnant or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".

3. Wetlands have also great cultural value, since in many of them there are places of archaeological or historical importance recognized all over the world. In Mexico, some are, or are in, Protected Natural Areas. Many wetlands contribute to the recharging of underground aquifers, which store 97% of the non-frozen fresh water in the world, and which in many cases are the only source of drinking water for millions of people. Climate change and the resulting changes in the water cycle constitute a greater threat to the wetlands, already threatened by land use changes and the overexploitation of water resources. In future climate scenarios, it is highly probable that the wetlands will lose their essential characteristics when the water that characterizes them is reduced, as the result of greater evapotranspiration, combined with the overexploitation of this resource. IPCC evaluations indicate that Mexico may experience a significant reduction in run-off, in the order of 10 to 20% nationally, and of over 40% in the coastal wetlands of the Gulf. To this should be added the impact that the Gulf of Mexico wetlands, the tourism sector and human settlements will face as a result of the increase in average sea-levels and extreme events. Because of this, it is vital to formulate policies and measures for adaptation to climate change that will protect the wetlands, and their environmental functions and their biodiversity, mainly in the Gulf of Mexico.

4. The INE and the Metropolitan Autonomous University have completed the preparation phase of a four-year, multiannual project, with the technical and financial support of the GEF Adaptation Fund through the World Bank, by means of which climate change adaptation measures will be implemented in the Gulf of Mexico wetlands, in order to protect their environmental functions and rich biodiversity from the impacts of climate change (INE, 2006d). The project includes the definition of places of interest, the analysis of socio-economic conditions in the region, an inventory of the flora and fauna species that exist in these places, as well as hydroclimatic diagnoses that will help us to understand why the climate change factor presents a threat. An analysis of the wetlands and the environment will

lead to the proposal and implementation of adaptation strategies to reduce the vulnerability of these ecosystems to climate change, with special care for better water management in the region. As a first step for the proposed study, a collaboration scheme with Japanese climate scientists was established to analyze future climate change scenarios built using models with very high space resolution (20 km. These models are able to simulate the effect of cold fronts ("nortes") or hurricanes in the Gulf area, which are fundamental to the annual regional climate cycle. This capacity does not exist in traditional models, since their resolution is in the order of 300 km. In the next few months, the proposal will be defined in much more detail in order to begin climate change adaptation actions as soon as possible in the wetlands regions of the Gulf of Mexico. This study will be characterized by multidisciplinary, inter-institutional work involving collaboration with stakeholders, so that the experiences acquired can contribute toward designing a better climate change adaptation strategy in a greater number of sectors and regions of Mexico.

PDF key results, vulnerabilities

5. During the PDF B phase, consultants were contracted to carry out a series of studies to design the implementation phase of the project. These studies resulted in: define relevant characteristics of the pilot sites, selection of criteria to determine sites; identification of potential sites, definition of threats due to climate change, and definition of adaptation measures and identification of appropriate measures for each site. The studies also included a socio-economic analysis of the sites, the analysis of anthropogenic impacts in the sites resulting in defining the baseline for land use changes and water use, and the diagnosis of their bio-physical and ecological conditions.
6. Once the pilot sites were defined, their specific vulnerability to GCC associated threats was analyzed, including identification of vulnerable populations, reasons for vulnerability, degree of vulnerability, suggested adaptation measures to the identified vulnerability and elements that should be considered; in parallel a set of measures were defined to respond to the general threats and, finally, a list of possible measures for the eight specific sites were defined. During the Veracruz workshop, priority criteria were applied to the set of adaptation measures, which yielded three categories of measures: preparation, institutional strengthening and implementation measures. These categories were considered for the definition of the work-plan or chronogram.

Adaptation to Climate Change in the region:

7. The Latin America region has the largest and longest adaptation portfolio in the institution and also the largest from any multilateral agency working on the issue. This lead is the result of the combination of solid advances on the conceptualization of the problem and of the implementation of practical actions on the ground. Today the LAC portfolio in adaptation includes 8 full size projects in implementation or at various stages of adaptation.

The region's work on adaptation has been guided by four principles:

a) It focuses on addressing impacts induced by documented trends (*verbi et gratia*: the rapid retreat of glaciers in the Andes, the destruction of corals in the Caribbean) which have been widely documented in the scientific and technical literature, rather than on

variability of climate conditions, the latter being less certain and more subject to natural variations;

b) It has an ecosystem approach (impacts on ecosystems and the services these provide, rather than on economic sectors), making it clear that climate impacts are affecting the natural cycles, that affect not just human activities. The focus on impacts on the Andes addresses the effects of climate change in water supply, power generation but also ecosystem integrity;
c) It recognizes that at the current level of resources, the breadth of what is possible to finance falls into the "pilot activities" category. Still, it is through these pilots that information is being obtained on the costs and benefits of adaptation measures, as a prelude and guide to a much required next stage when massive resources will be required to address the impacts of climate change;
d) It understands that most countries in the region are at best marginal contributors to the problem (with the exceptions of Brazil and Mexico, see table 2, the inclusion of land use change related emissions, makes Brazil much more GHG intensive) and thus these impacts are not necessarily caused by their emission contributions.

8. Further, the work on adaptation focuses on "Climate Hotpots" in the region. To visualize regional climate impacts, it is useful to introduce the notion of Climate Hotspots, as those including ecosystems that are particularly affected by the physical consequences of climate change. The emphasis on ecosystems is required as there has been a tendency to characterize climate impacts solely in terms of economic damages to affected human populations. Climate impacts intrinsically reflect in changes to the biosphere, affecting all living species, not just humans. Because, it has been so difficult to assert the value of nature, it has become frequent to ignore the impacts of climate on ecosystems when addressing the consequences of climate change.

Thus defined, the key climate hotspots in the region are constituted by:

a) Collapse of the coral ecosystem in the Caribbean, which is seen to have major implications for biodiversity, tourism and fisheries amongst other economical activities.
b) Risk of collapse of the Amazon as a functioning forest ecosystem, with global and regional implications.
c) Rapid glacier retreat with consequences on water supply for Andean cities, power, agriculture and ecosystem integrity
d) Impacts from intensification of hurricanes in the Caribbean basin.
e) Reduced precipitation in the Mesoamerican region.

9. Other systemic impacts in agriculture, climate variations and changes in water cycle are less clear at the moment and require of further advances in science and better documentation. Strategically, the work on adaptation was focused on the promotion of specific adaptation measures that respond to impacts on key ecosystems. It is anticipated that this work could be used as a springboard to incorporate adaptation at a sector level including sector planning and policy making in the region.

Characterization of anticipated climate change in the Wetlands of the Gulf of Mexico

	PERIOD / CLIMATE CHANGE					
PILOT SITE	**2010-29** **□T (°C)□** **□PCP (%)** **EVENTS** **EXTREMES** **IMPACTS**	**2030-69** **□T (°C)□** **□PCP** **EVENTS** **EXTREMS** **IMPACTS**	**2070-2099** **□T (°C)□** **□PCP** **EVENTS** **EXTREMS** **IMPACTS**	**PRINCIPAL THREATS**	**CRITERIUM**	**STRATEGY OF ADAPTATION**
Río San Fernando	1° - 2° C apr – sep -5 to +5 % Heat waves + evap (5%) + Storms Intense hurricanes	2 - 3 apr – sep -10 to 0 % Heat waves +evap (10%) Droughts + storms intense hurricanes + sea level North storms	3 - 4 apr – sep -10 to -5 % +evap (15%) Droughts + sea level Intense hurricanes Heat waves + storms	1. Drought 2. Extreme heat events	Temperatures increment of 1 to 2° C for each 30 year period.	- Water resources management - Climate information (early warning system)
Río Pánuco	1 – 2° apr – sep -5 to 0 Heat waves + evap (10%) + Storms, North Storms Intense hurricanes	2 – 3° apr – sep -10 to -5 Heat waves + Storms, north storms Floods Intense hurricanes	3 – 4° C apr – sep -10 a -5 + Storms, north storms, Floods Heat waves Intense hurricanes			
Rio Papaloapan	1 – 2° C may – sep -5 a +10 +Storms, Intense north storms, Heat waves	1 – 2° may – sep -5 a +10 +Storms, intense north storms, Floods, Heat waves	2 – 3° may – sep -5 a +10 +Storms, Floods, Intense north storms Heat waves	1. Sea level rise. 2. Floods (Storms)	Increased peaks in hydrological cycle.	- Infrastructure measures. - Improved water management - Climate information (early warning system)
Río Coatzacoalcos	1– 2° may – jun -5 a +10 + storms, Intense north storms Sea level rise Heat waves	1-2° may – jun -5 a +10 + storms, Intense north storms Sea level rise Heat waves	2– 3.5° may – jun -5 a +10 + Sea level + storms, Floods Intense north storms			

Sistema Lagunar Carmen	1 – 2° abr – sep -15 a +5 + storms heat waves Droughts, Forest fires	2 – 3° abr – sep -15 a +5 Heat waves + sea level Droughts + Storms	2 – 4° abr – sep -15 a 0 Heat waves + Sea level + Intense storms	1. Extreme heat events 2. Floods, (storms, hurricanes)	Temperatures increment of 1 to 2° C for each 30 year period.	- Climate information (early warning system) - Forest-fire prevention
Sistema los Petenes	1– 2° jun – oct -5 a +5 + storms, Intense hurricanes Heat waves	1– 2° jun – oct -5 a +5 Intense hurricanes heat waves + storms	2– 3.5° jun – oct -5 a +5 Intense hurricanes heat waves + storms,			
Cancún	1 – 2° jun – oct -5 a 0 Intense hurricanes + storms, North storms	1 – 2° jun – oct -5 a -0 Intense hurricanes + Sea level Floods + storms, North storms	2 – 3° jun – oct -10 a -5 Intense hurricanes Floods, + Sea level + Storms	1. Hurricanes 2. Sea level rise	Increase in sea-surface temperature promote greater instability of the system which, in turn, derive in a probability that hurricanes are more intense.	- Climate information (early warning system) - Adequate construction norms
Punta Allen	1 – 2° jun – sep -5 a 0 Intense hurricanes Sea level rise + Storms	1 – 2° jun – sep -5 a 0 Intense hurricanes Sea level rise, Floods, + Storms	2 – 4° jun – sep -10 a 0 Intense hurricanes Sea level rise, Floods, + Storms			

Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

The Bank has a significant environmental portfolio of climate-related interventions, mostly related to environmental management. These have been summarized in the following tables:

Sector Issue	Project Name	Status	Implementation
Special Program on Adaptation in the Caribbean: SPAC Climate change vulnerability of coastal areas, availability of GCC impacts information	Dominica, St. Lucia, and St. Vincent & the Grenadines: Implementation of Pilot Adaptation Measures in coastal areas of Dominica, St. Lucia, and St. Vincent & the Grenadines (GEF)	On going	Moderately satisfactory
Climate change vulnerability, Natural disaster management, Environmental policies and institutions, Vulnerability assessment and monitoring	The Caribbean: Mainstreaming Adaptation to Climate Change (GEF)	Ongoing	Moderately satisfactory
Renewable Energy, Climate Change vulnerability of high-mountain ecosystems and of water resources	Colombia: Amoyá Environmental Services Project	Ongoing	Moderately satisfactory
Climate change vulnerability assessment, adaptation planning and related capacity building	Caribbean Planning for Adaptation to Global Climate Change Project (GEF).	Closed	Satisfactory
Restoration of agricultural capacity in drought-stricken areas; vulnerability reduction measures; flood protection and restoration of water supplies in low-lying areas	Guyana: El Niño Project (IBRD)	Ongoing	Satisfactory
Climate change vulnerability, Flood protection, health	Colombia: Integrated National Adaptation Project, INAP	Ongoing	Satisfactory
Climate change, Vulnerability to rising sea level and increased frequency and intensity of hurricanes	Central America, Regional: Addressing impacts of Climate Change on the Caribbean coast of Central America	In preparation	
Biodiversity(P); Climate change(S); Environmental policies and institutions(P); Land administration and management(S); Other environment and	MX environmental services	Ongoing	Satisfactory

natural resources management(S) General agriculture, fishing and forestry sector			
Irrigation & drainage(30%); Forestry(70%); Climate change(P); Water resource management(S)	Trinidad Tobago – Nariva Wetlands	In preparation	
Forestry(14%); Gen agr/fish/for sec(29%); Gen energy sector(14%); Gen wat/san/fld sect(29%); Other industry(14%); Climate change(S); Environmental policies and institutions(P); Water resource management(S)	Env DPL III	Closed	Satisfactory
Forestry(100%); Indigenous peoples(P); Rural non-farm income generation(P); Other environment and natural resources management(P)	Community Forestry III	In preparation	
Forestry(25%); Gen energy sector(25%); Gen wat/san/fld sect(50%); Climate change(P); Environmental policies and institutions(P)	Climate Change Development Policy Loan	Ongoing	Satisfactory
Forestry(58%); Central govt admin(22%); Other social service(20%)	Consolidation of the Protected Areas System Project (GEF)	Ongoing	Satisfactory
Animal production(8%); Gen agr/fish/for sec(50%); Central govt admin(21%); Gen education sector(13%); Other industry(8%); Export development and competitiveness(P); Biodiversity(P); Environmental policies and institutions(P); Water resource management(P)	Conservation and Sustainable Use of the Mesoamerican Barrier Reef System II	in preparation	
Forestry(80%); Gen wat/san/fld sect(20%); Rural non-farm income generation(S); Climate change(P)	Mangroves restoration and Carbon Sink Project	at concept stage	
transport, climate change	Mexico CTF IP	in preparation	

Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 3: Results Framework and Monitoring

PDO	Project Outcome Indicators	Use of Project Outcome Information
The objective of the project is 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 would provide information on the costs and benefits of alternative approaches to reduce their vulnerability, assessing also the overall impacts of climate change on national water resource planning, with a focus on coastal wetlands and associated watersheds.	• Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions • Four Wetland management plans and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions. • 15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals • 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 CC into water resources and wetland management and planning	
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
Component 1: Experience gained in incorporating climate change in developing wetland management plans and designing interventions to increase resilience Wetland monitoring capabilities strengthened as input to improved management of sensitive and vulnerable ecosystems Facilitate the development of long term management and monitoring of	• At least 6 pilot adaptation measures count with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation • Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[11] satellite) • Technical report on sustainability strategy for pilot adaptation measures •	Basis for definition of pilot adaptation activities to be implemented.

[11] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

selected ecosystems		
Component 2 (Investment). Increased knowledge of cost and benefits of adaptation in coastal wetlands in Mexico Increased ability to mainstream climate change considerations in land use plans Increased competence to incorporate wetlands protection in municipal land use plans	**Panuco:** 10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities **Papaloapan:** Alvarado Lagoon under management plan incorporating CC impacts Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise **Tabasco:** Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors 4 km of Sandbars separating the coastal lagoons from the sea stabilized. **Siam Ka'an:** Protected area monitoring system strengthened including climate change parameters Land use plans including climate change considerations developed for buffer area An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.	Provides the basis for costs and benefits of adaptation measures in coastal wetland ecosystems.
Component 3 Support the strengthening of the knowledge base required to mainstream climate change in water resources management and planning	• Climate change impact scenarios developed for national water resources and for coastal wetlands including identification of response options.	Supporting information for definition of response options

Arrangements for results monitoring

		Target Values					Data Collection and Reporting		
Project Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions	No adaptation measures in selected coastal wetlands	At least one measure is ready to start implementation; monitoring data generated; sustainability aspects included in pilot measure design.	At least 2 ready under implementation	At least 5 under implementation	At least 6 under implementation	Implemented measures provide results on adaptation approaches in wetlands; monitoring system fully operating and generating continuous data.	Bi annual supervision reports	Supervision visits, ALOS images, land cover and land use data, GIS	INE with local coordi-nators
Four Wetland management plans (WMP) prepared and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to deciding authorities and supported by local and state institutions.	Limited availability of WMP (exception Sian Ka'an); existing ones do not consider CC information or expected impacts	WMP including CC impacts designed for at least one site	2 WMP prepared and submitted for approval to deciding authorities	1 WMP considered for its adoption		At least one WMP updated based on relevant climate change data. At least t three WMP prepared.	Annual report, management plan	Annual review, ALOS images, land cover and land use data, GIS	INE with local coordi-nators
15,000 to 20,000 ha entered into conservation status in local land use plans & 5,000 ha reforested	no adaptation measures in pilot sites	Conservation, forestry, stabilization, coral repopulation	2000 ha reforested with native species; land use plans	Conservation plans implemented in 10000 ha;	Conservation plans implemented in 15000 ha; 4000 ha	Conservation plans implemented in up to 20,000 ha,	Annual report, conservation strategy,	Annual review, ALOS images, land	INE with local coordi-nators CONA-

with native species that would add to climate-resilience of coastal wetlands; 3,000 to 4,000 meters of coastal bars stabilized that address threat of sea level rise; 5,000 to 10,000 m2 of reefs repopulated with temperature-resistant corals		measures designed	reviewed and adjusted considering cc impacts on wetlands;	3000 ha reforested with native species; coral nurseries completed	reforested with native species; coastal stabilization works under execution	5000 ha reforested with native species; coastal stabilization works finished on up to 4000 m; up to 10,000 km2 of reefs repopulated;	reforestation plan, land use plans	cover and land use data, GIS	FOR, CONANP
Production and dissemination of practical guidance document on cost and benefits of adaptation measures in coastal wetlands as a basis for replication efforts					implemented measures provide data on cost and benefits of adaptation approaches in wetlands and are compiled in a guidance document	Guidance document is being disseminated and serves as basis for replication efforts	Draft and final Guidance document	Supervision visits, data generated from implemented pilots	INE
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	no response options defined yet on cc impacts in national water resources management	Scenarios of CC impacts on national water resources developed	Response options identified	Supporting studies at one emblematic basin concluded.	At least one national water resources management response option identified that considers CC impact scenarios		Annual report, minutes of meetings with IMTA/CONAGUA	List of viable policy options	IMTA/ CONAGUA
Intermediate Outcome Indicators									
Component 1: Detailed design of key selected adaptation measures									

At least 6 pilot adaptation measures with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation	Pilot sites don't consider adaptation yet	at least one measure designed	at least 2 designed measures under execution	at least 5 designed measures under execution	at least 6 designed measures under execution	implemented measures provide results on adaptation approaches in wetlands	Annual report, design progress reports, costs and benefits	Final design	INE with local coordi-nators
Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[12] satellite)	Limited monitoring of pilot wetlands, limited monitoring of CC data in pilot site areas	Availability of ALOS images and capacity to store and assess data and images	Modeling, generation of data, analysis, and access to information and long-term remote sensing	Pilot wetlands count with operating monitoring tool		Modeling, generation of data, analysis, and access to information and long-term remote sensing (though the ALOS[13] satellite)	wetland monitoring plans	ALOS images, other monitoring data	INE
Technical report on sustainability strategy for pilot adaptation measures	no adaptation pilots	sustainability aspects incorporated into pilot measures design	Sustainability strategy developed			Sustainability strategy updated based on project results seeking continuation of results	Sustainability strategy report	Preparation and supervision reports	INE
Component 2: Implementation of pilot adaptation measures in four selected wetlands highly vulnerable to the effects of climate change									
Site 1 Panuco: 10,000 ha of Panuco-Altamira Wetlands under pilot adaptation measures and 10 km of land barrier strengthened	Lagoon la Escondida has limited adaptation efforts	Design completed	Adaptation measures implemented benefiting 2000 ha and strengthening of natural barrier initiated	Adaptation measures implemented on 5000 ha	Adaptation measures implemented on 8000 ha	Adaptation measures implemented on 10,000 ha; 10 km of natural barrier strengthened	Conservation and reforestation plans; semi-annual reports	supervision, annual review	INE with local coordi-nator

[12] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.
[13] Advance Landscape Observation Satellite, under an MOU with the World Bank and JAXA.

Site 1 Panuco: Coastal zoning regulation taking into account anticipated climate impacts submitted for approval to deciding authorities	Coastal zoning does not take CC impacts into consideration and unsustainable practices continue weakening ecosystem's resilience	Studies for the development of coastal zoning plans concluded including relevant CC data and sustainable management practices	Coastal zoning regulation formally submitted to deciding authorities.	Climate resilient coastal zoning regulation considered for adoption by deciding authorities			Updated Coastal zoning regulation with CC scenarios and practices that strengthen wetland functioning; Semiannual reports	supervision, annual review	INE with local coordi-nator
Site 2. Papaloapan Alvarado Lagoon under management plan incorporating CC impacts	Conservation management plans do not take CC impacts into consideration unsustainable land use practices in the buffer zone prevail	Technical studies supporting a conservation management plans prepared for the Alvarado Lagoon and its buffer zone	Conservation management plan prepared, socialized and submitted to deciding authorities	Conservation management plan considered for adoption by deciding authorities			Updated conservation management plans for wetlands; Semiannual reports	supervision, annual review	INE with local coordi-nator
Site 2. Papaloapan Implementation of buffer zone around the lagoon including reforestation of up to 10,000 ha	no buffer zone around lagoon	buffer zone identified and designed;	10% of the buffer zone engaged	25% of the buffer zone engaged	40% of the buffer zone under recommende d practice	50% of the buffer zone under recommended practices	Buffer zone plans; semiannual reports	supervision, annual review, ALOS images	INE with local coordi-nator
Site 2. Papaloapan Construction of a 2 km pilot stabilization barrier to buffer extreme weather events and future sea level rise	Surveys indicate active erosion along coastal bar	Coastal stabilization options identified	Technical design of coastal bar stabilization concluded.	Works for the stabilization barrier initiated	Stabilization barrier finalized	Cost and benefits of stabilization barrier assessed	Design of barrier; Semiannual reports	Supervision , annual review flood control monitoring	INE with local coordi-nator
Site 3 Tabasco	fragmentati	Corridors	Financial	2000 ha under	4,000 ha	5000 ha	Semiannual	Annual	INE with

Land zoning regulations revamped including climate change considerations 5000 ha of the Carmen-Pajonal-Machona Wetlands benefited with biological corridors	on between protected areas	designed taking into consideration CC scenarios and migration routes	instruments and procedures to promote reforestation along biological corridors defined	contract for conservation reforestation with native species;	under contract for conservation reforestation with native species	under contract for conservation reforestation with native species;	reports, reforestation plan	review, ALOS images, land cover and land use data, GIS	local coordi-nators
Site 3 Tabasco 4 km of Sandbars separating the coastal lagoons from the sea stabilized.	Sandbar in process of destabilizati on	Strengthening of sandbar designed	Procurement process for strengthening of sandbar initiated	Strengthening of sandbar under construction and erosion monitored	Sandbar stabilization finalized and erosion parameters monitored	Performance evaluation of activities to strengthen sandbar conducted and recommendat ions shared among participating agencies and stake-holders.	Design of strengthening measures; erosion monitoring reports, Lagoon salinity level monitoring reports, Semiannual reports	Supervision , annual review, ALOS	INE with local coordi-nator
Site 4. Siam Ka'an Protected area monitoring system strengthened including climate change parameters	Monitoring of wetland does not include CC data.	CC data identified and collection program and protocols defined.	CC data part of monitoring program of wetland				Monitoring plan with CC data; Semiannual project reports	supervision, annual review; climate models	INE with local coordinato r
Site 4. Siam Ka'an Land use plans including climate change considerations developed for buffer area	Neighboring communities do not have land use plans;	Data and information for land use plans updated;	Update of land use plans through participatory processes;	At least on land use plan under consideration by deciding authorities;			updated land use plans, Semiannual project reports	supervision, annual review	INE with local coordinato r
Site 4. Siam Ka'an	Repopulatio	Design of	Nursery sites	Coral	up to 10,000		repopulation	supervision,	INE with

An area of 10,000 m2 of coastal reefs repopulated on a pilot basis to maintain their buffering capability and protection of the coastal wetland.	n not included in coral reef conservatio n programs.	repopulation plan and selection of adequate native species and nursery sites	developed	repopulation pilot initiated	m2 of reef under repopulation and monitored		plans; semiannual progress reports	annual review	local coordinato r
Component 3: Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options.									
Climate change impact scenarios developed for selected basins and for coastal wetlands Data on actual and future water resources availability in selected wetlands generated as basis for definition of response options	National policies do not yet incorporate cc impacts on water availability.	Scenarios of CC impacts on national water resources developed	Response options designed	Supporting studies at one emblematic basin concluded.	At least one national water resources management response option identified that considers CC impact scenarios		Annual report, Studies, CC data on national and priority watershed level	List of viable policy options	IMTA/CO NAGUA

Arrangements for results monitoring

Institutional issues:
INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist. Monitoring and evaluation of project outcomes/results (both intermediate and end-of-project) will be coordinated by the project staff in the GPS. The project manager will be responsible for monitoring project performance with the assistance of the regional institutions.

The project will be guided by semiannual learning reviews of project results to coincide with Bank supervision missions on which basis the GPS and the Bank will identify specific measures to: (i) address any areas of implementation weakness, and (ii) adapt project design to ensure that objectives are met. These measures for improvement will be reflected in GPS's semiannual learning reports and its proposal for the forthcoming year's Annual Implementation Plan including project budget.

INE-SEMARNAT will monitor financial and procurement management for the project. Financial information on inputs, outputs, budgeting, treasury, accounting, and audits will be monitored. The latter activity will be performed by an externally hired consultant. The project will send to the Bank quarterly financial management and procurement reports. Monitoring and processing of procurement for services, goods, works, and subprojects will be carried out by INE-SEMARNAT's project staff. The annual planning processes will be monitored with specific indicators on planning performance defined in the Results Framework. The project's physical implementation will be monitored based on the specific outputs and monitoring indicators for project components as defined in the Results Framework. Information from the monitoring system will be analyzed by project management and disseminated according to the project's communication strategy to appropriate stakeholders. The project will provide the Bank with quarterly progress reports and an update on legal covenants compliance every six months.

The monitoring and evaluation process will function as a mechanism for assessing project impacts and as a day-to-day management tool. A baseline study will be carried out at inception, and follow-up evaluations at both midterm and project closing. Site-specific baseline studies, as required will be complemented before work begins in the pilot areas; baseline studies will be shared with local NGOs and other national institutions. Specific project implementation monitoring data will be provided in agreed-upon report formats, included in the operational manual, and will be required for the twice-yearly supervision missions. INE, with the help of the Steering Committee, will develop the project monitoring system that will record planning, physical implementation, performance of local technical assistance and development objective indicators from the project's Results Framework.

Data collection
Project activities will be reported to the GPS. INE-SEMARNAT will be responsible for compiling data and reporting to the World Bank.

Semiannual evaluations
Semiannual discussions are planned to coincide with supervision missions to identify and discuss lessons learned during project implementation with project stakeholders and beneficiaries. Project staff will submit semiannual reports on lessons learned and plans for incorporating those lessons into future activities.

Midterm Evaluation

The Bank's supervision team, together with a team of external reviewers and key stakeholders, will conduct a midterm evaluation of project execution. It will be conducted no later than three years after the first disbursement. The external review will focus on: (i) progress in achieving project outcomes, (ii) institutional arrangements for project implementation, (iii) operational manual for payments, (iv) review of both the project implementation plan and general project operational manual. In preparation for the midterm review (MTR), the Steering Committee, together with the local implementing agencies, will prepare a working book containing the following information: (i) executive summary of the overall project status, (ii) up-to-date description of the overall components' development and indicators; and (iii) detailed description of the status of the proposed adaptation pilots by catchments.

Final Evaluation

A final evaluation will be conducted in the last semester of project execution. The key objectives of the final evaluation will be to: (i) assess attainment of the project's expected results, (ii) use the results to design a strategy for replication in future projects, and (iii) design a strategy for mainstreaming future adaptation activities in the participating countries.

Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 4: Detailed Project Description

Component 1. Detailed design of key selected adaptation measures .

1. **Detailed design of pilot adaptation measures.** This activity will complement and complete any required additional designs for the pilot adaptation measures, including: a) Mainstreaming climate change considerations in wetland management plans; (b) Technical, engineering design of adaptation pilots; (c) M&E system design to measure and monitor the impacts of adopted measures; c) development of methodologies to assess impacts; (d) design of very long term sustainability strategies.

2. **Development of a methodology for, and assessment of, the anticipated physical impacts of intensified hurricanes, extreme rainfalls and storm surges on the Gulf Coast of Mexico (supported under a companion CCIG grant).** The activity seeks to quantify the impacts resulting from the anticipated intensification of hurricanes as a consequence of climate change. This information will be used to develop potential adaptation measures. The component will be assisted through a partnership with the Georgia Institute of Technology, a leading academic institution with regard to analyzing the impacts of climate change on intensified hurricanes. A methodology for the assessment of these impacts and projected results will be produced and made available for application in other coastal areas, globally.

3. **Assessment of the expected impacts of global climate change in the hydrologic response of Gulf of Mexico watersheds (supported under a companion CCIG grant).** This component would support the GOM's efforts to strengthen the scientific basis to better assess the impacts of climate change on its dwindling water resources and to support the water regulation design process. Emphasis will be made to develop tools to explore the expected future water flows to coastal wetlands, the final users of water in basins draining to the Gulf. This effort will be complemented through the use of the Advanced Land Observing Satellite (ALOS) for remote sensing of coastal wetlands in order to analyze the behavior of wetlands/coastal ecosystems in the face of intensified hurricanes as well as their function as a possible buffer. The following activities will be supported:

(a) **Modeling of future climate in the Gulf of Mexico area at a high resolution.** Results from the latest and more sophisticated models (Earth Simulator and NCAR's new generation of analytical tools) will be applied with emphasis on downscaling the information to make it useful for hydrologic analysis. This activity will allow the use of generalized climate data, with hydrologic models based on high resolution descriptions of the terrain, and the operation rules imposed by water resources managers.

(b) **Remote sensing monitoring of wetlands in the Gulf of Mexico.** ALOS information will be analyzed to provide land use and vegetation data to feed into hydrologic models. This activity will support INE and INA efforts to see the evolution of the wetlands and the eventual response from the implementation of adaptation measures.

4. **Economic assessment of implications from climate change impacts on coastal wetlands (supported under a companion CCIG grant).** This component will support an economic assessment of the impacts of climate change on coastal ecosystems, based on data generated.

Component 2. Implementation of pilot adaptation measures in highly vulnerable wetlands.

Characteristics of pilot sites

5. Coastal wetlands have been identified by the Mexican Government as the most critical and threatened ecosystems by climate change (INE-SEMARNAP, 1997; INE-SEMARNAT, 2001, 2006); these impacts include for example, the changes in rainfall patterns, which will cause alterations in water supply to these systems, and an increase in hurricane and storm frequency and severity, with the subsequent physical damage to local biological communities; a rise in water temperature, which will affect the survival of coral communities by creating bleaching events; a probable increase in parasites and algal overgrowth; changes in ocean patterns, which will affect the global transport of nutrients, oxygen, and larvae; marine water acidification, which will affect the successful subsistence of calcium fixing organisms; and a rise in sea level with the consequent saline intrusion to coastal estuaries and lagoons.

6. The wetlands have a great ecologic and economic importance because of their great biodiversity and for being a “living storeroom” of marine organisms that depend on them to complete a part of their biological cycle and because of the numerous economic services provided to the populations in the area (freshwater supply, fisheries, water for agriculture and tourism).

7. The climate change scenario considered for purposes of the project estimate that the Gulf Coast wetlands will face 1 to 4 °C temperature rises, reductions in rainfall of -5 to 15%, increases in evaporation rates, more intense north winds and storms, an increase in sea level and more intense hurricanes. Changes in land will exacerbate these effects. Based on the results obtained from the trends in land use (1976 – 2000), it was determined that the main causes of the changes (attractors) for wetlands (classified as hydrophytic vegetation), was the conversion of these zones to grazing lands, seasonal farming activity and human settlement expansion. According to the latest research, the changes in land use, projected by 2020, these trends would continue, unless actions are taken today.

8. A 20 year land use projection estimates a reduction in the areas with a greater density of vegetation, the disappearance of mangroves and an increase in areas with sparse vegetation, such as grazing lands. This change is very important since poorer vegetation causes a lesser infiltration and an increase in runoffs. It also diminishes friction between the runoff and the soil surface, increasing the speed of the currents. The change in land use will have important impact

on the climate on a regional scale. These trends highlight the relevance of adopting and enforcing land use planning in the region.

9. **Ecological Importance:** Mexico has a mangrove surface area of 0.5 million ha (43% in the Gulf of Mexico (GM). The GM coast is bordered by estuaries, bays, and coastal lagoons that serve as refuge, feeding and breeding areas for numerous species that represent the most important riverbank fisheries. Moreover, the coastal swamps of Tabasco and Campeche are refuge to 45 of the 111 aquatic plant species recorded for México, which makes them the most important aquatic plant reserve in Mesoamerica. In these ecosystems, there are numerous bird populations (resident as well as migratory species), mammals, reptiles, amphibians, fish and invertebrate species. The pilot sites identified for applying adaptation measures to restore the coastal wetlands are also amongst the most important areas for bird conservation in the GM.

1) Río Panuco Lagoon system of: Altamira/Ciudad Madero/Tampico. States of Tamaulipas and Veracruz. Municipalities of Altamira, Tampico, Ciudad Madero, Pánuco, Pueblo Viejo y Tampico Alto. Area, 165,355.37 has. Latitude (A: 22°0'27'', B: 22°31'49''), Longitude (A: 9 7°46'56'', B: 98°22'40'').
2) Lagoon system of Carmen-Pajonal-Machona: State of Tabasco, Municipalities of Cárdenas and Comalcalco. Area 67,531.85 has. Latitude (A: 18°10'44'', B: 18°26'9''), Longitude (A: 93°20'57', B: 93°53'35'').
3) Río Papaloapan-(Alvarado lagoon): State of Veracruz, Municicpalities of Alvarado, Tlacotalpan, Acula, Ignacio de la Llave e Ixmatlahuacan. Area 83,821.52 has. Latitude (A: 18°30'27'', B: 18°53'12''), Longitude (A: 95°33'50'', B: 95°58'56'').
4) Punta Allen, State of Quintana Roo (Municipality of Tulum. Area 305,891.16 has; Latitude 19º 24'40" - 20º 09'35"N; Longitude 87º 56' 42" - 87º 23' 36" O.

Baseline Investments. With the cooperation of CONAGUA, the activities proposed under the project will add a climate overlay and influence the design of CONAGUA's interventions where possible. The intended overlays are summarized below.

Impact of project in scope of baseline activities

Baseline activities	Modified activities
Wastewater treatment	Adjustment of location and type of treatment to account for anticipated climate changes affecting their design (sea level rise, changes in physical properties of receiving waters)
Monitoring of water quality	Adjustment of location and scope of monitoring to account for anticipated climate changes including expected increases in slaination of coastal inland waters
Rationalization of water use practices	Adjustment of programs and goals to account for changes in net runoffs and water tables
Flood control	Inclusion of consideration of intensification and changes in frequency of extreme weather events.

Wetland Río Panuco, Corredor Sistema Lagunar: Altamira/Ciudad Madero/Tampico, Tamaulipas

10. The lagoon system of Panuco-Altamira is located in the coastal plain of the northern Gulf of Mexico between the states of Tamaulipas and Veracruz. The rivers Panuco and Tamesi limit these federative entities. It is composed of extended salt marshes. The estuary system is home to a red of lagoons that are alimented by the deltas of these rivers. The river Panuco includes in its totality the hydrological region 26 which is located inside the Northern Gulf CONAGUA Administrative region IX. The watershed occupies the fourth rank of the country with regard to the surface that it drains and the fifth rank in terms of runoffs. The Panuco River receives its water contributions from the states of Mexico, Guanajuato, Hidalgo, Nuevo Leon, Puebla, Querétaro, San Luis Potosí, Tamaulipas, Veracruz y el Distrito Federal. More than 15 million inhabitants are estimated to be living along its catchment.

11. The climate is sub-humid and hot at this site with an average temperature of more than 22C, and wide temperature fluctuations between 7 and 14C. Between the months of June to October, cyclones can cause major damage because of the wind and precipitation intensity which can be 200km/hour and 90mm/day. During the winter the precipitation is influenced by strong Nortes. The entire area is highly exposed to hurricanes and to sea level rise.

12. In terms of ecological relevance the estuary system of Panuco Altamira is considered one of the terrestrial, marine and hydrological priority regions. It includes the natural protected area of "La Vega Escondida". It has also been denominated as an area of importance for the conservation of birds, and is considered a site of international importance according to the Ramsar convention. Finally it has also the classification of a reserve in the *Red Hemisférica para Aves Playeras* (WHSRN). Mangroves are being protected under the official Mexican norm NOM-ECOL-059-2001. This system is considered as one of the priority wetlands for the conservation of waterfowl[14]l. The wetland hosts hydrophilic vegetation of tropical wetland types such as different mangroves species (red, white, black) and other species typical for freshwater bodies.

Anthropogenic impacts:

13. The environmental problems in the lower Rio Pánuco watershed are due to the pollution of the tributaries, mostly because of industrial pollution sources from the center of the country and sewage water discharge. The estuary system of Panuco-Altamira is subject to pressures that derive mainly from the oil industry, agricultural activities and the expansion of the urban area of the Tampico-Altamira-Ciudad Madero. Agro-industrial activities in the area further contribute to the deterioration of the water bodies and its wetlands. The conversion of forest areas into pastureland is very widespread in the region. The Panuco River is highly contaminated because

[14] **a) Avifauna.** 208 bird species have been recorded here, of which 45% are migratory[14]
b) Other wildlife that depends on the wetlands. Species with NOM-ECOL-059-2001designation: Manatee (*Trichechus manatus*), special protection; and Kemp-ridley turtle (Lepidochelys kempr), in danger of extinction. **Plant communities/Surface (Ha):** Oak forests/423.83; Mangroves/1637.14; Popal-tular/11802.14; Caducifolia and subcaducifolia lower jungle/ 10902.31; Halophytic and gypsophila vegetation/3384.59. **Species with NOM-ECOL-059-2001 protection:** Red Mangrove, *Rhizopora mangle*, special protection; Black Mangrove, *Avicenia germinans*, special protection; and, White Mangrove, *Laguncularia racemosa*, special protection.

of important wastewater discharge from the Valley of Mexico and other urban areas along the river basin. About 82% of water extracted in the hydrological region of the Panuco River is used for agricultural production, 10% for public-urban use, and 8% for industrial activities.

14. The main drivers of land use change are induced pastures, temporary agricultural activities and expansion of human settlements, particularly the urbanization process. Projections in land use changes based on current trends show an important reduction in vegetation density of different forest types, disappearance of mangroves and continued increase in pastures, and are associated with deforestation and urban development slowly encroaching into the wetlands area.

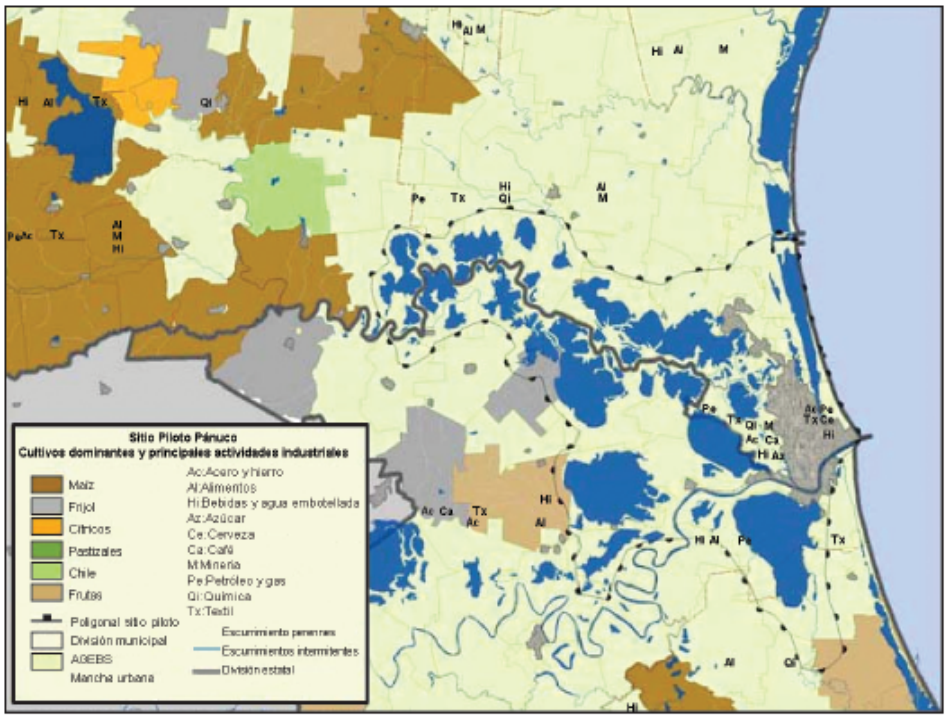
15. Between 1976 and 2000 15,000 ha of hydrophilic vegetation underwent major transformation processes which represent a loss of more than 35% of the original cover. The "encinos" forests observed in the 1976 cartography have diminished considerably as a consequence of urban development which now covers 60% of these forests.

16. The proposed area for adaptation measures is La Escondida Lagoon. The city of Tampico is located between the Gulf of Mexico and the La Escondida Lagoon and depends on it, partially for its water supply. There is a greenbelt between the city and the lagoon in the northeast area of the lagoon (most exposed area to Nortes and sea level rise) which provides for some protection. The major challenges are posed by potential expansion of urbanization. The overuse of the aquifers and the lack of water use efficiency create additional pressures on the system. Besides this, there has also been loss of vegetation cover in the border area of the lagoon.

Expected Climate Change trends

17. In this lagoon system one of the main risks related to climate change is sea level rise along the coast as well as inside the wetland area. In this part of the Gulf the dunes are soft and mobile which favors the presence of wide beaches with low inclination. At the same time such morphology causes sea level rise to have also impacts on the interior parts along the coastline. In this site high lands are distributed around low lands and wetlands. As a result urban areas have expanded on the areas most vulnerable to sea level rise. In addition to being very vulnerable to inundations caused by extreme weather events, hurricanes and sea level rise, this pilot site is vulnerable to droughts and heat wave events.

Figura 4. Actividades dominantes y uso del suelo. Sitio piloto Pánuco-Altamira.



Fuente: elaborado por Rodríguez *et al.*, 2007 para el presente estudio, con base en INEGI, 1991, INEGI, 2000, e INEGI, 2002.

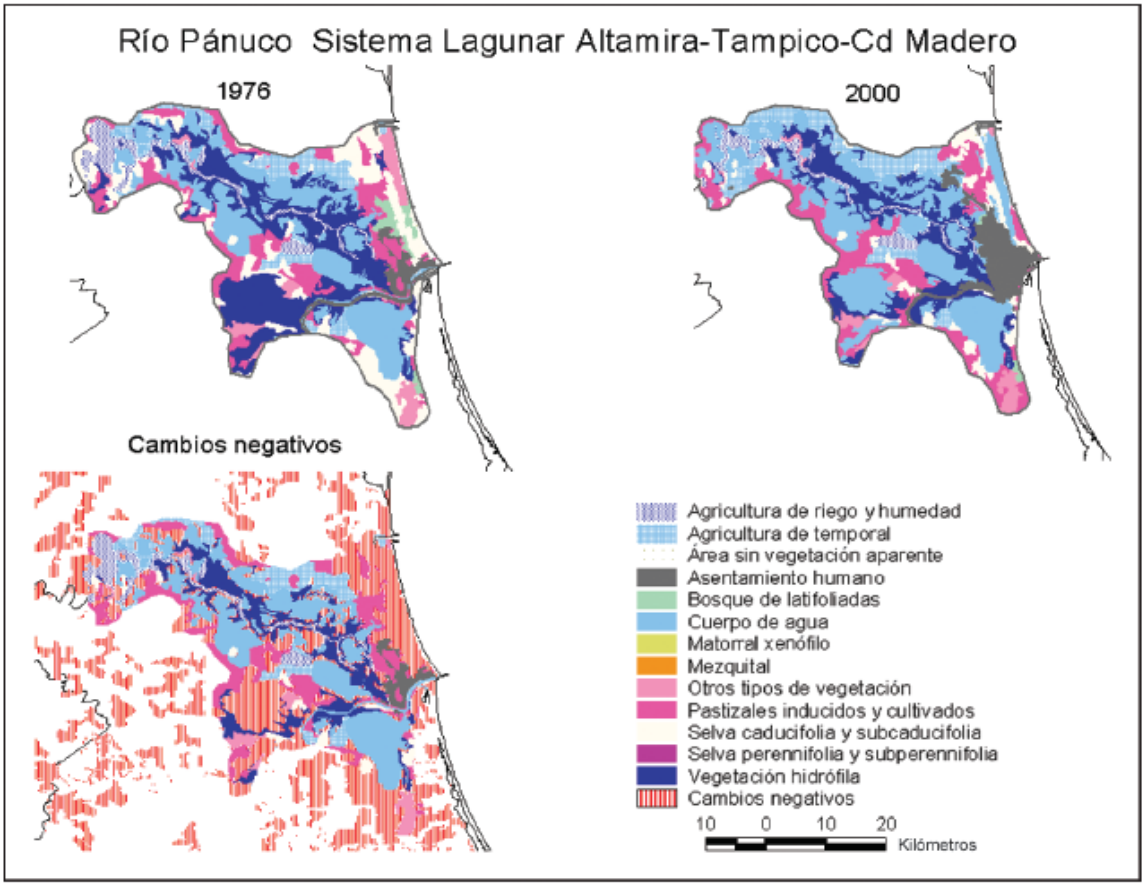
18. For the northern part of the Gulf of Mexico temperature is expected to increase by no more than 1C in the next two decades. However, based on projections for the second half of the century, temperature is expected to increase more rapidly and could reach up to 4C in the north-eastern part of the country. The months with major increases are foreseen between April and September.

19. With regard to heat waves (defined by temperature higher than 30C) these events will be more frequent after 2030. They are expected to triple in frequency and to be more intense, an increase of between 2 and 3 C in comparison to actual temperatures, as of 2030. The model projections for precipitation indicate minimum changes in this site by the end of the century in the order of less than 5% reduction. More intense *Nortes* and storms, sea level rise and more intense hurricanes are projected for this region. The sea level is expected to rise 0.5 meter until 2050. It is very probable that many of the freshwater wetlands in the area will be lost with sever loss of habitat for migratory species.

20. The anthropogenic impacts that threaten the whole lagoon area harm the ecological functioning of the ecosystems as well as the subsistence of the local population that depend economically of the products and services of these ecosystems. A part from the increase in inundations caused by storms and hurricanes, as well as by sea level rise, the main CC threats

will be droughts and extreme heat waves. This wetland has been selected for pilot adaptation measures for being one of the most vulnerable with wide exposure to extreme weather events.

Figura 6. Cambios de uso de suelo y cobertura vegetal de 1976 a 2000 en el sitio piloto del estuario del río Pánuco.



Fuente: elaborado por Gómez *et al*., 2007, para el presente estudio.

21. **Proposed Interventions.** The project will support the development and submission to deciding authorities of a climate resilient coastal zoning regulation in the area, including the expansion of conservation area around the Lagoon La Escondida, essential to maintain surface hydrology balance on the land side of the city of Tamaulipas (this would also include the strengthening of land barriers and other conservation measures) and maintain habitat for migratory species. About 10,000 ha are expected to enter into conservation status. The development of effective, climate sensitive zoning would simultaneously address the need to order land use, eliminating key anthropogenic impacts around the wetland and the need to allow for anticipated climate changes, in particular sea level rise and the occurrence of extreme weather events. The land barrier between the coastal strip and the lagoon would be strengthened. The estimated cost of the design of the land zoning is $1.5 million. The strengthening of 10 Km

of the land barrier (essentially, an increase in its height from 0.5 m to 1.5 m, is anticipated to cost $2.0 million). The strengthening of the barrier would provide valuable information on the cost and benefits of this approach. Water quality monitoring and climate sensitive flood control practices will be done through CONAGUA.

Cuadro 2. Cambio de uso de suelo. Sitio río Pánuco-laguna Altamira.

Uso de suelo y vegetación	Superficie en 1976 (ha)	Superficie en 2000 (ha)	Tasa de transformación
Agricultura de riego y humedad	9 545	7 602	-0.01
Agricultura de temporal	12 644	17 760	0.01
Área sin vegetación aparente	753	1 017	0.01
Asentamiento humano	3 585	11 654	0.05
Bosque de latifoliadas	2 842	546	-0.07
Cuerpo de agua	38 809	56 448	0.01
Otros tipos de vegetación	7 183	4 892	-0.02
Pastizales inducidos y cultivados	23 615	27 799	0.01
Selva caducifolia y subcaducifolia	26 203	10 524	-0.04
Vegetación hidrófila	40 041	25 834	-0.02
Bosque de coníferas y latifoliadas	113	0	-1.00
Total	165 332	164 077	

Fuente: elaborado por Gómez *et al.*, 2007, para este estudio.

Humedal Río Papaloapan-(Laguna de Alvarado), Veracruz

22. The Alvarado wetland is an estuary lagoon system which is composed of saline coastal lagoons. The most important ones are the ones of Alvarado, Buen Pais and Camaronera. The wetland is considered a priority region by CONABIO.

23. The system forms part of the Papaloapan watershed, its flow volume is the seventh largest in the world and along with the Coatzacoalcos river, it manages 30% of the runoff of the entire country and is the second most important water flow system in Mexico after the Grijalva-Usumacinta system in Tabasco. The Alvarado wetlands have ecosystems that are representative for the coastal plains of the Gulf of Mexico and include coastal dunes vegetation, *espadinal, tular, pompa*l and different kinds of endemic palms, as well as aquatic and sub-aquatic vegetation. Mangroves are the outstanding tree species in this wetland and cover an area of 19,000 ha including red, black and white species Rhizophora mangle, Laguncularia racemosa and Avicennia germinans protected under the NOM-059-ECOL-2001 (Portilla-Ochoa et al., 2003)). The wetland is extremely rich in avifauna and other wildlife[15] of global biodiversity value.

[15] **a) Avifauna:** There are 15 species of resident and migratory egrets (Ardeidae), 14 ducks (Anatidae), 28 species of raptors (Accipitridae, Falconidae), 27 species of shorebirds (Charadriidae, Recurvirostridae, Scolopacidae), 14 *gaviotas* y marine swallows (Laridae), 5 *martines pescadores* (Alcedinidae) 27 de *mosqueros* (Tyrannidae), 30 *de chipes* (Parulidae), 16 de *chichiltotes y calandrias* (Icteridae). 311 species have been registered to date. Additionally, 35 other occasional species have been registered by others for a total of 346 especies, 32.64% of all the species that occur in Mexico[15].

24. The climate is hot humid and sub-humid in the Alvarado lagoon, with summer rainfall that reaches an average of 286 to 320 mm. The annual average temperature amounts to 22 to 26C. The occurrence of "Nortes" strengthens the winter precipitation. The Papaloapan basin has an annual average precipitation of more than 3000 mm in the high and middle part of the basin. The area supports agriculture, fisheries, tourism and timber activities.

Anthropogenic impacts:

25. The Alvarado Lagoon System is locally threatened by: 1) Reduction and deterioration of the mangroves due to the constant extractive activities such as intensive cattle raising, cottage industry and other changes in land use; 2) Reduction in important economic species as a result of intensification of fishing activities, introduction of prohibited species and changes in water quality due to contamination and 3) pollution from untreated discharges. The human induced threats to the Alvarado wetlands place the ecological functioning of the entire system at risk, as well as the subsistence of the local communities that depend on the ecosystem economically for the products and services that the system provides. (Portilla-Ochoa et al., 2002). Fishing activities in this site are also affected by hydrological changes that lead to a lower salinity level and to changes in water flows. The deforestation of mangroves in the area has further reduced the reproduction capacity of fish stock.

26. The predominant land uses today in the wetland are hydrophilic vegetation, coastal dunes and water bodies. Land use changes between 1976 and 2000 show that the most significant change has been the transformation of extensive areas of hydrophilic vegetation into cultivated pastures. The expansion of the agricultural and cattle raising areas have lead to significant fragmentations of the aquatic vegetation, mangroves, water bodies and coastal dune vegetation. The hydrological system is also affected by upstream dams as well as by pollution. The deforestation does not only occur in the area of the wetlands. One of the most important problems in this estuary system is the sedimentation (azolvamiento) of the "mouth" of the Alvarado lagoon and of the artificial canal that links the Camaronera lagoon with the sea. These sediments are carried from upstream areas where deforestation has lead to erosion.

Vulnerability of wetland:

27. The region of the Alvarado lagoon is characterized by high incidence of hydro-meteorological extreme events (e.g. hurricane Keith, 2000). This watershed is one of the most affected by inundations. The vulnerability of this site to sea level rise is the highest in comparison to the other pilot sites as well as with regard to the total surface at risk of inundation. The interior wetlands are subject to higher inundation risks than the coastal lines due to the geology of the region. Meteorological events such as storms and hurricanes can lead to inundations of approximately 20 km towards the inland. The projections of sea level rise of 0.5 m by mid century make the loss of more than half of the freshwater wetlands very probable. In summary the main threat caused by climate change for this site is the sea level rise and the increase in extreme weather events and hurricanes.

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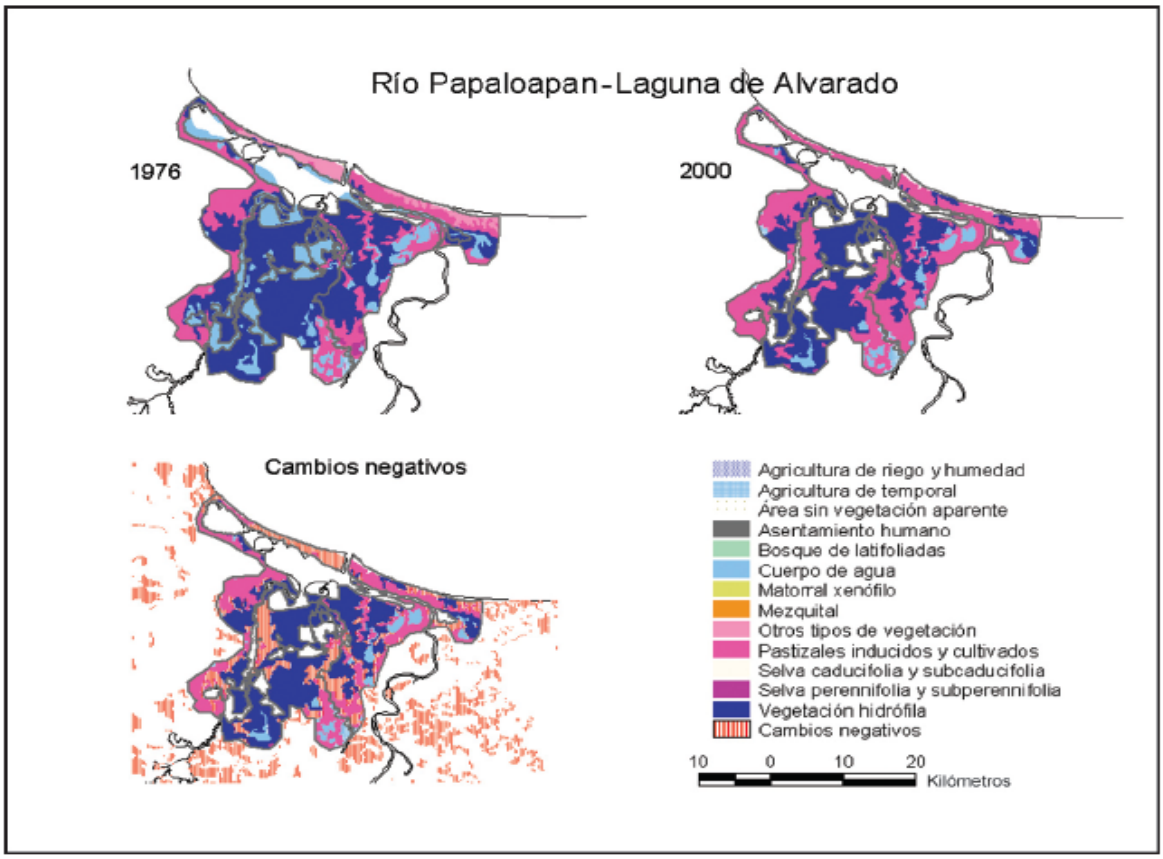
b) Other wildlife: Other flora and fauna of the area include: 45 genus of phytoplankton, 9 species of zooplankton, 38 species of mollusks, 26 families of crustaceans, 44 species of fish, more than 5 species of amphibians, 24 reptiles y more than 15 species of mammals (Montejo, 2003).

Figura 4. Cambios de uso de suelo y cobertura vegetal de 1976 a 2000.
Sitio río Papaloapan-laguna de Alvarado.



Fuente: Gómez *et al.*, 2007.

Expected climate change trends:

28. The period of significant change is anticipated to initiate as of 2050. The temperature is likely to increase between 2 and 3C. The heat waves are expected to triple in frequency and will be more intense between June and July, between 2 and 3 C compared to the actual situation. The dry season will be longer. Precipitation might show a reduction of 5 to 10%. “Nortes” and the hurricanes are anticipated to more intense. Sea level is projected to rise by 0.5 m until 2050 to which this lagoon system is very vulnerable. The inundation risk is higher for the interior wetlands compared to the coastal line given the geological conditions of the zone.

Cuadro 1. Cambios de uso de suelo entre 1976 y 2000. Sitio Papaloapan-Alvarado.

Uso de suelo y vegetación	Superficie en 1976 (ha)	Superficie en 2000 (ha)	Tasa de transformación
Agricultura de temporal	881	949	0.00
Área sin vegetación aparente	300	1 174	0.05
Asentamiento humano	0	138	1.00
Cuerpo de agua	16 120	3 352	-0.06
Otros tipos de vegetación	3 321	65	-0.17
Pastizales inducidos y cultivados	17 827	30 066	0.02
Selva perennifolia y subperennifolia	535	32	-0.12
Vegetación hidrófila	35 792	28 183	-0.01
Bosque de latifoliadas	75	0	-1.0
Total	**74 850**	**63 960**	

Fuente: Gómez *et al.*, 2007.

29. **Proposed interventions.** The project will fund the design and adoption of a management strategy of the Alvarado Lagoon that effectively integrates climate concerns into its long term conservation strategy and the adoption and effective enforcement of a buffer zone around the lagoon. The creation of the buffer zone has been proposed but was so far not implemented due to lack of funding. The buffer zone is expected to effectively reduce anthropogenic impacts while also strengthening its climate resilience. It will order land use around the Lagoon and promote reforestation. About 10,000 will be reforested. The estimated costs including the costs of the initial two year vigilance effort is estimated at $2.0 million.

30. The project will also fund the construction of a pilot stabilization barrier to buffer extreme weather events and future sea level rise around the lagoon. The pilot barrier would be located between the coastal zone and the lagoon and would also contribute to the protection of the urbanized areas. The barrier is a pilot, demonstrative measure that would provide the local authorities key information about the costs and benefits of such measures. The length of the expected pilot barrier would cover only the quarter most exposed to northern winds (about 2 km) and is estimated to cost about $4 million. These measures will result in preservation of critical habitat for migratory species of global value. CONAGUA will support with counterpart resources a wastewater treatment plant to reduce pollution loads in the lagoon.

Humedal del Sistema Lagunar Carmen -Pajonal-Machona, Tabasco

31. This wetland is located in the plain formed by the delta of the Grijalva and Usumacinta rivers. The lagoons El Carmen and La Machona belong to a wider lagoon area which is parallel to the coastal line. The topography in this area is flat with depressed areas (variation between 2 and 17 meters). The lagoons are isolated from the Gulf of Mexico through a narrow littoral barrier (length of 35 km, width of 300-600 m, and height of 1 to 6 m) that has been formed through beaches and active and stabilized dunes. The vegetation that encloses the lagoon system is typical of the rainy tropical zones and is characterized by tropical mangrove forests with black and red mangrove trees. In the region one can find portions with tropical rainforests on soils with

good drainage which existence is determined by climate conditions. The wetland is a major bird migratory site and has significant wild life[16].

32. The climate in the area is hot and humid, with rainfall in summer and an average annual temperature of 26C. During the winter months there are meteorological changes that generate strong rainfalls and decreases in temperature mainly caused by "nortes". The average precipitation is 1500 mm/year with an average evaporation of 1600 mm/year. One of the main productive activities in the region of the wetland is oil extraction. The oil industry has the largest share of productive activities, followed by forestry, agriculture and cattle raising, as well as fishing and tourism

Anthropogenic impacts

33. In 1975 the lagoon La Machona has been connected to the sea through an artificial opening denominated "Boca de Panteones". These works caused intrusion of large volumes of salt water into 60,000 ha of pastures, cultivations, fresh water areas, etc. The intrusion of saltwater caused an ecological chain reaction unique in terms of size in Mexico. Freshwater fishes were replaced by saltwater species, mangrove areas were substituted by lagoons, and pastures, cultivations, etc replaced by mangroves. The massive intrusion of saltwater caused also changes in the hydrological regime, salinization of surrounding lands, and sedimentation of lagoons. The site is also characterized by the presence of one of the most polluting industries: the oil industry. In addition to that agricultural activities have lead to high concentrations of fertilizers and herbicides in the water.

34. Deforestation rates are high in the site. Land use in the lagoon system is dominated by riparian and coastal vegetation formed by mangroves, *mucal, popal-tular* and *tasistal*. The transformation of the vegetation cover can be detected in the oriental zone of the site. Between 1976 and 2000 these areas have been converted from hydrophilic vegetations to pastures. The same process has taken place in the southern part of the Machona lagoon. In this period the loss of hydrophilic vegetation is estimated at 4000 ha.

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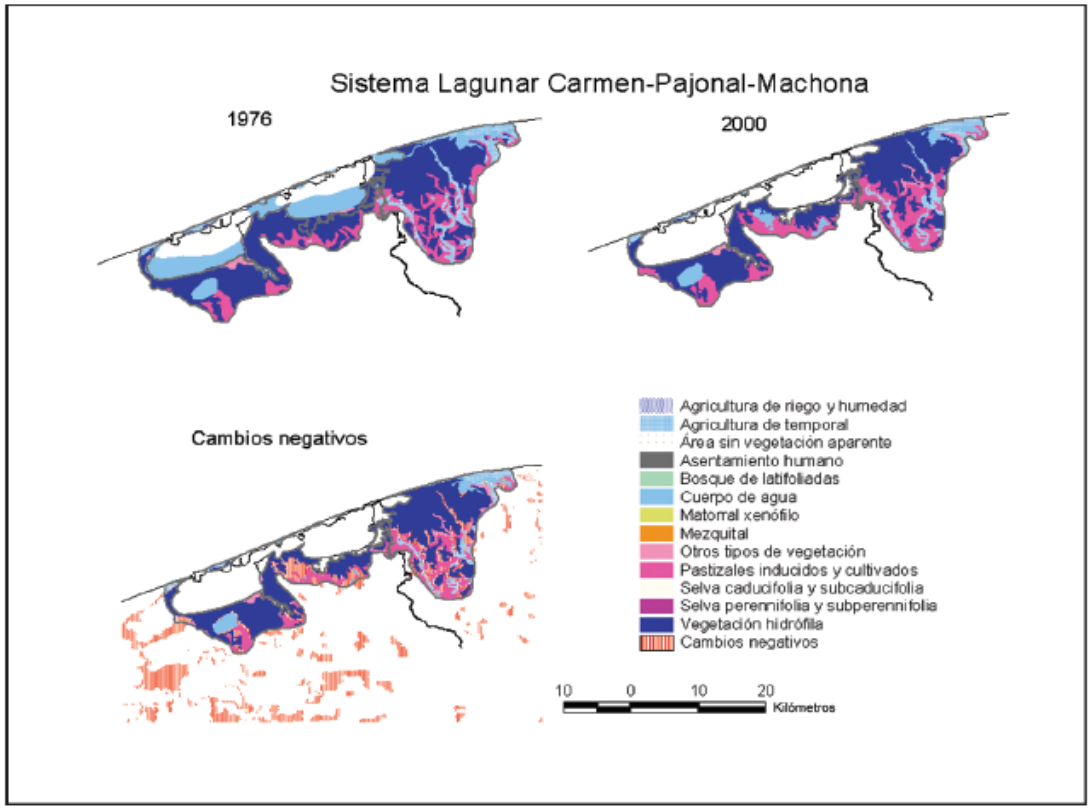
[16] **a) Bird resources**: There are few studies and little information regarding the avifauna in this area; hence the importance of supporting projects that extend the knowledge of the physical conditions of the site as well as that of the ecosystem and bird populations, migratory and resident. Some of the avifauna species of the area are: Peregrine falcon (*Falco peregrinus*), Osprey (*Pandion haliaetus*) a species in danger of extinction, Fulvous whistling duck (*Dendrocygna Autumanlis*)a threatened species , and the Great egret (*Casmerodiis Albus*) also a threatened species.

b) Other wildlife that depend on the wetlands.
Fauna: There are 50 fish species recorded, 75 reptile species, 26 amphibian species, 88 mammal sps. and over 100 bird species. Among the species that are under the NOM-059-ECOL-2001 protection are: Reptiles: The Central American river turtle (*Dermatemis mawii*), Pochitoque turtle (*Kinosternos leucostomum*), Galapagos turtle (*Pseudemys scripta*) and under the special protection category are the , Mexican giant musk turtle (*Staurotypus triporcatus*), Common snapping turtle (*Chelidra serpentina*) and Morelet crocodile (*Crocodylus moreletii*) under the species in danger of extinction category.

Flora: The vegetation surrounding the lagoon is typical of rainy tropical zones and is characterized by tropical mangrove forests, with Black mangrove trees (*Avicennia germinans*) and Red mangrove trees (*Rizophora mangle*), of up to 4 ms. high, which spread toward the adjacent rivers and lagoons.The distribution of this type of vegetation is controlled by tidal influence (Phleger and Ayala-Castañares, 1971), the availability of fresh water, insolation, environment temperature and sediment texture. On the southern bank of the lagoons, there are isolated growths of mangrove swamps with scarce development and exposed to the erosion caused by the lagoon tides.

Figura 5. Cambios en el uso de suelo y cobertura vegetal de 1976 a 2000, del sistema lagunar Carmen-Pajonal-Machona, Tabasco.



Fuente: Gómez *et al.*, 2007, para este estudio.

Cuadro 2. Cambio de uso de suelo. Sistema lagunar Carmen-Pajonal-Machona, Tabasco.

Uso de suelo y vegetación	Superficie en 1976 (ha)	Superficie en 2000 (ha)	Tasa de transformación
Agricultura de temporal	6 125	4 832	-0.01
Asentamiento humano	0	85	1.00
Cuerpo de agua	11 421	2 882	-0.06
Otros tipos de vegetación	725	1 392	0.03
Pastizales inducidos y cultivados	9 558	11 411	0.01
Vegetación hidrófila	29 335	25 344	-0.01
Selva perennifolia y subperennifolia	56	0	-1.00
Total	**57 220**	**45 945**	

Fuente: Gómez *et al.*, 2007, para este estudio.

Climate change trends

35. The temperature is expected to increase between 2 and 4 C on average with significant changes as of 2050. The months with major increases will be between April and September resulting in major changes in summer. The heat waves will double in frequency and are expected

to be more intense, between 3 and 4 degrees in comparison to the actual temperature. The precipitation could change from a reduction of 15% to an increase of 5%. The dry seasons will be longer in duration. Nortes and hurricanes are anticipated to be more intense.

36. Sea level rise will affect the waterbodies from the wetlands as well as the ones along the coast. The Carmen-Pajonal-Machona lagoon system is particularly vulnerable to extreme heat events and inundations caused by extreme weather events and hurricanes. The combination between temperature increase and extractive activities can lead to an augmentation in forest fires.
37. The lagoon system is vulnerable to sea level rise as a consequence of the low incline of the riverbed and of the magnitude of the hydro-meteorological events. The "asolvamiento" of riverbeds and hydraulic works increase the vulnerability to inundations. The mining activities including the extraction of hydrocarbons are vulnerable to CC in the short term. The disastrous experience with the hurricane Emily shows the magnitude of the impacts of such extreme events. Out of the total of quantified damage PEMEX had a share of 50.5 %.

38. **Proposed Interventions.** The project will support the revamping of land zoning regulations to incorporate climate concerns, specifically anticipated sea level rise and intensification of extreme weather events. The anticipated cost is $1.0 million. The project will also fund restoration and reforestation efforts with native species along biological corridors in the wetland system, with an estimated total cost of $3.0 million. An anticipated 5,000 hectares will be restored. The project will fund the strengthening of the sandbars that separate the coastal lagoons from the sea. A total length of 5 km will be strengthened with a total cost of about $2.0 million.

Humedal Punta Allen (Sistema Lagunar Boca Paila), Quintana Roo

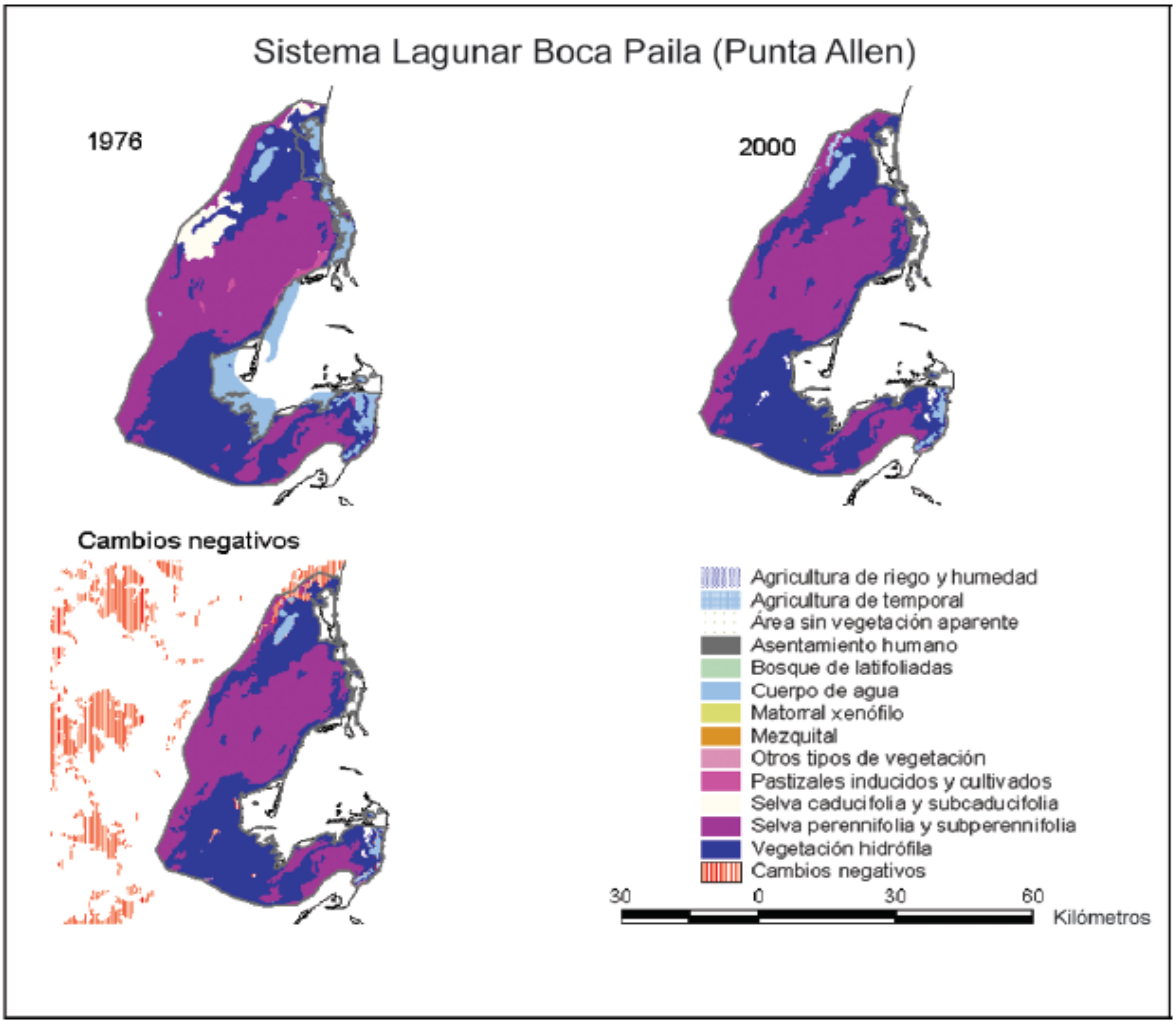
39. The Punta Allen lagoon system is part of the Biosphere Reserve Sian Ka'an. The protected natural area decree dates from January 20, 1986. The lagoon system expands over 306,000 ha with a perimeter for 239 km. One of the main highlights of Sian Ka'an is the coral reef which is situated in front of the reserve with a length of 110 km. This barrier forms part of the second longest reef chain of the world. The presence of the reef reduces the energy of the waves which has the potential of being very destructive during the hurricane season. The barrier causes calm waters in the bay and an abundant sedimentation of calcareous materials which enable the formation and development of mangroves on the coast. The mangroves also act as an organic barrier between the protected water and the adjoining sea.

40. The climate is hot and sub-humid with rainfall during the summer. The average annual temperature is 26C and monthly average is always superior to 22C. The annual temperature variation is 4.8C with the highest season in July and august and January being the coldest month. The region is located in the tropical cyclone zone of the Caribbean. The yearly precipitation amount so 1300 mm with 75% of the precipitation registered between May and October. Hurricanes are frequent in the Caribbean and Sian Ka'an represents a wide area on the trajectory. In the last 88 years 12 hurricanes have entered its coasts.

The reserve of the biosphere Sian Ka'an includes the main communities that are characteristic of the peninsula of Yucatan and the Caribbean. The area includes sea grasses, mangroves, swamps, and intertidal areas. Two vegetation communities are of particular importance for being endemic

to the Yucatan Peninsula: floodplain forests and coastal lagoons. The second largest reef in the world is located in front of the reserve. Conabio has declared this area as a terrestrial, marine and hydrological priority region. It also has the designation of an area of importance for the conservation of birds and is a natural protected area. Internationally this pilot site has various distinctions: it is a site of international importance under the Ramsar convention, it belongs to the Hemisférica de Reservas para Aves Playeras (WHSRN) and is considered natural world heritage site by the IUCN in collaboration with UNESCO (1997). The main economic activities are tourism and lobster fishing. The lobster fishing is one of the most important activities in the site and was key for human settlements.

Figura 4. Cambios de uso de suelo y cobertura vegetal de 1976 a 2000 en el sistema lagunar Boca Paila (Punta Allen), Quintana Roo.



Fuente: elaborado por Gómez *et al.*, 2007, para este estudio.

41. **Anthropogenic impacts.** The main negative change to this system is the conversion of hydrophilic vegetation into pastures. The human pressures caused by tourism also represent a threat to the vegetal cover.

42. **Expected climate change trends**

The temperature in the wetlands area of the pilot site is expected to increase between 2 and 4 C on average by the end of the century with significant changes as of 2030. The months with major increase will be between June and September. The heat waves are expected to double in frequency and will be more intense between 2 and 3 C in relation to actual ones. The results for precipitation changes are relatively stables. The dry seasons will be longer and superior to 6 days per year. More intense hurricanes are expected to occur.

43. **Proposed Interventions.**

The project will support (i) Strengthening the protected area monitoring system to include climate change impacts and the development of land use plans around its buffer zone. The anticipated costs are $1.5 million. The project will fund pilot repopulation of coastal reefs to maintain their buffering capability and protection of the coastal wetland to storm surges and other extreme weather events. This is anticipated to cost $1.5 million.

Coral repopulation:

44. Wherever severe coral bleaching has killed most of the corals on a reef, the few corals that do survive are very important for the ultimate adaptation of that reef to the higher water temperatures caused by climate change. These surviving temperature-tolerant corals and the associated heat-tolerant symbiotic algae species that they contain are in effect genetic treasures. No-take MPAs in fact are considered the primary adaptation strategy for coral reefs at this time, with relation to lowering stress on coral reef organisms and maintaining a healthy balance of organisms (Marshall and Schuttenberg 2006, Grimsditch and Salm 2006). In support of this working hypothesis, restoration of threatened coral species appears to be much more effective within no-take zones than on overfished reefs, with coral predators attacking and killing corals in contact with the reef at the majority of overfished sites, only those corals suspended from ropes or planted onto mesh frames located on sand thrive on such reefs, being isolated from snail and fire worm predation.

45. A scientific consensus has developed that an effective means for adapting coral reefs to climate change is to work to increase the health and natural ecological balance of the coral reef system. An abundance of healthy corals and fish in turn helps to lessen the impacts of sea level rise, as the reefs grow rapidly upward to block incoming waves, while generating sand to rebuild beaches, giving communities more time to adapt to climate change. Any solution to the problem of coral reef decline should rightly qualify as climate change adaptation. However, merely conserving and restoring health to coral reefs is not enough, additional methods to lessen the impacts of climate change to coastal communities and to help coral reefs adapt to increasing temperatures need to be developed and demonstrated.

46. The proposed pilot intervention supports efforts to strengthen the resilience of Caribbean coral reefs to increasing sea surface temperatures. A major strategy will be to actively work with corals to identify and propagate temperature-tolerant genotypes, working to increase their abundance in sizable reef patches, which in turn will accelerate the natural process of adaptation of corals to increased sea surface temperature brought about by climate change. The coral work will also serve as a primary awareness tool to strengthen the connection between coral reef health and reef resilience in a time of climate change and other serious problems facing coral

reefs, supporting no-take marine protected areas and multi-stakeholder awareness through hands-on involvement and action.

47. The project will be based on the successful experiences of the International's Coral Gardens-Living Reefs Initiative. www.counterpart.org In former and present sites, Coral nurseries have been successfully established in Puerto Rico, Jamaica, Honduras, and the Dominican Republic (Bowden-Kerby et al, 2005). Through trail-and-error experimentation over more than a decade, low-cost methods have been developed that are successful for rearing thousands of second generation corals in the field, as well as perfecting methods for replanting corals back to reef enhancement and restoration sites.

48. The work will begin with surveys of temperature stressed coral reefs, to identify individual corals and populations of corals that have survived past warm-water bleaching events and associated mass coral mortality over the past decade, with the last major bleaching event taking place during the summer of 2005. Samples of surviving temperature-tolerant corals will be treated as genetic treasures, with samples taken for cultivation within coral nurseries located in shallow sites sheltered from storm waves. The fragments of heat-tolerant corals will be cultivated into "mother corals" in the coral nurseries, which in turn will be trimmed to produce second generation coral fragments for replanting into reef restoration and enhancement sites, a type of "coral reforestation".

Cuadro 5. Cambio de uso de suelo entre 1976 y 2000 en el sistema lagunar Boca Paila (Punta Allen), Quintana Roo.

Uso de suelo y vegetación	Superficie en 1976 (ha)	Superficie en 2000 (ha)	Tasa de transformación
Agricultura de temporal	0	1 024	-1.00
Área sin vegetación aparente	0	1 221	-1.00
Asentamiento humano	0	55	-1.00
Pastizales inducidos y cultivados	2 392	0	1.0
Cuerpo de agua	29 383	4 527	0.08
Otros tipos de vegetación	0	1 135	-1.00
Selva perennifolia y subperennifolia	102 564	104 144	0.00
Selva caducifolia y subcaducifolia	10 740	0	1.0
Vegetación hidrófila	93 636	100 664	0.00
Total	238 714	238 714	0

Fuente: elaborado por Gómez *et* al., 2007, para este estudio.

Component 3. Assessment of impacts of climate change on water resources planning at a national level and in coastal wetlands including identification of potential response options

49. The proposed work draws on the considerable expertise available in Mexico for the country's resource management and planning. In particular, the planned tasks have been broken down as follows: (a) supplementing the analyses done of the impact of climate change on water resources in Mexico, with a description of projected hydrological trends in each of the 13 hydrological administrative regions into which the country has been subdivided; (b) analysis of

national response options that are suited to meeting more effectively current and projected demand or facilitating the adoption of rules for the allocation of available water resources; and (c) Institutional Analysis for the Implementation of adaptation options.

50. Specifically this component will support:

a) **Hydrological characterization of regions from a climate perspective**: The objective is to characterize, generate, and organize climate data. The analysis will use historical and modeled data.

Products:

- Data model with information on climate variables and scenarios for hydrological basins
- Temporal and spatial estimate of missing data (daily and monthly)
- Analysis of information from weather station networks
- Climate change scenarios for the 13 hydrological administrative regions based on general circulation model (IPCC 4AR) results

b) **Identification of response options for Inclusion of Climate Change in the Planning and Management of Water Resources:** An analysis of climate change impact scenarios will be conducted and specific response options will be identified. The end product will be a list of options, the criteria for analyzing their feasibility and acceptance by the different actors, and the transactions required.

Products

A list of feasible response options will be prepared considering climate impacts on water supply in order to meet future demand. Analysis will include the projected availability of water resources, a financial analysis, a list of criteria for assessing the feasibility and acceptability of the options identified, and recommendations of options to be considered in subsequent phases. Emphasis will be placed on planning and management measures that lead to the effective and efficient integrated management of water resources.

c) **Institutional Analysis for the Implementation of adaptation options:** The institutional analysis will focus on the organizational, legal, and political/social feasibility required for the successful implementation of adaptation options.

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Annex 5: Project Costs (US$ Million)

Project Cost By Component and/or Activity	Local	Other Foreign	GEF	Total
Component 1 (Planning). Detailed design of key selected adaptation measures	**0.7**	**1.8**	**0.5**	**3.0**
Component 2 (Investment). Implementation of pilot adaptation measures in selected wetlands highly vulnerable to the effects of climate change.	**14.4**	**0.6**	**3.5**	**18.5**
Component 3. Internalization of climate change considerations on water resources planning at a national level.	**0.5**	**0.1**	**0.4**	**1.0**
Component 4: Project management	**0.9**		**0.1**	**1.0**
Total Cost	**16.5**	**2.5**	**4.5**	**23.5**

[1]Identifiable taxes and duties are US$m ___, and the total project cost, net of taxes, is US$m___. Therefore, the share of project cost net of taxes is ___ percent.

Table 5.2 Sources of Funding by Component (including baseline resources)

Project Cost By Component and/or Activity	CONAGUA/PEMEX	NAWCA	GEF	CCIG	Other financing	Total US$ million
Component 1 (Planning). Detailed design of key selected adaptation measures	1.3	0.1	0.5	0.4	1.1	3.0
Component 2 (Investment). Implementation of pilot adaptation measures in selected wetlands highly vulnerable to the effects of climate change.	11.9	0.6	3.5		2.1	18.5
Component 3. Internalization of climate change considerations on water resources planning at a national level (global overlay).			0.4	0.1	0.5	1.0
Component 4: Project management			0.1		0.9	1.0
Total Baseline Cost	13.2	0.7	4.5	0.5	4.6	23.5

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Annex 6: Implementation Arrangements

Site specific arrangements.

1. **General implementation arrangements:** INE-SEMARNAT will coordinate and implement all technical activities through a group of professional staff (GPS) led by a full time adaptation specialist and will be in charge of all fiduciary responsibilities, including financial management, procurement of goods and services and the application of environmental and social safeguards. NAFIN will be the financial intermediary. The implementation of pilot activities will be supported and implemented through the participation of local agencies in each pilot site. Local agencies have confirmed their support to the project. INE with the support of CONAGUA/IMTA will implement the assessment of options to address climate issues in water resources planning. CONAGUA and IMTA have pledged technical and financial resources to the project activities. Oversight of the project will be responsibility of a steering committee.

2. **Technical implementation arrangements:**

Steering Committee. The main responsibility of the Steering Committee (involving representatives from the four participating states, INE, SEMARNAT, CONAGUA, and NAFIN) is to assure political and strategic support for the implementation of the selected adaptation pilots and the coordination with counterpart resources. The Steering Committee will also provide guidance on the implementation of the project and make high level recommendations regarding the project's development, technical difficulties and management issues. The Steering Committee will approve the Annual Operating Plans (AOP) of the project. Additionally, a Scientific Advisory Panel, appointed by INE will be convened regularly, to advice on project implementation.

3. **A group of professional staff (GPS)** from SEMARNAT and INE will be responsible for project implementation including one general project coordinator in charge of the operational coordination of the project activities in each site. The GPS will prepare the POA[17] in consultation with the local agencies in each site, and be responsible for its execution as well as for the operational coordination of the project activities in each site. The GPS will ensure the financial, conceptual and methodological coherence among all activities and the integrity of the project. Specifically the GPS will provide technical leadership, monitoring and evaluation of project activities and public outreach.

4. **Overall technical coordination**: INE will be responsible for the project's overall technical coordination. As such, INE will be responsible for project planning, coordination, implementation, supervision and overall technical monitoring and evaluation. INE will also be responsible for maintaining the SC of the Project; for developing and submitting the AOP to the SC and the Bank's approval. Progress reports will be prepared by INE integrating the results of

[17] The POA will include statement of specific objectives for the year, a description of the activities, expected outputs, monitoring indicators, detailed budgets and a procurement plan, indicating the sources of financing in the budget.

the monitoring and evaluation activities and setting out measures recommended to ensure efficient implementation of the Project. Integrated reports will be issued on a semi-annual basis to the Bank.

5. **Local project coordination**: For each site a local coordinator will support the technical execution of the activities. This will be done with the support of project partners such as local government entities, municipalities, NGOs and academia.

6. **Site specific arrangements:** INE-SEMARNAT and NAFIN shall enter into a subsidiary agreement with each local coordinator defining the responsibilities in terms of technical execution of activities. Grant resources will be managed exclusively by INE-SEMARNAT through NAFIN.

7. **Wetlands-Panuco-Altamira (Tamaulipas).** The implementation of adaptation activities will be implemented by INE with the support of the State Environmental Agency. The agency will work closely with local community included representatives from academia, local and regional agencies, the delegate from SEMARNAT, the commerce and industrial association, local communities and the head of government, the Mayor of Tamaulipas. The city of Tampico also pledged support in the implementation of project activities.

8. **Wetlands of the Papaloapan Rivershed, Alvarado Lagoon (Veracruz).** The implementation of site project activities by INE will be supported by INECOL, the State Environmental Agency in cooperation with local NGOs. INECOL will coordinate with the local community, academia, the State and Municipal authorities, led by the Mayor of Alvarado, the local Navy detachment, fisherman and agriculture cooperatives, local NGOs, CONAFOR, the Local Sustainable Development Council and the scientific community.

9. **Wetlands of Carmen-Pajonal- Machona (Tabasco).** The site activities coordinated by INE will be supported by the State Environmental Agency. The State of Tabasco has created a State Climate Change Committee, SCCC, with wide representation of national, state and local stakeholders. In the meetings held with key stakeholders and community leaders the project was directed to coordinate all action through this SCCC. The agency will liaise and consult with the committee during implementation of project activities.

10. **The Siam Ka'an nature conservancy site (Punta Allen, Quintana Roo).** The federal government has enacted a protective status to the Siam Ka'an reserve in response to the unique beauty, extraordinary biodiversity and highly productive environmental services found in this reserve. This site was selected as an example of a well protected coastal wetland in Mexico. With over 610,000 ha of protected lands, this Ramsar site is also home to two local communities that have endorsed a management plan based on the conservation and preservation of the natural reserve, as well as in the sustainable exploitation of its natural productivity. The reserve is under the management of CONANP, with a well trained and highly respected staff. CONANP will help INE in the coordination of the project activities at the site.

11. **Administrative and financial management: INE-SEMARNAT** will carry out the administrative and financial management of the project. Specifically, **INE-SEMARNAT** shall: i)

issue an operational manual containing inter alia provisions on detailed arrangements for carrying out the project; ii) with the assistance of and in agreement with the executing agencies (project coordinators), shall update the procurement plan and provide the AOP for Bank approval; iii) carry out the approved AOP in accordance with its terms. NAFIN will be the intermediary financial agency for the project and channel the funds.

12. **INE.** The National Institute of Ecology of Mexico (Instituto Nacional de Ecología) is a decentralized body of the Secretariat of Environment and Natural Resources, (Secretaría de Medio Ambiente y Recursos Naturales, or SEMARNAT), created in June 2001 to promote and coordinate research on environmental issues in order to provide data, ideas, proposals, and technical input for decision-making to support the environmental and natural resources management.

Under the project, INE will play the central coordination role and will house the GPS. While NAFIN will carry out all financial management and procurement activities.

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Annex 7: Financial Management and Disbursement Arrangements

1. The financial management assessment has been undertaken as part of project preparation for the management of the PDF B in accordance with OP/BP 10.02 and the Guidelines for Assessment of Financial Management Arrangements in World Bank-Financed Projects, in order to determine whether the Beneficiary has or will have in place acceptable financial management arrangements prior to effectiveness, capable of providing with reasonable assurance, accurate and timely information on the status of the project in agreed reporting formats.

Risk assessment and Mitigation

2. Project implementation will require a lot of coordination with different actors to carry out the proposed activities, not only at the government level, but also interaction with local beneficiaries. On such basis, inherent risk of the project would be rated as moderate.

3. In spite of INE's experience in the implementation of inter-regional projects, the control risk at this stage would be rated as moderate too, meanwhile the specific arrangements for the proposed activities are formalized and in place to support implementation for specific activities.

Implementing Entity

4. The grant recipient would be NAFIN. The beneficiaries will be INE and the local institutions (state Environmental Agencies and CONAMP. Under such arrangements, NAFIN would assume overall responsibility for project implementation including the fiduciary functions in terms of procurement and financial management.

5. A typical Management Unit would include a Regional Director, Regional Officer, a Steering Committee and technical experts, including a Administrative Officer, that would be basically undertake specific administrative and financial tasks required by the corresponding financier, in close coordination with INE.

6. Following these arrangements, NAFIN has developed important expertise in external financed projects.

7. Specifically in terms of FM, the Bank will work with NAFIN on the definition of the terms of reference, to make sure they include the required qualifications to undertake Bank's FM and Procurement requirements.

Programming and budget

8. INE has established specific processes and procedures for the preparation of annual operational plans (POA). The Management Unit is in charge of the preparation of the project POA, which needs to be approved by the corresponding Steering Committee.

9. The POA and budget are prepared following the functional classification in terms of components, sub-components and activities, defined for each project. The structure of the codes

defined by NAFIN allows the preparation, registration and control of the budget, following such structure, clearly identifying the source of financing.

Processes and procedures

10. Specific processes and procedures have been established by NAFIN, and those are followed both, for their own expenditures and for project expenditures. Those procedures provide for an adequate segregation of duties, in terms of approval and authorization. Therefore, all contracting or payment requests coming from the Management Units need to be approved by the Technical Cooperation Coordination, which ensures that the activity is included in the annual program approved for the project and that there is available budget. Upon such verification, the procurement request is submitted to the Purchases/Contracting Unit or in the case of payments, to the accounting section, where the accountant in charge of Technical Cooperation Projects, processes and records the payment.

Accounting – Information systems

11. NAFIN uses an integrated accounting system, which chart of accounts allows for the registration of different projects using separate accounts, both for the recording of sources and uses of funds. Although a functional classification is not used in the accounting module, they have developed an interphase between the accounting and annual program/budget module, so that the budget execution is updated on a daily basis. The interphase between both modules, allow recording in each accounting voucher the related functional activity defined in the corresponding program/budget. Therefore the reports issued by the accounting system will also related to the expenditures to the annual program.

Financial reporting

12. Taking into account the considerations made in the budget and accounting sections, the financial reports will be prepared on the basis of the information provided by the program/budget module, which is daily updated with information from the accounting system. Those reports would be used as the basis for the preparation of annual financial statements as required in Bank related Guidelines[18]. The content and format of the reports currently issued by NAFIN, comply in substance with Bank requirements, and very few adjustments, in terms of format would be required.

13. The financial interim reports will specify sources and applications of project resources and a statement of investment by project component reporting the current quarter and the accumulated operations against ongoing plans. Similarly to the annual financial statements, these reports will be obtained from the system the XX utilizes. The reports would be submitted to the Bank on a semi-annual basis, with progress reports.

Flow of funds

[18] Directrices para los Prestatarios Relativas a los Informes de Seguimiento Financiero de Proyectos Financiados con Recursos del Banco Mundial, Division de Politicas de Operaciones y Servicios a los Paises, Noviembre 30, 2002- Parrafo 11. FMR para pequeñas operaciones. And Guidelines: Annual Financial Reporting and Auditing for World Bank-Financed Activities, FM Sector Board, June 30, 2003 – Paragraph 8, Content of financial statements.

14. NAFIN can open and maintain a separate account in US dollars in a commercial bank, acceptable to the Bank. Subject to the formalization of NAFIN as the Grant Recipient and upon completing the arrangements with the Loan Department, a **Designated Account** in US dollars will be opened and maintained in a commercial bank acceptable to the Bank on the name of the project and it will be managed directly by General Secretariat. To facilitate project implementation, the project will have access to funds advanced by the Bank to this DA. Funds deposited into the DA as advances, will follow Bank's disbursement policies and procedures, as they are described in the legal agreement and Disbursement Letter.

15. The following disbursement methods may be used to withdraw funds from the WB credits, (a) Replenishment, (b) advance, and direct payments. The ceiling for advances to be made into the DA would be determined during appraisal, estimated to be sufficient for project execution for a period of at least 4 months. It is expected that eligible expenditures paid out of the DA be reported on a monthly basis. Supporting documentation for documenting project expenditures under advances and reimbursement method will be: statement of expenditures (SOEs) and records for all expenditures above the thresholds.

Counterpart funds

16. Counterpart funds have been defined and committed and will be directly applied by the local agencies involved.

Auditing arrangements

17. The financial statements of NAFIN and the projects it implements are subject to yearly independent external audits. Additionally, and in compliance with the requirements of different financing agreements, each project's financial statements are also audited, with the subsequent issuance of a specific audit report. For this project purposes, specific terms of reference should be agreed and approved by the Bank, providing for the review of project financial statements.

Next steps

18. As project design is completed, the actions detailed in the attached action plan need to be completed and formalized with NAFIN in order to complete the design of the specific financial management arrangements. Completion of the action plan would be supported and guided by the Bank's fm team, and final evaluation performed before appraisal, in order to update the assessment and be able to arrive to a final discussion in terms of the adequacy of the proposed arrangements; and therefore updated corresponding sections of the PAD.

Conclusion. From this preliminary assessment, it can be concluded that the XX has in place generally acceptable financial managements arrangements.

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Annex 8: Procurement Arrangements (DRAFT)

A. General

1. Procurement for the proposed project will be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits," dated May 2004, revised on October 2006, "Guidelines: Selection and Employment of Consultants by World Bank Borrowers," dated May 2004, revised on October 2006, and the provisions stipulated in the Legal Agreement. The various items under different expenditure categories are described in general below. For each contract to be financed by the Loan/Credit, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and timeframe are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be included and updated in SEPA at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

2. **Procurement of Works**: Works procured under this project will include: small civil works such as remodeling water and sewer capturing management works (e.g., ponds). Procurement will be done using the Harmonized Standard Bidding Documents (SBDs) agreed between the Secretaría de la Función Pública (SFP) for all ICB. Contracts with estimated values below the agreed threshold for ICB (US$ 15.0 million equivalent), will be done using the Harmonized Standard Bidding Documents (SBDs) agreed between the Secretaría de la Función Pública (SFP). Works estimated to cost less than US$ 500,000 equivalent per contract may be procured through price comparison of quotations of at least three contractors, received in response to a written invitation. The invitation will include a detailed description of the small works, including basic specifications, required completion dates, and a basic contract form acceptable to the Bank. When needed and if the requirements of paragraphs 3.1, 3.6 and 3.7 of the Procurement Guidelines are met, direct contracting of small works may be undertaken, with prior agreement of the Bank. The proposed Loan will not finance works carried our by force account.

3. **Procurement of Goods:** Goods procured under this project will include: Goods procured under this project would include: SAT servers, computers, printers, software; other office equipment; specialized equipment, including photographic, detection, monitoring, data processing and transmitting equipment; telecommunications equipment, including GPS; satellite imagery; field equipment, amidst others. The procurement for all ICB will be done using the Bank's Harmonized Standard Bidding Documents (SBDs) agreed between the Secretaría de la Función Pública (SFP). Contracts with estimated values below the agreed threshold for ICB (US$3'000,000) may be procured using NCB procedures, will be done using the Harmonized Standard Bidding Documents (SBDs) agreed between the Secretaría de la Función Pública (SFP). For contracts valued less than $ 100,000 shopping procedures may be followed. When needed and if the requirements of paragraphs 3.1, 3.6 and 3.7 of the Procurement Guidelines are met, direct contracting of goods may be undertaken with prior agreement of the Bank.

4. **Procurement of non-consulting services:** All contracts for services not related to consultant services as logistics, organization of seminars, workshops, and printing services may be procured under same methodologies specified for goods above.

5. **Selection of Consultants:** Analytical studies; assessment, identification, monitoring and evaluation services; design, supervision and audit services; training, and other consulting services will be financed under this Grant. These consultant services would be procured following Bank's policies and using Harmonized Standard Documents. Short lists of consultants for services estimated to cost less than $500,000.00 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

6. Most contracts for firms are expected to be procured using Quality and Cost-Based Selection methods (QCBS), Least Cost Selection (LCS) is expected for audits and other noncomplex works and Selection Based on the Consultants Qualifications (CQS) would be used for small assignments. Consultant assignments of specific types, and previously agreed with the Bank in the Procurement Plan, may be exceptionally procured using Single Source Selection (SSS) methods, and under circumstances explained in paragraph 3.9 of the Consultants' Guidelines.

7. **Selection of individual Consultants:** Individual consultants will be hired through comparison of qualifications of at least three qualified candidates to provide technical advisory and project support services and selected in accordance to Section V of the Guidelines.

8. **Operating Costs:** Operating costs will include reasonable expenditures to carry out the project such as travel and per diem costs for official project staff and personnel commissioned under the project; rentals; utilities; project vehicle fuel; communications (including Internet connectivity); maintenance of facilities, equipment and vehicles; consumable materials and supplies and other project administration related costs, to be procured using the implementing agency's administrative procedures reviewed and acceptable to the Bank. The procurement procedures and SBDs to be used for each procurement method, as well as model contracts for works and goods procured, will be presented in the Implementation Manual.

B. Assessment of the agency's capacity to implement procurement.

9. Procurement activities will be carried out by NAFIN. An assessment of the capacity of NAFIN, the proposed executing agency, to implement procurement actions for the project had been carried out by the World Bank in ……... The assessment reviewed NAFIN organizational structure and capacity for implementing the project. The overall project risk for procurement is AVERAGE

C. Procurement Plan

10. The Borrower, at appraisal, developed a procurement plan for project implementation which provides the basis for the procurement methods. This plan will be agreed between the Borrower and the Project Team by appraisal and will be made available at SEPA (Sistema de Ejecución de Planes de Adquisiciones). It would also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project

Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

11. In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended a first supervision after the 6 months of project procurement implementation, and then annually, including visiting the field to carry out post review of procurement actions.

E. Details of the Procurement Arrangements Involving International Competition

1. Goods, Works, and Non-Consulting Services

(a) List of contract packages to be procured following ICB and direct contracting:

1	2	3	4	5	6	7	8	9
Ref. No.	**Contract (Description)**	**Estimated Cost**	**Procurement Method**	**P-Q**	**Domestic Preference (yes/no)**	**Review by Bank (Prior/Post)**	**Expected Bid-Opening Date**	**Comments**
	Computers, Software and Accessories	TBD	ICB		Yes	Yes	July 2008	
	Glaciers monitoring Station Equipment	TBD	LIB		Yes	Yes	July 2008	

(b) ICB contracts estimated to cost above [*fill in threshold amount*] per contract and all direct contracting will be subject to prior review by the Bank.

2. Consulting Services

(a) List of consulting assignments with short-list of international firms. (to be completed by appraisal)

1	2	3	4	5	6	7
Ref. No.	**Description of Assignment**	**Estimated Cost**	**Selection Method**	**Review by Bank (Prior/Post)**	**Expected Proposals Submission Date**	**Comments**

(b) Consultancy services estimated to cost above [*xx*] per contract and single source selection of consultants (firms) for assignments estimated to cost above [*xx*] will be subject to prior review by the Bank.

(c) Short lists composed entirely of national consultants: Short lists of consultants for services estimated to cost less than US$50K equivalent per contract, may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

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Annex 9: Project Preparation and Supervision

	Planned	Actual
PCN review	03/14/2006	03/14/2006
Initial PID to PIC		12/12/2008
Initial ISDS to PIC		12/12/2008
Appraisal	02/01/2007	02/09/2009
Negotiations	03/18/2009	
Board/RVP approval	04/28/2009	
Planned date of effectiveness		
Planned date of mid-term review		
Planned closing date		

The time lapse between PCN and PAD reviews was caused by the descapitalization of the SCCF. Lack of funds to support the project was announced by the SCCF, after it had been accepted for pipeline entry, in early 2007. The SCCF finally allocated resources to the project in July 2008 and thus only then preparation could proceed.

Key institutions responsible for project preparation: INE in coordination with State Agencies.

Bank staff and consultants who worked on the project included:

Name	**Title**	**Unit**
Walter Vergara	Task Manager/Lead Chemical Engineer and Environmental Specialist	LCSEN
Alejandro Deeb	Hydrologist	LCSEN
Doug Olson	Water Specialist	LCSEN
Rita Cessti Alonso Zarzar	Water Specialist Senior Social Scientist	LCESN LCSEO
Sebastian Scholz	Forestry Specialist	LCSEN
Seraphine Haeussling	Co-task manager and Economist	LCSEN
Keiko Ashida	Operations Analyst	
Gabriel Penaloza	Procurement Specialist	
Victor Ordonez	Financial Management Specialist	
Mariangeles Sabella	Counsel	LEGLA

Bank funds expended to date on project preparation:

1. GEF resources: $180K
2. Trust funds: GEF PDF-B $350K
3. Total: US$430,000

Estimated approval and supervision costs:

1. Remaining costs to approval: $10K; Estimated annual supervision cost:$70K

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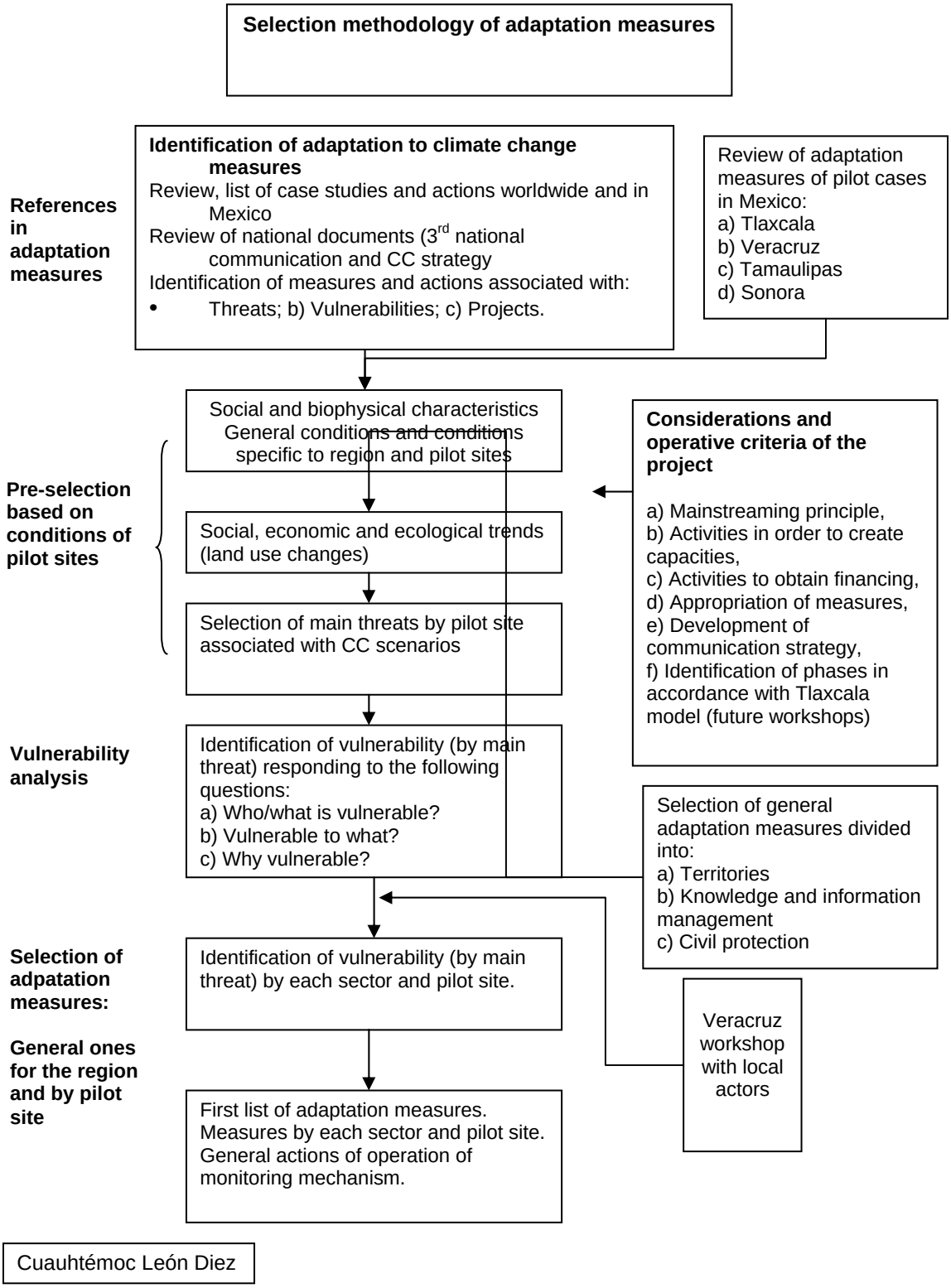
Annex 10: Documents in the Project File

Latin America and Caribbean Region: Sustainable Development Working Paper 25: Adapting to Climate Change, Lessons Learned, Work in Progress and Proposed Next Steps for the World Bank in Latin America, October 2005, by Walter Vergara.
M. C. René Cuauhtémoc León Diez: Análisis de medidas de adaptación (INE, 2007)
Lic. Norma Salomé Munguía Aldaraca Análisis institucional (INE, 2007)
Mtra. Emelina Nava García Análisis Socioeconómico (INE, 2007)
Dr. Javier Bello Pineda Diagnóstico Biofísico, Ecológico y Sistema de Soporte para la Toma de Decisiones (SSTD) (INE, 2007)
Biól. Mauricio Cervantes Ábrego. Coordinación del PDFB (INE, 2007)
Dr. Pedro Hipólito Rodríguez Herrero Impactos Antropogénicos (Uso del Agua) (INE, 2007)
Dr. Víctor Orlando Magaña Rueda Modelaje (INE, 2007)
Ocean. Francisco Manuel Noriega Echeverría Facilitación de Reuniones y Taller (INE, 2007)
M. en Geog. Leticia Gómez Mendoza Impactos Antropológicos (Uso de suelo) (INE, 2007)
Instituto Nacional de Ecología (INE-SEMARNAT): Adaptación a los impactos del cambio climático en los humedales costeros del Golfo de México, 2008
P. C. D. Milly1, K. A. Dunne1 & A. V. Vecchia. Global pattern of trends in streamflow and water availability in a changing climate. Nature: November 17, 2005 pp
Caso, M., I. Pisanty y E. Ezcurra 2004: Diagnóstico ambiental del Golfo de México. Vol. I y II. INE/Semarnat
Amended General Wildlife Law (2007)
MAPA DE ZONIFICACION DEL PROGRAMA DE CONSERVACION Y MANEJO DEL COMPLEJO SIAN KA'AN MAYO, 2007
BORRADOR DEL PROGRAMA DE CONSERVACION Y MANEJO DEL COMPLEJO SIAN KA'AN MAYO, 2007
Latin America and Caribbean Region Sustainable Development Working Paper 32: Assessing the Potential Consequences of Climate Destabilization in Latin America (2009)

Annex 11: Selection process and characteristics of pilot sites



Cuauhtémoc León Diez

1. **Selection process of pilot sites:** There are 42 Lagoon-Estuary Systems *(Sistemas Lagunares–Estuarinos)* along the entire coastline of the Gulf of Mexico and the Caribbean. Each of these systems in turn possesses a diversity of coastal wetlands. The selection process focused on systems that are very representative of each ecological region in each coastal state of the Gulf of Mexico and the Caribbean, with a certain biological and ecological priority of the wetland according to CONABIO criteria as a land or marine region and hydrological region, defined by CONANP as a natural protected area, a wetland of international importance (Ramsar Site), a priority wetland for wildlife, SEMARNAT, and a site of importance for the North American Wetlands Conservation Council (NAWCC). During project formulation, the specialists hired through the PDF B defined selection criteria and assigned weights which were then applied to a long-list of sites. The selection criteria are shown summarized below in table 3, and include: a) vulnerability to climate impacts; b) status of conservation; c) biological value; d) degree of anthropogenic intervention; e) local implementation capacity

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Table 3 shows criteria in decreasing order, according to the overall weight assigned to the selection criteria.

Table No. 3. List of aptitude criteria used to evaluate sites

No.	Criteria in decreasing order	Weight
1	Floodability	0.17807
2	Climate	0.09978
3	Economic specialization	0.07805
4	Pressure	0.07034
5	Risk	0.06144
6	Rain	0.06121
7	Hurricanes	0.05751
8	Sector	0.05722
9	Beaches	0.05313
10	Environmental services	0.05083
11	Geo-political	0.04375
12	Accessibility	0.04220
13	Demographics	0.02996
14	Eco-region	0.02287
15	Ecological value	0.02194
16	Poor people	0.01984
17	Activities	0.01895
18	Rural	0.01769
19	Population	0.01520

Results:

Table No. 5. Lagoon-Estuary Systems of the Gulf of Mexico and the Caribbean	
No.	
1	Río Coatzacoalcos (Uxpanapan-Laguna El Colorado)
2	Río Papaloapan-(Laguna de Alvarado)
3	Can Cun (Laguna Nichupte-Nizuc)
4	Progreso (Chuburna/Chixulub)
5	Sistema lagunar Pom-Atasta-Puerto Rico (Río Palizada: Río San Pedro and San Pablo)
6	Delta Río Soto la Marina-Laguna los Morales
7	Río Panuco Corredor Sistema Lagunar:Altamira/Ciudad Madero/Tampico
8	Sistema Lagunar Carmen -Pajonal-Machona (Río San Felipe, Pajonal and Santa Ana)
9	Río Hueyapan (Sistema lagunas Catemaco-Sontecomapan)
10	Punta Allen (Sistema Lagunar Boca Paila)
11	Ría Lagartos
12	Ría Celestun
13	Sistema Lagunas Tamiagua-Tampamachoco
14	Río San Fernando-Laguna la Nacha

2. Criteria regarding threats and representativeness were assigned higher weights. For that reason those sites had a higher rating that were identified as vulnerable to natural disasters, with a high level of human presence in at-risk zones, and having a high degree of human impact. Sites with lower ratings were those that were evaluated as less vulnerable, better conserved, and with a low level of human presence. As there is a need to support geographical diversity and conservation work is being done by PEMEX at El Colorado, this system was replaced by Carmen Pajonal (no.5). Also, a well conserved site was needed in the sample to provide for a baseline. Punta Allen was then included instead of Cancun in Quintana Roo.

No.	Table No. 6. Pilot Sites and Control Sites	Weight
1	**Río Coatzacoalcos (Uxpanapan-Laguna El Colorado). Veracruz**	**0.900**
2	**Río Papaloapan-(Laguna de Alvarado). Veracruz**	**0.835**
3	**Cancún (Laguna Nichupte-Nizuc). Quintana Roo**	**0.820**
4	**Río Panuco Corredor Sistema Lagunar: Altamira/Ciudad Madero/Tampico. Tamaulipas**	**0.703**
5	**Sistema Lagunar Carmen -Pajonal-Machona (Río San Felipe, Pajonal and Santa Ana). Tabasco**	**0.689**
6	**Punta Allen (Sistema Lagunar Boca Paila). Quintana Roo**	**0.628**
7	**Río San Fernando-Laguna la Nacha. Tamaulipas**	**0.555**
8	**Sistema los Petenes. Campeche**	**0.525**

3. **Identification of pilot measures:** The selection process included a literature review of adaptation case studies and related technical documents such as national communications and adaptation strategies in Mexico and worldwide. General adaptation measures were identified based on the threats and vulnerabilities identified. Measures were selected on the basis of conditions of the pilot sites, including biophysical characteristics, social, economic and ecological trends (land use changes), main threats associated with climate scenarios. The process included a specific vulnerability analysis regarding anticipated climate change impacts at each site. The list of the measures eligible under this GEF window were selected and presented for public consultation at each pilot site, after which final measures were selected.

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Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 12: Social Assessment

1. This annex summarizes the process of consultation that was carried out in the four project sites where pilot measures will be implemented and provides a picture of the main social features and main economic activities in each site[19].

The consultation process

2. The consultation was organized by INE-SEMARNAT in close coordination with the municipalities and local authorities in each project site. The consultation was joined by the Task Team as well as by other local and State representatives of various institutions.

3. **Wetland Panuco River, Altamira – Ciudad Madero – Tampico Lagoon System Corridor in Tamaulipas**. The consultation was lead by the Municipality of Tampico. It included a significant participation from the most important local and State institutions as well as by several university professors and students. More than 200 people attended the meeting. The participants included representatives from the municipality of Tampico, the government of Tamaulipas, environmental and social NGOs, State universities such as UNE, U.A.T., and UVB Valle de Mexico, environmental State agencies, private environmental companies and federal government environmental agencies.

4. **Wetland Papaloapan River – Alvarado Lagoon, in Veracruz**. The consultation was lead by the Municipality of Alvarado. It had an impressive number of representatives from grass root organizations, local enterprises as well as research institutions. More than 150 attended the meeting called by the Major of Alvarado. The participants included representatives from the Municipality of Alvarado, the government of Veracruz, around twenty fishermen cooperatives, local conservation NGOs, the Fishing National Institute, representatives from adjacent municipalities, women's cooperatives, research institutions from State universities, and members of CONAGUA.

5. **Wetland of the Lagoon System Carmen Pajonal – Machona, in Tabasco.** The consultation was lead by the municipalities of Paraiso and Cardenas. It included a significant number of representatives (estimated over 70 participants) from the local governments and the state of Tabasco. The participants included Cabinet members of the State of Tabasco, mayors, high municipal government officials as well as representatives from PEMEX, CONAFOR, CFE, leaders from the *Ejidos*, conservation NGOs, farmers and fishermen cooperatives, foresters, cattle raising associations, and members from the Climate Change State Council.

6. **Wetland of Punta Allen – Estuary System Boca Paila, Biosphere Reserve Sian Ka'an in Quintana Roo.** The consultation was lead by the municipalities of Felipe Carrillo, Tulum and Solidaridad and included state and federal authorities. It included the participation of the local fishermen, representatives from local NGOs associated with the Sian Ka'an reserve and state university members. During these meetings presentations were made on climate change in general,

[19] The project sponsor has prepared a vast document of more than 800 pages including biological, climate, demographic and socio economic assessments for all the sites. This annex presents only the most relevant features and a brief description of the socio economic situation in each site.

expected scenarios of CC for Mexico and in particular for the wetlands in the Gulf of Mexico, and the potential adaptation measures that can be implemented through this project and other investments. There was ample room for interventions from the stakeholders, for questions and proposals around the issue of wetland protection and improving resilience for CC, as well as regarding improvement of natural resource use.

Socio economic assessment

7. **Wetland Panuco River, Altamira – Ciudad Madero – Tampico Lagoon System Corridor in Tamaulipas.** The population in this large area is estimated at around 1.3 million people as per the 2008 census. Fishing and agriculture have declined in the period 1999-2004 at an annual average rate of -0.6 percent. At the same time the area has experienced a process of urbanization with a significant increase of the industrial sector at an annual rate of 19 percent due to the oil industry, the *maquilas* and the construction of the harbor in Altamira. Tourism is the other growing sector at an annual rate of 8 percent.

8. The Panuco site is the most intervened one of the four. It has the highest population and is the most urbanized. The overuse of the aquifers and the lack of water use efficiency create additional pressures on the system. The current process of urbanization is also being triggered with the construction of the Altamira harbor, one of the largest in the country. The area has the highest deforestation in comparison to the other project sites. The main drivers of land use change in the Lagoon System Corridor are induced pastures, expansion of human settlements, and the increase in cattle raising.

9. In the specific location of project intervention, the main driver of land use change is the process of urbanization around the Lagoon La Escondida, next to the city of Tampico. The project will support expanding the area under conservation of the Lagoon La Escondida in the city of Tampico, a process that is not expected to trigger OP 4.12 (Involuntary Resettlement), because it will not require the involuntary taking of land, nor would it entail restriction of access to natural resource use that sustain livelihoods.

10. The Lagoon La Escondida is used mainly for recreational activities and some artisanal fishing. The specific project intervention objective is to reduce the expansion of urbanization at the cost of the vegetation surrounding the lagoon, and thus protecting the lagoon from further urban encroachment. To avoid physical displacement there will be no demolition of existing buildings under the project. There will be no other restrictions imposed on ongoing livelihoods or recreational activities, since these activities do not affect project objectives.

11. **Wetland Papaloapan River – Alvarado Lagoon, in Veracruz.** The population in the area of influence of the Lagoon system is estimated at half a million inhabitants. The most important economic activities in the area are fishing (with serious pollution and over exploitation problems) and cattle raising, followed by agro-industry (sugar cane) and tourism, which is growing rapidly in the last years.

12. The human induced threats to the Alvarado wetlands place the ecological functioning of the entire system at risk, as well as the subsistence of the local communities that depend on the ecosystem economically for the products and services that the system provides.

13. The Alvarado lagoon complex is characterized similar to the Panuco site by a very high deforestation rate. The predominant land uses today in the wetland are hydrophilic vegetation, coastal dunes and water bodies. Land use changes between 1976 and 2000 show that the most significant change has been the transformation of extensive areas of hydrophilic vegetation into cultivated pastures and temporal agriculture.

14. Altogether the major threat to the wetland is the increase of livestock activities. Project financing for the adoption and effective support of a buffer zone (not a legally protected area) around the Alvarado lagoon will not trigger OP 4.12 (Involuntary Resettlement) because the policy only applies in the case of legally designated parks or protected areas. The creation of a buffer zone will encourage a more sustainable use of natural resources and will aim at reducing the rate of deforestation of mangroves (so critical for the functioning of the wetland ecosystem) due to cattle raising expansion and the illegal conversion of mangrove forests into pastures.

15. According to Mexican legislation mangrove lands are under federal tenure; however, many of them are encroached upon by cattle ranchers who make significant investments to convert the mangroves into pasture lands. Existing, converted pasture lands will be maintained as they are, and therefore, there will be no adverse impact on cattle ranchers who are currently using these pasture lands since their access to such lands will not be restricted under the project. However, no new illegal deforestation will be allowed in the buffer zone, which is under federal land tenure.

16. During the first year of project implementation the design of the buffer zone will be made through the preparation of a baseline study that will include a social census and a detailed description of natural resource use in the area of intervention.

17. It is interesting to note that there are currently several, although small in scale, mangrove reforestation programs in which even cattle owners are participating and gaining an understanding of the critical role mangroves play in sustaining live in this wetland.

18. **Wetland of the Lagoon System Carmen Pajonal – Machona, in Tabasco.** The population in the area of influence of this very large wetland is estimated at around 1.5 million inhabitants. The most important economic activities are agricultural production, livestock, oil production, fishing and tourism. This latter one is experiencing significant growth in the last years.

19. In 1975 the lagoon La Machona was connected to the sea through an artificial opening denominated “Boca de Panteones”, which was opened for oil activities. These works caused intrusion of large volumes of salt water into 60,000 ha of pastures, cultivations, fresh water areas, affecting agriculture production, pastures and fishing.

20. Large areas of mangrove vegetation had been substituted by pastures and terraces for rice production. Fishing activities are intensive and are creating over pressure to some species such as oysters. Agriculture activities and livestock have been significant in replacing the original vegetation and are the major drivers for deforestation of the mangrove forests. Overall deforestation of the mangrove vegetation is one of the highest among the four sites. Ecotourism has a large potential for development in the area and is currently being supported by the local municipalities.

21. Project supported activities such as reforestation with native species to create biological corridors will provide new sources of employment and income to the local population and will not entail restriction of access to natural resource use, but would rather improve natural conditions and natural productivity, helping also growing ecotourism.

22. **Wetland of Punta Allen – Estuary System Boca Paila, Biosphere Reserve Sian Ka'an in Quintana Roo.** The population in the area of influence of this wetland is estimated at around 90,000 people. In the biosphere reserve there is only two fishermen villages (Punta Allen and Punta Herrero) with around a thousand people.

23. The main economic activities are tourism (with several boutique hotels inside the reserve) and lobster fishing. The reserve is the second largest producer of lobster in Mexico. Tourism is growing and registers more than 30,000 visits per year. Sport fishing or fly fishing is a new activity triggered by tourism, but the wetland has also experienced pressures from agriculture, logging and livestock. Lobster fishing is responsible for the presence of the inhabitants in the reserve. Fishermen are organized in five cooperatives, but only two are inside the reserve. The main pressure on the wetland is the large number of tourists and the presence of small hotels which in turn means a larger amount of solid waste and water discharges. The activities supported by the project do not adversely affect people's livelihoods, but would rather contribute to a better management for land use.

24. During project implementation the specific interventions supported by the project will be prepared as well as the land zoning plans. The social specialist in the team will closely monitor and participate in these processes to ensure that no physical or economic displacement takes place and that local people effectively participate in project implementation measures.

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Annex 13: Environmental Framework

ENVIRONMENTAL MANAGEMENT OF THE PROJECT

1. The environmental management plan takes into account the previously described components as well as the project's classification as Category B. The supported activities may have minor environmental impacts from some on-the-ground investments. The project will make use of environmental best practices. The use of a framework approach has been successfully employed in the Colombia: Integrated National Adaptation Program and the Regional: Adaptation to Rapid Glacier Retreat in the Tropical Andes. The following table presents potential environmental issues and impacts.

Component	Environmental issues and impacts	Elements of the Environmental Management Plan
Detailed design of key selected adaptation measures		
Detailed design of key selected adaptation measures	Due to the characteristics of this component no direct or indirect negative environmental effect is likely to arise during its implementation. In all cases the designs contemplate the analysis of alternative measures to reduce the impacts of climate change. Measures will include interventions to increase the resilience of coastal ecosystems.	Key elements of the detailed formulation and design of site-specific adaptation interventions are the identification of potential environmental and social impacts, their characterization, and the definition of specific actions to improve, prevent, and control adverse outcomes. There are no institutional capacity issues as most participating agencies are associated with or are environmental authorities.
Implementation of pilot adaptation measures in four selected wetlands highly vulnerable to the effects of climate change.		
Sub-component 2.1. The project will support the development and submission to deciding authorities of a climate resilient coastal zoning regulation in the area, including the expansion of conservation area around the Lagoon La Escondida, essential to maintain surface hydrology balance on the land side of the city of Tamaulipas (this would also include the strengthening of land barriers and other conservation measures) and maintain habitat for migratory species. About 10,000 ha are expected to enter into conservation status. The development of effective, climate sensitive zoning would simultaneously address the need to order land use, eliminating key anthropogenic impacts around the wetland and the need to allow for anticipated climate changes, in particular sea level rise and the occurrence of extreme weather events. The land barrier between the coastal strip and the lagoon would be strengthened. The	Impacts are localized and limited to the sites where each pilot measure for climate change adaptation is implemented. In all cases the impacts are expected to be mostly positive because the measures are aimed at mitigating identified and documented problems caused by GCC impacts, favoring environmental best practices.	During pilot implementation the responsible agencies in each site will oversee the execution of the environmental management plan, as implemented by contractors. An overall monitoring plan will be developed to maintain adequate control of project implementation and of the implementation of all covenants, including the application of corresponding environmental guidelines. Given the limited size of the proposed interventions, and their pilot nature, the country's existing standards and procedures are rated acceptable and in agreement with the Bank's OP 4.01.

Component	Environmental issues and impacts	Elements of the Environmental Management Plan
estimated cost of the design of the land zoning is $1.5 million. The strengthening of 10 Km of the land barrier (essentially, an increase in its height from 0.5 m to 1.5 m, is anticipated to cost $2.0 million). The strengthening of the barrier would provide valuable information on the cost and benefits of this approach. Water quality monitoring and climate sensitive flood control practices will be done through CONAGUA. **Sub-component 2.2.** The project will fund the design and adoption of a management strategy of the Alvarado Lagoon that effectively integrates climate concerns into its long term conservation strategy and the adoption and effective enforcement of a buffer zone around the lagoon. The creation of the buffer zone has been proposed but was so far not implemented due to lack of funding. The buffer zone is expected to effectively reduce anthropogenic impacts while also strengthening its climate resilience. It will order land use around the Lagoon and promote reforestation. About 10,000 will be reforested. The estimated costs including the costs of the initial two year vigilance effort is estimated at $2.0 million. The project will also fund the construction of a pilot stabilization barrier to buffer extreme weather events and future sea level rise around the lagoon. The pilot barrier would be located between the coastal zone and the lagoon and would also contribute to the protection of the urbanized areas. The barrier is a pilot, demonstrative measure that would provide the local authorities key information about the costs and benefits of such measures. The length of the expected pilot barrier would cover only the quarter most exposed to northern winds (about 2 km) and is estimated to cost about $4 million. These measures will result in preservation of critical habitat for migratory species of global value. CONAGUA will support with counterpart resources a wastewater treatment plant to reduce pollution loads in the lagoon. **Sub-component 2.3.** The project will support the revamping of land zoning regulations to incorporate climate concerns, specifically anticipated sea level rise and intensification of extreme weather events. The anticipated cost is $1.0 million. The project will also fund restoration and reforestation efforts with native species along biological corridors in the wetland system, with an estimated total cost of $3.0		Community involvement is an integral part of pilot implementation.

Component	Environmental issues and impacts	Elements of the Environmental Management Plan
million. An anticipated 5,000 hectares will be restored. The project will fund the strengthening of the sandbars that separate the coastal lagoons from the sea. A total length of 5 km will be strengthened with a total cost of about $2.0 million. **Sub-component 2.4.** The project will support (i) Strengthening the protected area monitoring system to include climate change impacts and the development of land use plans around its buffer zone. The anticipated costs are $1.5 million. The project will fund pilot repopulation of coastal reefs to maintain their buffering capability and protection of the coastal wetland to storm surges and other extreme weather events. This is anticipated to cost $1.5 million.		
Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options		
This component will complement efforts – supported by the Bank and other IFI- to assess current and feasible response options and measures that could be adopted at a national level to incorporate the anticipated impacts of climate change on water resource planning (global overlay). The component will update the diagnosis of current impacts and produce an analysis of recommended response measures. The component will be carried out by SEMARNAT-INE and IMTA. The companion grant CCIG will generate data on the impacts of CC on the country's national water resources focusing on high priority watersheds. This component will specifically support the following activities: • Hydrological characterization of 13 regions of the country with CC scenarios • Selection of pilot regions for detailed analysis of CC impact on hydrological resources • Analysis of response options to incorporate CC in planning and management of water resources • Development of tools for climate prognosis of use of planning and management • institutional analysis for the implementation of adaptive management	No negative environmental impacts will result from this component. This component will provide the data required to define policies to better plan and manage water resources in the face of CC impacts.	
Monitoring and Evaluation systems		
The project will support the design and	No significant impacts are	It is recommended that the M&E

Component	Environmental issues and impacts	Elements of the Environmental Management Plan
implementation of the corresponding monitoring and evaluation systems in order to analyze the effectiveness of the adaptation measures adopted under the project framework.	expected because this component will only monitor and evaluate the measures taken and will not have any physical direct or indirect effect on the environment. Observation of wetlands will provide important data on changes in biomass and extension as a consequence of land use changes and climate change impacts. The companion CCIG activities will generate data on changes in water flows to the wetland and in water quality.	system specifically include environmental indicators to assess pilots environmentally induced impacts, most of which are expected to be positive. The use of ALOS as a monitoring tool will help detect any changes in biomass as a result of the project.

Taking into account the potential environmental impacts, the following table summarizes the environmental management for each component**.**

Component	Description	Field interventions	Environmental negative issues	Environmental control measures	Monitoring
Detailed design of key selected adaptation measures	Activities supported include: a) Technical, engineering design of adaptation pilots; (b) drafting of management plans; (c) M&E system design to measure the impacts of adopted measures; and (d) assessment of the economic implications of the impacts.	none	No negative impacts are expected from this activity. The design process will make sure that physical impacts of pilots are minimal and focused on strengthening of ecosystems and their services and on increasing their resilience to CC impacts.	Each pilot design will undergo environmental assessments to make sure benefits for ecosystems and benefits for people that depend upon these ecosystems are maximized.	Monthly progress reports on design;
	Public outreach and dissemination of information	none	No negative impacts are expected from this activity. This activity will help increase awareness about biological and human importance of preserving wetlands and their services, particularly raise awareness on the implications of CC impacts for these. This component will help share generated data on CC impacts on wetlands.	N.A.	Seminannual progress reports
Implementation of pilot adaptation measures in four selected wetlands highly vulnerable to the effects of climate change.	Wetlands-Panuco-Altamira (Tamaulipas). The project will support the development and submission to deciding authorities of a climate resilient coastal zoning regulation in the area, including the expansion of conservation area around the Lagoon La Escondida, essential to maintain surface hydrology balance on the land side of the city of Tamaulipas (this would also include the strengthening of land barriers and other conservation measures) and maintain habitat for migratory species. About 10,000 ha are expected to enter into conservation status. The development of effective, climate sensitive zoning would simultaneously address the need to order land use, eliminating key anthropogenic impacts around the wetland	Expanding conservation area; strengthening land barriers; Reforestation; implementation of coastal zoning regulation	Most expected environmental impacts are positive. There might be minor physical interventions that will apply appropriate environmental guidelines; Expanding conservation areas will imply strengthening of protected area status and strengthening of natural land barriers through reforestation and restoration efforts. Coastal zoning regulations will include better information and data on CC impacts which will allow for improved decision making of preservation of ecosystems and on the intensity of land uses. Reforestation efforts	Use of best environmental practices; communities will be involved in the monitoring efforts. Agreements will be sought with landholders adopting coastal zoning regulations that take CC impacts into account.	Detailed supervision reports; Semiannual progress reports; ALOS images;

Component	Description	Field interventions	Environmental negative issues	Environmental control measures	Monitoring
	and the need to allow for anticipated climate changes, in particular sea level rise and the occurrence of extreme weather events. The land barrier between the coastal strip and the lagoon would be strengthened. The estimated cost of the design of the land zoning is $1.5 million. The strengthening of 10 Km of the land barrier (essentially, an increase in its height from 0.5 m to 1.5 m, is anticipated to cost $2.0 million). The strengthening of the barrier would provide valuable information on the cost and benefits of this approach. Water quality monitoring and climate sensitive flood control practices will be done through CONAGUA.		will be carried out with native species and in areas previously forested. The areas will be selected based on satellite images from the past and based on analysis of major positive impacts for surface hydrology balance.		
	Sub-component 2.2: Wetlands of the Papaloapan Rivershed, Alvarado Lagoon (Veracruz). The project will fund the design and adoption of a management strategy of the Alvarado Lagoon that effectively integrates climate concerns into its long term conservation strategy and the adoption and effective enforcement of a buffer zone around the lagoon. The creation of the buffer zone has been proposed but was so far not implemented due to lack of funding. The buffer zone is expected to effectively reduce anthropogenic impacts while also strengthening its climate resilience. It will order land use around the Lagoon and promote reforestation. About 10,000 will be reforested. The estimated costs including the costs of the initial two year vigilance effort is estimated at $2.0 million. The project will also fund the construction of a pilot stabilization barrier to buffer extreme	Strengthened conservation efforts; Strengthened buffer zone pilot stabilization barrier	No negative environmental impacts are expected from this activity. Conservation plans will take CC impacts into account and thus have a longterm planning horizon, and address current and projected threats to make wetlands more resilient to CC. Buffer zones won't limit access to natural resources and will consider space for species to migrate under future sea level and extreme weather event scenarios. Stabilization barriers will include natural means to protect ecosystems. In case of physical interventions best environmental practices will be used.	Buffer zone will be strengthened through voluntary agreements with land holders. Environmental good practices will be followed for conservation efforts. Only native species will be used; stabilization barrier will use natural means.	Detailed supervision reports; Semiannual progress reports; voluntary agreements; Mainstreamed Conservation plans; reforestation plans; ALOS images;

Component	Description	Field interventions	Environmental negative issues	Environmental control measures	Monitoring
	weather events and future sea level rise around the lagoon. The pilot barrier would be located between the coastal zone and the lagoon and would also contribute to the protection of the urbanized areas. The barrier is a pilot, demonstrative measure that would provide the local authorities key information about the costs and benefits of such measures. The length of the expected pilot barrier would cover only the quarter most exposed to northern winds (about 2 km) and is estimated to cost about $4 million. These measures will result in preservation of critical habitat for migratory species of global value. CONAGUA will support with counterpart resources a wastewater treatment plant to reduce pollution loads in the lagoon.				
	Sub-component 2.3: Wetlands of Carmen-Pajonal- Machona (Tabasco). The project will support the revamping of land zoning regulations to incorporate climate concerns, specifically anticipated sea level rise and intensification of extreme weather events. The anticipated cost is $1.0 million. The project will also fund restoration and reforestation efforts with native species along biological corridors in the wetland system, with an estimated total cost of $3.0 million. An anticipated 5,000 hectares will be restored. The project will fund the strengthening of the sandbars that separate the coastal lagoons from the sea. A total length of 5 km will be strengthened with a total cost of about $2.0 million.	Reforestation Strengthening of sandbar	Reforestation will be done with native species and on areas previously forested and found adequate in order to strengthen ecosystem; Decision on location of biological corridors will address current root causes of biodiversity and ecosystem functioning loss as well as future CC scenarios, and will be established in harmony with local reforestation efforts; Strengthening of sand bar will undergo previous analysis of physical requirements to maintain natural separation between lagoon and sea under CC scenarios and implement strengthening measures by natural means: under consideration are to partly revert the artificial opening of "Boca de	Environmental good practices will be followed. Bidding documents for sand bar strengthening will incorporate EIA and EMP. If minor infrastructure works are required, detailed EIS will be prepared.	Detailed supervision reports; Semiannual progress reports; voluntary agreements; Reforestation plan; ALOS images; detailed supervision report (semiannual) application of good environmental practices.

Component	Description	Field interventions	Environmental negative issues	Environmental control measures	Monitoring
			panteones" and to strengthen the existing sand bar in order to stabilize the sand deposits with regard to coastal currents. This work will be based on an analysis of currents and sedimentation, definition of areas of major instability, types of stabilizing structure etc.		
	Sub-component 2.4: The Siam Ka'an nature conservancy site (Punta Allen, Quintana Roo). The project will support (i) Strengthening the protected area monitoring system to include climate change impacts and the development of land use plans around its buffer zone. The anticipated costs are $1.5 million. The project will fund pilot repopulation of coastal reefs to maintain their buffering capability and protection of the coastal wetland to storm surges and other extreme weather events. This is anticipated to cost $1.5 million.	Strengthened monitoring system for protected areas Updated land use plans repopulation of coral reefs	No environmental negative effects will take place through this activity. This component will help expand monitoring efforts by considering CC data and will improve existing monitoring system. Land use plans will integrate better information related to probable future climate scenarios. Repopulation of coral reefs will be done with native species that have shown resilience to past temperature increases.	Coral program will only consider native species and tested repopulation techniques.	Detailed supervision reports; Semiannual progress reports; mainstreamed monitoring systems and CC data generated
Assessment of the impacts of climate change on water resources planning at a national level and in coastal wetlands including the identification of potential response options	Selection of pilot regions for detailed analysis of CC impact on hydrological resources. Identification of response options to incorporate CC in planning and management of water resources. Development of tools for climate prognosis of use of planning and management	This is a modeling and analytical activity with no physical impacts.	Results will help to generate climate change impacts data for the water resources planning process.	N/A	Generated data and response options

Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 14: Regulatory, policy and institutional framework of wetland management

1. Mexico has several direct and indirect regulatory, policy and institutional tools in place to protect coastal wetlands. These include the Mexican constitution, the national water law, the general law of ecological equilibrium and environmental protection (LGEEPA), the general forestry law, the general wildlife law, several norms of which norm NOM-022-SEMARNAT-2003 is the one most directly related to wetland protection. Also the competences of CONAGUA and of the municipalities provide for wetland protection. With regard to ministries, the following have competences related to wetland management: ministry of environment, ministry of marine matters, ministry of tourism, ministry of health, ministry of agriculture, Secretaria de gobernacion, and the inter-ministerial climate change committee, created in April of 2005 as the responsible unit to formulate public policies and transversal strategies of mitigation and adaptation to CC. The ministry of environment (SEMARNAT) has among its objectives the protection, restoration, and conservation of ecosystems and natural resources. It proposes to the federal executing entity the establishment of natural protected areas. In terms of sector programs there are several related to wetlands such as SEMARNAT's "Ordenamiento territorial de mares y costas de México" and "Ordenamiento del Golfo de México y Mar Caribe", the national reforestation program and the national climate change program.

2. The norm that is most directly related to wetland protection is **NOM-022-SEMARNAT-2003.** The Official Mexican Norm NOM-022-SEMARNAT-2003, in effect since April of 2003, establishes specifications for the preservation, conservation, sustainable use and restoration of coastal wetlands in swamp areas. By this means, measures and programs for protecting the integrity of coastal wetlands can be implemented, protecting and, where necessary, restoring their hydrological functions, of contiguity, of maintaining biodiversity, and of coastal stabilization, with measures that re-establish their vegetation cover and hydrological flow, preventing their deterioration from the change in land use, indiscriminate canalization, opening of mouths in lagoons and marshes, and interruption or diverting of fresh water or increased movement in coastal wetlands which results in greater obstruction, an increase in salinity, the reduction of productivity, and the loss of habitat for the reproduction and breeding of the larvae of marine species.

3. Also the competences of **CONAGUA** comprise several provisions for wetland protection. Among the objectives of the national water program are the development of economic incentives and tools to promote the conservation of wetlands. The program includes also the promotion of the elaboration of a national wetland inventory, with the help of INE. The functions of the technical direction of CONAGUA include the proposal of technical and official norms for the conservation, protection and restoration of wetlands. The national water law (revised in 2004) includes the environment as a legal water use and mandates the establishment of Basin Organizations (under CONAGUA) and Basin Councils with representatives from federal, state and municipal governments, and other stakeholders.

4. One of the most effective environmental policy instruments for the conservation of biodiversity in Mexico is the declaration of **Protected Natural Areas (PNAs).** They are created by presidential decree, and categories are established for the activities that may be carried out in them, such as biosphere reserves according to the general law of ecological

equilibrium and environmental protection (LGEEPA). LGEEPA establishes that prior authorization from SEMARNAT is required for carrying out works or activities that may cause ecological imbalance or exceed the limits and conditions for protecting the environment, and for preserving and restoring the ecosystems. In the Gulf of Mexico there are currently 12 protected natural areas, including the Centla and Petenes wetlands in Tabasco and Campeche. Semarnat, through CONANP, has identified 199 mangrove swamps, 69 of which are included in one of the different categories of the protected natural areas; 131 are considered by the National Biodiversity Commission to be high-priority regions because of their biodiversity, and 88 to be important areas for wildfowl conservation. At the beginning of 2005, the National Committee on High-priority Wetlands was created in the CONANP.

5. The **General Wildlife Law** in force since July 2000 gives particular importance to the species that form part of wetlands, especially to mangroves. With the entry into force of the amendments to the General Wildlife Law in February 2007, it became strictly prohibited to destroy mangroves. This law emphasizes the importance of species that are part of wetlands, in particular of mangroves in coastal wetlands. It protects these communities and prohibits absolutely the destruction of mangroves. The amendment was done by presidential decree and aims at avoiding any hydrological modification that could affect the mangrove ecosystem.

Municipal authorities

6. According to article 115 of the Mexican constitution municipalities have direct and exclusive competence with regard to land use even though land use changes need to be authorized on a federal level. The lack of obligations and repercussion related to land use has often lead to the realization of land use changes without major procedures. In practice municipalities play a key role in the management of natural resources even though there are no specific provisions in their competences for wetlands. The municipalities have the competence to use and develop a tool not yet fully exploited: the local ecological land management plans (ordenamiento ecologico territorial local (LGEEPA, article 20)).

Ministry of Tourism:

7. This ministry is responsible for the formulation and realization of policies on developing national touristic activities, promoting areas of national touristic development and formulating in cooperation with SEMARNAT the respective declarations. In this context the ministry has a direct impact on areas where there are wetlands with the potential to affect them negatively and to put them at risk.

State entities:

8. There aren't any state laws related to wetlands. States have no way to act, they can only influence. In general state entities have environmental legislations that intend to respond to their necessities and realities but which have often been copied from the LGEEPA. Environmental state laws are not homogenous among themselves. Even though LGEEPA is clear with regard to state competences not all state entities have regulated yet their authorities, competences and obligations. Even if states have no direct competence in wetlands they are together with the municipalities to a great extend responsible for their protection and for their deterioration. The states and municipalities have regulations related to the environment and to the water that could be applied to wetlands. However, these would need to be more specific and clearly defined in order to lead to effective interventions. Some of these regulations deal with prevention and control of water pollution, environmental

zoning and delimitation of settlements, establishment of state and municipal natural protected areas.

Ramsar

9. Mexico signed the Ramsar treaty on July 4, 1986 with the objective idea of preserving wetland ecosystems. To date CONANP is the focal point for the Ramsar Convention. CONANP announces the terms of reference for the preparation of conservation and management programs for protected natural areas, including mangrove swamps. Management programs are the guiding instrument in planning and regulating, and establishing the activities, actions and basic guidelines for the management and administration of the protected natural areas.

10. The Resolution VIII.3 of the 8th Meeting of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar) regarding Climate change and wetlands: impacts, adaptation and mitigation, calls upon Contracting Parties to manage wetlands in such a way as to increase their resilience to climate change and extreme climatic events, and to reduce the risk of flooding and drought in vulnerable countries by, *inter alia*, promoting wetland and watershed protection and restoration. It invites Contracting Parties to pay special attention to the need for building and strengthening institutional capacity and synergies between related instruments at the national level in order to address the linkages between climate change and wetlands, and to report at COP9 on progress in this matter, including achievements and the identification of difficulties encountered.

11. The existing regulatory framework is only limited to the protection of wetlands. Although this is important it has not been possible to reduce the continuing loss of wetlands. The loss of coastal wetlands is the result of several factors. The municipal governments have tolerated and promoted the urban development in risk areas and in areas affecting wetlands. Agricultural and cattle raising activities have lead to major land use changes. Water pollution affects the functioning of these water dependent ecosystems. The conservation of wetlands requires the coordination of several actors from the different sectors such as water, tourism, oil, urban development, agricultural, etc. The municipalities have an essential tool in their hands: land use plans. Through this tool they can significantly contribute to the conservation of wetlands. Municipalities and states have not assumed their capacities and responsibilities with regard to urban planning. The Normatividad and aptitude exist in that regard, starting with their authority to develop local ecological land management plans.

Wetlands in NPAs

12. The National Commission of Natural Protected Areas (NCNPA) manages currently 166 natural areas of federal character, representing over 23.1 million hectares. Of these PNA's, **14 include wetland ecosystems, of which 10 are classified as Biosphere Reserves, and 4 as National Parks.** The NCNPA coordinated too the Ramsar convention in Mexico.

13. **Biosphere reserves.** These are areas representing one or more ecosystems unaltered by human actions or needing to be preserved and restored, inhabited by species representative of national biodiversity, including those considered to be endemic, threatened or in danger of extinction.

14. **National Parks**. Areas with one or more ecosystems that is outstanding for their scenic beauty, their scientific, educational, and recreational value, their historical value, for

the existence of flora and fauna, for their suitability for the development of tourism, or for other similar reasons of general interest.

With regard to the pilot sites the formal protection status is as follows:

1. Sistema Lagunar de Alvarado: RAMSAR, AICAS, RTP, RMP[20]; considered terrestrial, marine, and hydrological priority area by CONABIO;
2. Estuario de rio Panuco: sistema lagunar: AICAS, inside of the natural protected area "la Vega Escondida" with decree from 2003.
3. Lagunas El Carmen, Pajonal y Machona: RMP;
4. Punta Allen: ANP, RAMSAR, AICAS, RMP, RTP; part of the Biosphere Sian Ka'an with a natural protected area decree from 1986.

Sector	Institution
Human settlements	State Ministry including SINAPROC
Water, Biodiversity, Coastal zones management and environmental services	SEMARNAT with several institutions: CONABIO, CONAFOR, INIFAP, INE CONAGUA; IMTA;
Agriculture and cattle raising and fishing	SAGARPA
Human activities in urban coastal zones	Sistema nacional Portuario from Communication Ministry

Current site-specific management:

15. **Punta Allen Lagoon - Estuary System, Sian Ka'an Biosphere Reserve, Quintana Roo.** The Sian Ka'an Biosphere Reserve, where the Punta Allen Wetland is located, has presented a management plan that proposes that the natural conditions of the ecosystem be altered as little as possible. The Ministry of Environment and Natural Resources [*Secretaría del Medio Ambiente y Recursos Naturales* SEMARNAT], through the National Commission of Protected Natural Areas [*Comisión Nacional de Áreas Naturales Protegidas* CONANP], is responsible for managing the Reserve. The Government of Quintana Roo, the municipalities of Solidaridad, Felipe Carrillo Puerto, and Tulum, as well as local groups and the academic sector help with its management.

16. The region has a strong social fabric tied to natural resources, based on the understanding of the additional value that the wetland represents because of the services it provides, apart from the intrinsic value of the ecosystem. These are factors that contribute to the successful preservation of the wetland. The provision of tourism services, through cooperatives, is an activity with tremendous potential for the society, and fishing, especially for lobster, has been, is and will continue to be an ethologically, culturally, and socially necessary activity in communities located on bodies of water.

17. In the case of Protected Natural Areas, the guidelines are geared toward protecting the integrity of the area and complying with the stipulations of the General Law on Ecological Balance and Environmental Protection [*Ley General del Equilibrio Ecológico y la Protección*

[20] Area Natural Protegida (ANP), Sitio Ramsar (RAMSAR), Region Terrestre Prioritaria (RTP), region Marina Prioritaria (RMP), areas de importancia para aves (AICAS)

al Ambiente] and the objectives of the decree concerning the establishment of the area. In order to manage the areas under its control, the National System of Protected Natural Areas [*Sistema Nacional de Areas Naturales Protegidas* SINAP] uses several legal planning instruments. The regulatory authority may, as set forth in the federal decrees for each area, establish coordination agreements, collaboration arrangements, and contracts, in order to meet the objectives of management, conservation, and sustainable use of natural resources, stated in the management programs.

Programa de manejo	Componentes de manejo y estrategias
Programa de manejo de la Reserva de la Biosfera Sian Ka'an.	7. Promover la investigación, particularmente en las áreas de ecología, socioeconomía y de manejo de los recursos naturales. 8. Contar con áreas que puedan servir como "patrón", para poder evaluar los cambios ocasionados por el uso humano de los ecosistemas en la península de Yucatán. 9. Ofrecer oportunidades para la recreación controlada en contacto con la naturaleza. 10. Facilitar la interpretación y educación ambiental, con énfasis local y regional. Para el manejo de recursos naturales de uso actual, los objetivos generales que se plantean son: crear una red eficiente de unidades de manejo de recursos naturales, aminorar el impacto de las actividades productivas sobre los ecosistemas de la reserva y capacitar a los pobladores locales en el manejo de tecnologías apropiadas de uso de los recursos.

18. **Panuco River Wetland: Altamira/Ciudad Madero/Tampico Lagoon System Corridor, Tamaulipas**

Part of the lagoon system is found within la Vega Escondida, which was declared a protected natural area in November 2003 by the municipality of Tampico, Tamaulipas. Tampico's Municipal Regulations for the Protection and Control of Environmental Quality [*Reglamento Municipal para la Protección y Control de la Calidad Ambiental*] sets forth the ecological guidelines and strategies for the municipality, in order to establish, preserve, and restore the ecological balance. .

19. The Land Use and Urban Development Plan [*Plan de Ordenamiento Territorial y Desarrollo Urbano*] for Tampico, Tamaulipas, published in the State Official Gazette on January 14, 2003, allows for the use of the soil in the ecological conservation zone, but only for activities that preserve the quality of the natural environment.

20. This protected natural area is comprised of different management areas, which are described below.

- Zone 1 for the Preservation of Flora and Fauna. This includes the strip of land around the Escondida lagoon, between the edge of the lagoon itself, the federal zone in the middle, and the bank of the Tamesí River, and excludes the 100 m wide strip parallel to the bank of the river, as well as its federal zone.

21. Zone 2 for the Preservation of Flora and Fauna. This includes the strip of land between the right bank of the Tamesí River and the Costa lagoon, and excludes the 100 m wide strip parallel to the bank of the river, as well as the federal zones.

22. Various activities may be carried out in buffer zones 1 and 2 provided that they are consistent with the objectives of this Municipal Agreement and the Management Plan for this protected natural area, subject to an evaluation of the Environmental Impact Statement. The execution of public or private works, including dredging of and removal of water weeds from

shipping channels, shall be authorized subject to an evaluation of the Environmental Impact Statement, in accordance with the respective regulation.

23. The guidelines governing activities in the area will be included in the Integrated Management Plan formulated by the Tampico city council. Once this Plan is approved, it will be binding upon the public, social, and private sectors. Any violation of the provisions of this Municipal Agreement will be punishable pursuant to the provisions of the General Law on Ecological Balance and Environmental Protection of the State of Tamaulipas, the Penal Code of the State of Tamaulipas, and the Municipal Regulations for the Protection and Control of Environmental Quality in the Municipality of Tampico, Tam.

24. The Tampico city council will spearhead the formulation of an agreement with the Ministry of Urban Development and Ecology of the State Government of Tamaulipas to integrate this protected natural area into the State System of Protected Natural Areas.

25. The reason for the wetland's degradation is that there was no mechanism to support its preservation. Ever since la Vega Escondida was declared a protected natural area, on the initiative of the municipality of Tampico, Tamaulipas, the area has been preserved. The instrument formulated must be strengthened and the municipalities of Altamira and Ciudad Madero must exercise their powers in order to better ensure that the selected wetland will be conserved.

26. **Carmen - Pajonal - Pachona Lagoon System Wetland, Tabasco .** In the case of this wetland, representatives from the SEMARNAT delegation in Tabasco and the Ministry of Natural Resources and Environmental Protection in the State of Tabasco have indicated that the mangroves in the lagoon system were exploited and then planted for their preservation. With the entry into force of the amendments to the General Wildlife Law in February 2007, it became strictly prohibited to destroy mangroves, which restricts the "legal" use of the mangroves in the coastal wetlands, inasmuch as this encourages their degradation for use for illegal purposes, without any compensatory actions being undertaken by the beneficiaries to help the mangroves recover from their activities.

27. Tabasco has a state ecological regulation program that was presented in December 2006 and developed by the State Technical Committee for Ecological Regulation [*Comité Técnico Estatal de Ordenamiento Ecológico* CTEOE], which aims to supervise, evaluate, execute, and monitor the state ecological regulation program in Tabasco. The Committee is comprised of federal and state government agencies, the town councils of the 17 municipalities of the State, educational institutions, chambers of commerce, and civic associations.

28. This instrument is binding upon the State and will serve as the basis for formulating the development programs and projects that it seeks to execute, based on a set of criteria that must be met. For example, it prohibits the draining, dredging, and backfilling of wetlands and bodies of water, as set forth in NOM-022-SEMARNAT-2003; it prohibits human settlements on dunes, mangroves and beaches; and it requires that engineering works executed on wetlands receive authorization in the environmental impact sphere. The corresponding statement should include actions to ensure the ebb and flow of surface and ground water, within and between the ecosystems, in accordance with NOM-022-SEMARNAT-2003.

29. Despite the stipulation that it is binding, the Program does not have any explicit mechanisms for sanctions in the event of noncompliance and has not been fully developed. The coastal wetland adaptation to climate change project will help to launch a process that will enable the site under consideration to initiate the process in order for it to be declared a protected natural area. The municipalities' strength must therefore be used to exercise their powers regarding the change of soil use.

30. **Papaloapan River Wetland - (Alvarado Lagoon), Veracruz**

The Government of Veracruz, in collaboration with the University of Veracruz, the National Ecology Institute [*Instituto Nacional de Ecología* INE], and the British Embassy presented the Veracruz Climate Change Program for public consultation, whereby efforts will be made to encourage the incorporation of climate change into the activities of the ministries of the State. It is a frame of reference for influencing the protection and adaptation of wetlands to climate change that must be formulated in detail in order to preserve and recover priority ecosystems such as the Alvarado wetland.

31. The coastal wetland adaptation to climate change project will reactivate the process to declare the Alvarado wetland a protected natural area. The municipalities' authority must therefore be used to exercise their powers regarding the change of soil use. In the case of Alvarado it is felt that part of the problem presented by the degradation of the wetlands is that property rights and the type of soil use were pre-defined to allow for the development of the tourism infrastructure and the expansion of human settlements, two or three decades ago.

Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico

Annex 15: Statement of Loans and credits and country at a glance

			Original Amount in US$ Millions				Difference between expected and actual Disbursements[a/]	
Project ID	FY	Project Name	IBRD	GRANT	Cancel.	Undisb.	Orig.	Frm Rev'd
P106261	2009	MX Sustainable Rural Development (FIRCO)	50	10.5	0.0	50.0	0.0	0.0
P106589	2009	MX IT Industry Development Project	80.0	0.0	0.0	80.0	11.8	0.0
P112258	2009	MX Priv Housing Finance Markets Strngth	1,010.0	0.0	0.0	10.12	(366.7)	0.0
P106528	2009	MX Results-based Mgmt. and Bugdeting	17.2	0.0	0.0	17.2	1.0	0.0
P112327	2009	MX (Suppl) SINAP II - Fourth Tranche	0.0	5.4	0.0	0.0	0.0	0.0
P088996	2008	MX (CRL2) Integrated Energy Services	15.0	0.0	0.0	15.0	4.0	0.0
P095038	2008	MX-GEF Integrated Energy Services	0.0	1.0	0.0	0.0	0.0	0.0
P066426	2007	MX Hybrid Solar Thermal (Agua Prieta)	0.0	49.4	0.0	49.4	0.0	0.0
P106103	2007	MX-SINAP II - Third Tranche -Add'l Fin	0.0	7.4	0.0	0.0	0.0	0.0
P085593	2006	MX (APL I) Tertiary Educ Student Ass	180.0	0.0	0.0	123.98	94.9	0.0
P088728	2006	MX (APL1) School-Based Management Prog	240.0	0.0	0.0	4.8	(18.9)	0.0
P088732	2006	MX Access to Land for Young Farmers	100.0	0.0	0.8	46.6	38.6	0.0
P087038	2006	MX Environmental Services Project	45.0	0.0	0.0	23.8	6.8	0.0
P089171	2006	MX GEF Environmental Services Project	0.0	15.4	0.3	13.2	7.8	0.0
P077717	2006	MX GEF LargeScale RE Dev (La Venta 3)	0.0	25.0	0.0	25.0	4.8	0.0
P091695	2006	MX Modernization Water & Sanit Sector TA	25.0	0.0	0.2	14.48	13.3	0.0
P074755	2005	MX State Judicial Modernization Project	30.0	0.0	0.0	30.0	28.0	0.0
P089865	2005	MX-(APL1) Innov. for Competitiveness	250.0	0.0	0.0	64.1	5.8	0.0
P087152	2004	MX (CRL1)Savings & Rural Finance (BANSEFI)	154.5	0.0	0.4	54.6	(25.6)	0.0
P080149	2004	MX Decentralized Infrastructure Development	108.0	0.0	0.0	2.6	2.8	0.0
P059161	2003	MX GEF Climate Measures in Transport	0.0	5.8	0.0	0.2	0.2	0.0
P070108	2003	MX Savings & Credit Sector Strengthening	85.6	0.0	0.0	17.8	(3.2)	0.0
P065988	2002	MX GEF Consolidat. Prot Areas (SINAP II)	0.0	25.7	0.0	1.0	(11.8)	0.0
P060908	2001	MX GEF MESO AMERICAN CORRIDOR	0.0	14.8	0.0	2.4	2.4	2.4
P066321	2001	MX: III BASIC HEALTH CARE PROJECT	350.0	0.0	0.0	25.67	25.7	14.0
		OVERALL RESULT	**2740.3**	**199.8**	**1.6**	**671.95**	**(178.3)**	**16.4**

Notes:
1) The MX Sustainable Rural Development was recently approved by the Board in February 24th, 2009.
2) FY09 Approvals also include the MX ENVDPL III and Supplemental totaling US$701 million. They were fully disbursed by end-December 2008.
3) The undisbursed balance of IBRD loans amounts US$580.85 million.

MEXICO STATEMENT OF IFC's
Held and Disbursed Portfolio
in Millions of US Dollars

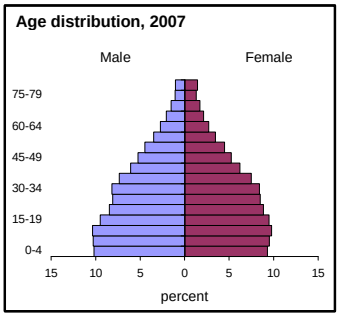
As of February 28, 2009

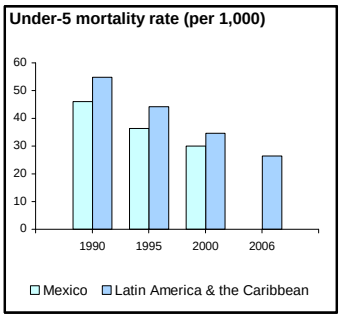
		Committed					Disbursed				
FY Approval	Company	Loan	Equity	Quasi	All	Partic.	Loan	Equity	Quasi	All	Partic.
2008	Agrofinanzas	-	1.5	-	1.5	-	-	-	-	-	-
2008	Alta Growth Fund	-	20.0	-	20.0	-	-	1.3	-	1.3	-
2007/ 2008	Banco Amigo	-	2.6	-	2.6	-	-	2.6	-	2.6	-
2006/ 2008/ 2009	Banco del Bajio	-	56.3	-	56.3	-	-	55.8	-	55.8	-
1995/ 1996/ 1998/ 1999	Baring MexFnd	-	1.7	-	1.7	-	-	1.7	-	1.7	-
2008	Bioparques	7.0	-	5.0	12.0	-	7.0	-	5.0	12.0	-
2005/ 2008	CMPDH	26.8	-	-	26.8	-	26.8	-	-	26.8	-
2006	Carlyle Mexico	-	5.2	-	5.2	-	-	1.3	-	1.3	-
2001/ 2005/ 2007	Compartamos	7.3	0.3	-	7.6	-	-	0.3	-	0.3	-
2004	DTM	4.3	-	-	4.3	-	4.3	-	-	4.3	-
2002	Ecomex	3.5	0.3	0.2	4.0	-	3.5	0.3	0.2	4.0	-
2005/ 2007	FINEM	21.4	0.8	-	22.1	-	9.5	0.8	-	10.2	-
2003/ 2005	GFNorte	72.1	-	-	72.1	-	72.1	-	-	72.1	-
2005/ 2006/ 2009	GMAC Financiera	48.0	-	-	79.6	-	-	-	-	10.1	-
1998/ 2004/ 2008	Grupo Calidra	51.4	-	-	53.4	-	36.4	-	-	37.7	-
1997/ 2000	Grupo Kuo	6.4	-	-	6.4	8.6	6.4	-	-	6.4	8.6
1992/ 1993/ 1996/ 2000	Grupo Posadas	-	-	10.0	11.6	-	-	-	10.0	10.0	-
1999/ 2007	Grupo Sanfandila	-	-	-	-	0.0	-	-	-	-	-
2006/ 2009	Grupo Su Casita	-	20.2	-	20.2	-	-	20.2	-	20.2	-
2008/ 2009	Hipotec Vertice	18.7	6.0	-	24.7	-	8.0	5.7	-	13.8	-
2007	Infrainvest	-	50.0	-	50.0	-	-	-	-	-	-
	Interoyal	-	0.0	-	0.0	-	-	0.0	-	0.0	-
2007	Irapuato	-	-	-	8.4	-	-	-	-	8.4	-
1998/ 1999	Merida III	21.5	-	-	21.5	38.1	21.5	-	-	21.5	38.1
1995/ 1997/ 1999	Mexplus Puertos	-	0.8	-	0.8	-	-	0.8	-	0.8	-
2007/ 2009	MicroCred Mexico	-	0.6	-	0.6	-	-	0.6	-	0.6	-
2007/ 2009	Monex Financiera	-	-	-	1.0	-	-	-	-	1.0	-
2007	Nexxus III Fund	-	20.0	-	20.0	-	-	9.6	-	9.6	-
2003	Occidental Mex	16.7	-	-	16.7	22.2	16.7	-	-	16.7	22.2
	Occihol	-	8.0	-	8.0	-	-	8.0	-	8.0	-
2000/ 2004/ 2008	Pan American	-	4.4	-	4.4	-	-	4.4	-	4.4	-
2007	Petstar	8.5	-	5.1	14.1	11.1	8.5	-	5.1	14.1	11.1
2009	Progresemos	2.7	-	-	2.7	-	1.3	-	-	1.3	-
2002	Puertas Finas	4.9	-	-	4.9	-	4.9	-	-	4.9	-
	Savoy	-	1.7	-	1.7	-	-	1.7	-	1.7	-
	Sierra Nevada	7.5	-	-	7.5	-	7.5	-	-	7.5	-
2001/ 2002/ 2004/ 2005/ 2006/ 2007	Su Casita	143.0	-	-	143.0	-	143.0	-	-	143.0	-
1997	TMA	0.6	-	3.9	4.5	2.1	0.6	-	3.9	4.5	2.1
2008	Vinte	9.2	7.2	-	16.4	-	4.2	7.2	-	11.4	-
2006	Vuela	40.0	-	-	40.0	-	25.8	-	-	25.8	-
2002	ZN Mexico II	-	2.9	-	2.9	-	-	2.8	-	2.8	-
1999/ 2000	ZN Mxc Eqty Fund	-	1.0	-	1.0	-	-	1.0	-	1.0	-
Total Portfolio:		**521.3**	**211.5**	**24.3**	**802.1**	**82.1**	**407.9**	**126.0**	**24.3**	**579.4**	**82 408**

Mexico at a glance

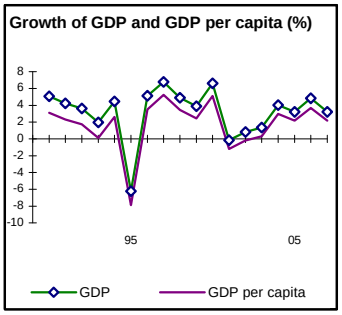
3/5/09

Key Development Indicators	Mexico	Latin America & Carib.	Upper middle income
(2007)			
Population, mid-year (millions)	105.3	563	823
Surface area (thousand sq. km)	*1,958*	20,421	41,497
Population growth (%)	1.0	1.2	0.6
Urban population (% of total population)	*76*	78	75
GNI (Atlas method, US$ billions)	989.4	3,118	5,750
GNI per capita (Atlas method, US$)	9,400	5,540	6,987
GNI per capita (PPP, international $)	12,580	9,320	11,868
GDP growth (%)	3.2	5.7	5.8
GDP per capita growth (%)	2.2	4.5	5.1
(most recent estimate, 2000–2007)			
Poverty headcount ratio at $1.25 a day (PPP, %)	..	8	..
Poverty headcount ratio at $2.00 a day (PPP, %)	..	18	..
Life expectancy at birth (years)	75	73	70
Infant mortality (per 1,000 live births)	22	22	22
Child malnutrition (% of children under 5)	..	5	..
Adult literacy, male (% of ages 15 and older)	93	91	94
Adult literacy, female (% of ages 15 and older)	90	89	92
Gross primary enrollment, male (% of age group)	110	120	112
Gross primary enrollment, female (% of age group)	108	116	109
Access to an improved water source (% of population)	97	91	95
Access to improved sanitation facilities (% of population)	79	78	83





Net Aid Flows	**1980**	**1990**	**2000**	**2007** [a]
(US$ millions)				
Net ODA and official aid	55	156	-56	247
Top 3 donors (in 2006):				
United States	9	23	24	154
Germany	15	9	15	26
France	15	51	-11	22
Aid (% of GNI)	0.0	0.1	0.0	0.0
Aid per capita (US$)	1	2	-1	2



Long-Term Economic Trends	**1980**	**1990**	**2000**	**2008**	**1980–90**	**1990–2000**	**2000–08**
					(average annual growth %)		
Consumer prices (annual % change)	26.3	26.7	9.5	5.1			
GDP implicit deflator (annual % change)	33.4	28.1	12.1	6.7			
Exchange rate (annual average, local per US$)	0.0	2.8	9.5	11.2			
Terms of trade index (2000 = 100)	194	106	100	114			
Population, mid-year (millions)	67.6	83.2	98.0	106.4	2.1	1.6	1.0
GDP (US$ millions)	194,357	262,710	581,426	1,085,951	1.1	3.1	2.4
		(% of GDP)					
Agriculture	9.0	7.8	4.2	3.7	0.8	1.5	2.3
Industry	33.6	28.4	28.0	35.6	1.1	3.8	1.3
Manufacturing	22.3	20.8	20.3	18.9	1.5	4.3	1.2
Services	57.4	63.7	67.8	60.8	1.4	2.9	2.9
Household final consumption expenditure	65.1	69.6	67.0	64.3	1.4	2.3	3.5
General gov't final consumption expenditure	10.0	8.4	11.1	9.8	2.4	1.8	0.0
Gross capital formation	27.2	23.1	23.9	27.1	-3.3	4.7	0.6
Exports of goods and services	10.7	18.6	30.9	28.1	7.0	14.6	4.8
Imports of goods and services	13.0	19.7	32.9	29.8	1.0	12.3	5.7
Gross savings	22.0	20.3	20.5	25.3			

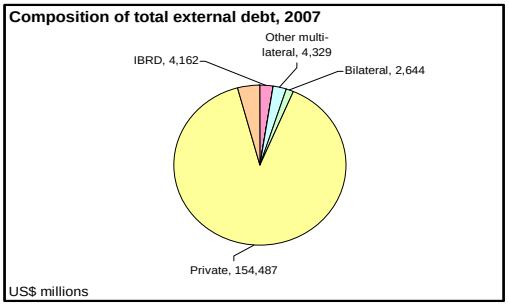
Note: Figures in italics are for years other than those specified. 2008 data are preliminary. .. indicates data are not available.
a. Aid data are for 2006.

Development Economics, Development Data Group (DECDG).

Balance of Payments and Trade	**2000**	**2008**
(US$ millions)		
Total merchandise exports (fob)	166,455	291,807
Total merchandise imports (cif)	174,458	308,645
Net trade in goods and services	-10,661	-23,844
Current account balance	-18,684	-15,527
as a % of GDP	-3.2	-1.4
Workers' remittances	6,573	25,145
Reserves, including gold	35,585	95,302

Central Government Finance		
(% of GDP)		
Current revenue (including grants)	19.7	23.6
Tax revenue	9.7	8.2
Current expenditure	18.3	19.3
Overall surplus/deficit (PSBR)	-3.5	-2.7
Highest marginal tax rate (%)		
Individual	40	28
Corporate	35	28

External Debt and Resource Flows	**2000**	**2007**
(US$ millions)		
Total debt outstanding and disbursed	150,313	172,968
Total debt (% of GDP)	25.9	16.9
	2000	**2008**
Foreign direct investment (net inflows)	17,773	18,589
Portfolio equity (net inflows)	447	-3981



Private Sector Development	**2000**	**2008**
Time required to start a business (days)	–	28
Cost to start a business (% of GNI per capita)	–	12.5
Time required to register property (days)	–	74
Ranked as a major constraint to business	**2000**	**2007**
(% of managers surveyed who agreed)		
Anticompetitive or informal practices	..	19.0
Corruption	..	17.8
Stock market capitalization (% of GDP)	21.5	38.9
Bank capital to asset ratio (%)	9.6	13.2

Technology and Infrastructure	**2000**	**2007**
Paved roads (% of total)	32.8	*37.0*
Fixed line and mobile phone subscribers (per 100 people)	27	84
High technology exports (% of manufactured exports)	22.4	*18.9*

Environment		
Agricultural land (% of land area)	55	*55*
Forest area (% of land area)	34.3	*33.7*
Nationally protected areas (% of land area)	..	*5.2*
Freshwater resources per capita (cu. meters)	..	*3,967*
Freshwater withdrawal (% of internal resources)	*19.1*	..
CO2 emissions per capita (mt)	4.3	*4.3*
GDP per unit of energy use (2005 PPP $ per kg of oil equivalent)	7.1	*6.6*
Energy use per capita (kg of oil equivalent)	1,534	*1,712*

World Bank Group portfolio	**2000**	**2008**
(US$ millions)		
IBRD		
Total debt outstanding and disbursed	11,444	5,769
Disbursements	1,748	1,940
Principal repayments	1,330	600
Interest payments	890	200
IDA		
Total debt outstanding and disbursed	–	0
Disbursements	–	0
Total debt service	–	0
IFC *(fiscal year)*	**2000**	**2007**
Total disbursed and outstanding portfolio	1,234	1,184
of which IFC own account	723	798
Disbursements for IFC own account	179	209
Portfolio sales, prepayments and repayments for IFC own account	66	134
MIGA		
Gross exposure	–	–
New guarantees	–	–

Note: Figures in italics are for years other than those specified. 2008 data are preliminary. 3/5/09
.. indicates data are not available. – indicates observation is not applicable.

Development Economics, Development Data Group (DECDG).

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