

# Funding Proposal

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## **FP056: Scaling up climate resilient water management practices for vulnerable communities in La Mojana**

Colombia | United Nations Development Programme (UNDP) | Decision B.18/08

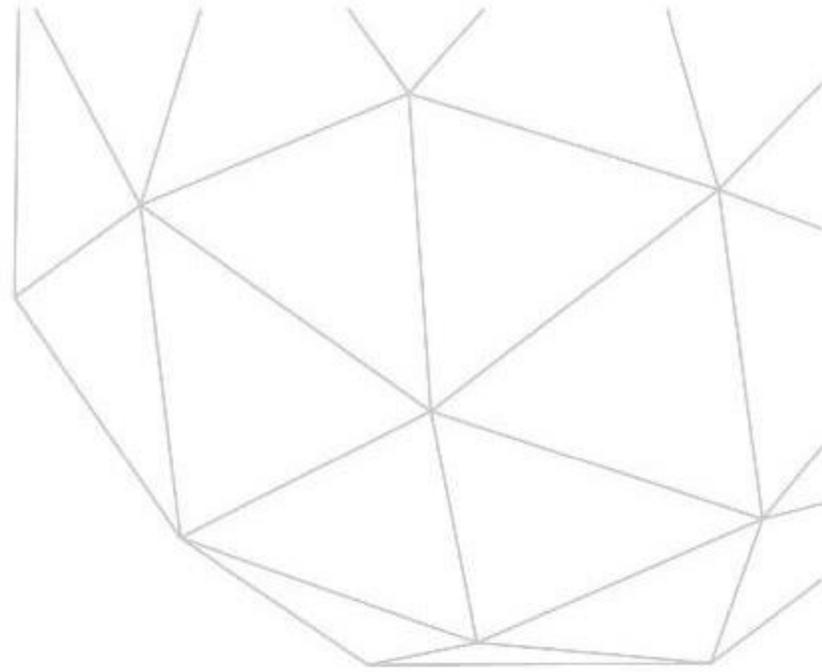
2 November 2017



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# Funding Proposal

Version 1.1

**The Green Climate Fund (GCF) is seeking high-quality funding proposals.**

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: Scaling up climate resilient water management practices for vulnerable communities in La Mojana

Country/Region: Colombia

Accredited Entity: UNDP

Date of Submission: 07/09/2017

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### ***Note to accredited entities on the use of the funding proposal template***

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

**Please submit the completed form to:**

[fundingproposal@gcfund.org](mailto:fundingproposal@gcfund.org)

Please use the following name convention for the file name:

“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

A.1. Brief Project / Programme Information		
A.1.1. Project / programme title	<b>Scaling up climate resilient water management practices for vulnerable communities in La Mojana</b>	
A.1.2. Project or programme	Project	
A.1.3. Country (ies) / region	<b>Colombia / Latin America</b>	
A.1.4. National designated authority (ies)	<b>Department of National Planning (DNP)</b>	
A.1.5. Accredited entity	<b>United Nations Development (UNDP)</b>	
A.1.5.a. Access modality	<input type="checkbox"/> Direct <input checked="" type="checkbox"/> International	
A.1.6. Executing entity / beneficiary	Executing Entity: National Adaptation Fund of Colombia ( <i>Fondo Adaptación</i> ) Beneficiary: 405,625 people (203,918 direct, 201,707 indirect)	
A.1.7. Project size category (Total investment, million USD)	<input type="checkbox"/> Micro ( $\leq 10$ ) <input type="checkbox"/> Small ( $10 < x \leq 50$ ) <input checked="" type="checkbox"/> Medium ( $50 < x \leq 250$ ) <input type="checkbox"/> Large ( $> 250$ )	
A.1.8. Mitigation / adaptation focus	<input type="checkbox"/> Mitigation <input checked="" type="checkbox"/> Adaptation <input type="checkbox"/> Cross-cutting	
A.1.9. Date of submission	07-09-2017	
A.1.10. Project contact details	Contact person, position	Gabor Vereczi
	Organization	UNDP
	Email address	<a href="mailto:gabor.vereczi@undp.org">gabor.vereczi@undp.org</a>
	Telephone number	+507-302-4700
	Mailing address	UNDP Panama Regional Center City of Knowledge, Clayto Bldg. 129 Panama City, Panama

A.1.11. Results areas <i>(mark all that apply)</i>	
<b>Reduced emissions from:</b>	
<input type="checkbox"/>	Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
<input type="checkbox"/>	Low emission transport (E.g. high-speed rail, rapid bus system, etc.)
<input type="checkbox"/>	Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
<input type="checkbox"/>	Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)
<b>Increased resilience of:</b>	
<input type="checkbox"/>	Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
<input checked="" type="checkbox"/>	Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation systems, etc.)
<input type="checkbox"/>	Infrastructure and built environment

(E.g. sea walls, resilient road networks, etc.)



Ecosystem and ecosystem services

(E.g. ecosystem conservation and management, ecotourism, etc.)

## A.2. Project / Programme Executive Summary

1. The proposed project supports the Government of Colombia (GoC) in scaling up climate resilient integrated water resource management practices in La Mojana- one of the poorest and most climate vulnerable regions in Colombia. Extreme events, such as intense flooding and prolonged dry seasons have caused significant impacts to the population with climate projections expecting these to become more frequent and intense. Loss of agricultural crops that sustain livelihoods, significant changes to ecosystems that have previously provided a buffer to flooding, and adverse impacts from prolonged dry periods are common and worsening with time. In addition, climate change induced pressures are straining already stressed water sources in the region, affecting both supply and quality.

2. In response, the government of Colombia has formulated the Climate Change Adaptation Action Plan for La Mojana (La Mojana Action Plan). This action plan differs from past approaches in the region which were reactive and focused on infrastructure solutions that failed to address comprehensive risk. The La Mojana Action Plan in turn promotes a comprehensive approach combining structural and ecosystem-based measures tailored to the environmental and socio-economic conditions of the local population, in order to adapt to projected floods (See Section 3.2.1 Annex II). The Action Plan, which is being implemented by the National Adaptation Fund (NAF), was formulated based on studies, assessments and hydrological models of the La Mojana region including flooding dynamics as well planning processes that include national, regional and local stakeholders. The plan is innovative in that it prioritizes investment in adaptive and sustainable infrastructure, sanitation, socio-economic development, environmental dynamics recovery and strengthening of Governance and local capacities. It does this however mostly focusing flood mitigation aimed at protecting large economic drivers and investing in infrastructure such as housing, public works, and wetland canal restoration.

3. In this context, GCF funding will be used to directly complement the implementation of the La Mojana Action Plan to tackle barriers derived from climate change related to lack of access of water sources directed at local populations, loss of resilience of natural ecosystems, limited access of early warning services and products, unsustainable management practices affecting household resilience, non-adapted local livelihoods to climate variability and limited knowledge on relevant issues related to integrated water management resources. The project will have the objective to enhance climate resilience of vulnerable communities in the La Mojana by focusing on four outputs aimed at: (1) Systemizing knowledge management of the impacts of climate change on water management for planning purposes, (2) Promoting climate resilient water resource infrastructure and ecosystem restoration (3) Improving Early Warning Systems for Climate Resiliency and (4) Enhancing rural livelihoods through climate resilient agro-ecosystems. Activities will focus on developing technical models and guidelines to enable decision making for long term water management planning, systemizing existing and new knowledge on water management in projected climate scenarios, investing in individual and community alternative water solutions, wetland restoration to recover its valuable water management services, developing climate adapted rural productive practices through technologies and scientific research and collection of traditional best practices, enhancing early warning systems monitoring and products, investing in climate resilient home gardens for crop diversification, and rural extension services.

4. The proposed project will advance a significant paradigm shift as GCF resources are used to operationalize the first comprehensive climate adaptive regional development plan which will serve as a model for the rest of Colombia. This includes adopting a long-term climate change risk informed disaster risk reduction strategy that is based not solely on infrastructure but also on restoring ecosystem services for regional water management. Hence it will revolve around restoring the original hydrology of the wetlands, adapting the local economy and livelihoods to the natural variation in the level of water in the wetlands through the seasons by directly empowering vulnerable communities and regional authorities to manage climate risks. It will also allow the implementation of new technologies to overcome threats posed by climate change impacts on the availability of water supply. This being a clear paradigm shift towards resilience in the context of climate change, away from the historical "rationalization" of water management, wherein water was evacuated rapidly from the region to allow for agricultural intensification. The project scales up results that have already been tried and tested in Colombia while promoting a paradigm shift in the adoption of technology for water supply. The project is designed with significant community involvement to promote their long term resiliency and foster project ownership, with a gender-balanced focus.

5. 203,918 people residing in Colombia's La Mojana region<sup>1</sup>, will be direct beneficiaries, with a further 201,707 people benefitting indirectly. The project is aligned with the development goals on climate change adaptation plan of the GoC, including Colombia's 2015 Nationally Determined Contributions. The proposal is informed by significant local and national consultations and has been endorsed by the National Designated Authority (NDA).

### A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	dd/mm/yyyy
Expected financial close (if applicable)	TBD [date of agreement on the FAA between UNDP and GCF]
Estimated implementation start and end date	Start: <u>15/01/2018</u> End: <u>14/01/2026</u>
Project/programme lifespan	8 years

<sup>1</sup> The total rural population in La Mojana as calculated in the 2015 Agriculture Census

### B.1. Description of Financial Elements of the Project / Programme

6. The GoC is seeking grant finance from the GCF to address critical climate change adaptation needs in La Mojana. To advance an integrated proactive approach to promote adaptation at the local level in the context of water resource management, the GoC-through Colombia's National Adaptation Fund (NAF)- will be complimenting the GCF resource with baseline financing for physical infrastructure and local capacity building. GoC is also co-financing each of the intended three areas of intervention in this project.

Output	Activity	Amount GCF + all co financing	Currency	Amount (GCF + all co financing)	Local currency	Amount GCF funding	Currency of disbursement to recipient
<b>Output 1.</b> Systemizing knowledge management and dissemination of the impacts of climate change on water management for planning.	1.1 Develop technical models and guidelines to enable decision making for long term water management planning for La Mojana	6.417	Million USD (\$)	17,968,729,212	COP	2.000	Million USD (\$)
	1.2 Management of adaptation knowledge on water management					1.582	
	<b>Total Output 1</b>					3.582	
<b>Output 2.</b> Promote climate resilient water resources infrastructure and ecosystem restoration by vulnerable households and communities	2.1 Establish Climate Resilient Water Solutions	86.699	Million USD (\$)	242,755,804,956	COP	13.332	Million USD (\$)
	2.2 Increase the adaptive capacity of natural ecosystems and ecosystems-based livelihoods					5.364	
	<b>Total Output 2</b>					18.696	
<b>Output 3.</b> Improved Early Warning Systems for Climate Resiliency	3.1 Enhancement of EWS	4.627	Million USD (\$)	12,954,704,000	COP	2.937	Million USD (\$)
	<b>Total Output 3</b>					2.937	
<b>Output 4.</b> Enhance rural livelihoods through climate resilient agroecosystems	4.1 Conduct Agro-ecosystems based livelihood diversification research	17.265	Million USD (\$)	48,342,642,264	COP	1.466	Million USD (\$)
	4.2 Improve rural extension for climate resilient adaptation and production					3.448	
	4.3 Improve water resource management in vulnerable households for food production systems					6.162	
	<b>Total Output 4</b>					11.076	

	Project management	2.205	Million USD (\$)	6,175,184,400	COP	2.205	Million USD (\$)
Total project financing		117.213	Million USD (\$)	328,197,064,832	COP	38.496	Million USD (\$)

The Accredited Entity (AE) fee for the proposed project is US\$3,079,678.40. The budget figures presented in this proposal exclude the fee.

### B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing		
(a) Total project financing	(a) = (b) + (c)	117.213	million USD (\$)				
(b) GCF financing to recipient	(i) Senior Loans	.....	Options	( ) years	( ) %		
	(ii) Subordinated Loans	.....	Options	( ) years	( ) %		
	(iii) Equity	.....	Options		( ) % IRR		
	(iv) Guarantees	.....	Options				
	(v) Reimbursable grants *	.....	million USD (\$)				
	(vi) Grants *	38.496					
* Please provide economic and financial justification in <a href="#">section F.1</a> for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in <a href="#">section E</a> .							
	Total requested (i+ii+iii+iv+v+vi)	38.496	million USD (\$)				
(c) Co-financing to recipient	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	Grant	61.800	million USD (\$)	National Adaptation Fund (NAF)	( ) years ( ) years	( ) % ( ) % ( ) % IRR	Options Options Options Options
		0.036		Presidential Agency for International Cooperation			
		1.091		University of Cordoba			
		0.183		Institute Alexander von Humboldt			
		1.358		Municipalities			

		5.571		District of Sucre			
		6.329		Corporación Autónoma Regional de los Valles			
		0.688		University of Sucre			
		1.661		Corpomojana			

Lead financing institution: Not applicable.

*\* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.*

(d) Financial terms between GCF and AE (if applicable)

In cases where the accredited entity (AE) deploys the GCF financing directly to the recipient, (i.e. the GCF financing passes directly from the GCF to the recipient through the AE) or if the AE is the recipient itself, in the proposed financial instrument and terms as described in part (b), this subsection can be skipped.

If there is a financial arrangement between the GCF and the AE, which entails a financial instrument and/or financial terms separate from the ones described in part (b), please fill out the table below to specify the proposed instrument and terms between the GCF and the AE.

Financial instrument	Amount	Currency	Tenor	Pricing
Grants	N/A	million USD (\$)	( ) years	( ) %

Please provide a justification for the difference in the financial instrument and/or terms between what is provided by the AE to the recipient and what is requested from the GCF to the AE.

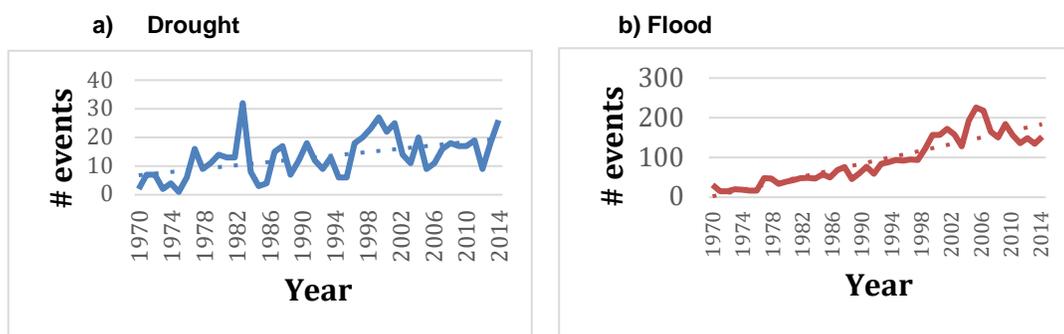
### B.3. Financial Markets Overview (if applicable)

7. The project relies on grant finance and does not generate revenue that lends itself to providing reflows to the GCF. A financial market overview is thus not appropriate.

## C.1. Strategic Context

8. Colombia is among a list of most vulnerable countries to extreme weather impacts due the high recurrence and magnitude of disasters associated with changing climate conditions. <sup>2</sup> Between 1970 and 1999, Colombia experienced an average of 2.97 disasters per year<sup>3</sup>. Both La Niña and El Niño have had, and continues to have, a significant impact in Colombia. The Seismic and Geophysical Observatory of Southwestern Colombia and the Office for Disaster Attention and Prevention state that between the years 1950-2007 rainfall related disasters increased by 16.1% especially during periods of La Niña. The Intergovernmental Panel on Climate Change (IPCC) estimates that the occurrence of disasters related to changing climate conditions in Colombia during 2000-2005 increased by 2.4 times when compared with the period from 1970 to 1999.
9. Climate change has exacerbated Colombia's vulnerability as the impacts of La Niña and El Niño have become more frequent and more intense. The most recent La Niña phenomenon (between 2010-2011) was particularly destructive causing sustained damage to much of the country's infrastructure, economy and human lives<sup>4</sup>. Colombia has, in the last decades, recorded an increased incidence of flooding and prolonged dry periods (Figure 1). These impacts are likely to be magnified as projected changes in precipitation and temperature unfold<sup>5</sup>.

Figure 1. Number of drought and flooding events in Colombia, 1970-2015<sup>6</sup>



10. National climate change projections suggest that regions across Colombia will be affected differently. Some areas will receive more precipitation. Other regions are expected to face a reduction of rainfall, which coupled with higher temperatures, threaten the availability of water in those regions. For example, projected average precipitation between 2071 and 2100 is expected to decrease by between 10-30% in a third of the total national territory. Municipalities in 14% of the national territory are projected to experience an increase of 10-30% in precipitation during the same period<sup>7</sup>. With the prevalence of six very different climatic zones in Colombia, anticipated climate change projections call for adaptive solutions that are appropriate for each region.
11. 27.8% of the total population and 47.8% of the rural population in Colombia is classified as poor, when measured under the GoC's Multidimensional Poverty Index<sup>8</sup>. While important gains have been made at poverty reductions, economic development has not spread evenly throughout the country. The 60-year-old internal conflict that ended recently isolated certain regions. The lack of continuous access of the government and associated public services to these regions produced development deficiencies in comparison to the national average. The result is pockets of

<sup>2</sup> Wheeler, D (2011). Quantifying Vulnerability to Climate Change Implications for Adaptation Assistance. GGD Working Paper 240. Washington DC. Center for Global Development.

<sup>3</sup> Sanchez-Triana, E., Ahmed, K., and Awe, Y. (2007). Environmental Priorities and Poverty Reduction: A Country Environmental Analysis for Colombia. The World Bank, Washington D. C

<sup>4</sup> OCHA estimates its direct impact to 4 million people, caused 491 deaths, left 43 people missing, and destroyed 16,269 homes and damaged 545,940 others throughout the country. Close to 1 million hectares of productive farmland were flooded, which included the loss of approximately 200,000 hectares of crops.

<sup>5</sup> Temperature increases are projected to be 1.4 C (2010-2040), 2.4 C (2041-2070), 3.2 C (2071-2100). DNP (2011). National Adaptation Plan to Climate Change: Conceptual Framework and Guides. Bogota

<sup>6</sup> D. Guha-Sapir, R. Below, Ph. Hoyois - EM-DAT: International Disaster Database (www.emdat.be). Université Catholique de Louvain – Brussels – Belgium.

<sup>7</sup> DNP. Plan Nacional de Adaptacion al Cambio Climatico.

<sup>8</sup> DANE (2016). Boletín Técnico Pobreza Monetaria y Multidimensional para Colombia 2015. [https://www.dane.gov.co/files/investigaciones/condiciones\\_vida/pobreza/bol\\_pobreza\\_15\\_.pdf](https://www.dane.gov.co/files/investigaciones/condiciones_vida/pobreza/bol_pobreza_15_.pdf)

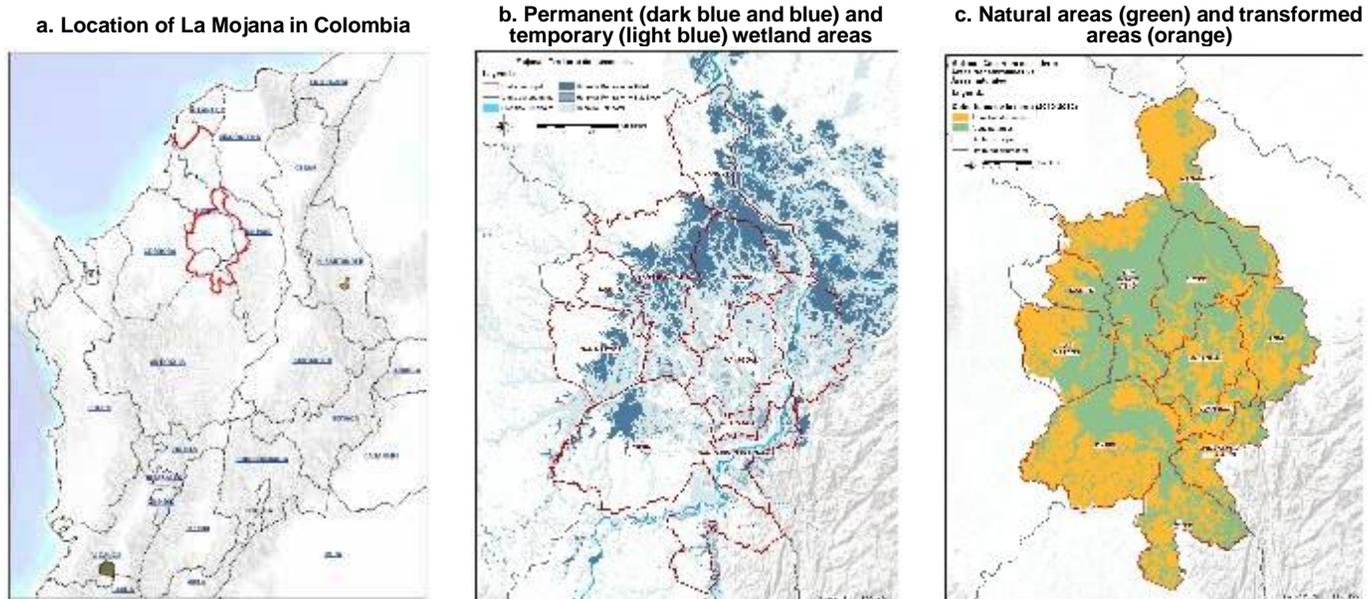
highly vulnerable population to climate change impacts. The La Mojana region, the focus of this project, is one such area.

12. The GoC is aware of the impact that climate change will have on its economy and in the wellbeing of its population. Colombia's National Adaptation Plan for Climate Change (PNACC) highlights key steps that the country must make as part of its long term planning and budgeting strategy. The strategy is to be followed by all levels of government to ensure that local action is based on regional priorities (informed by climate projections and vulnerabilities at a local level) and with a focus on protecting the most climate vulnerable, such as those in the region of La Mojana.

### General Profile of La Mojana

13. The region of La Mojana is a large floodplain located between the northern foothills of the Andes and the plains in the Caribbean region (Figure 2a). It comprises 11 municipalities<sup>9</sup> spread throughout 4 districts (Sucre, Bolivar, Cordoba and Antioquia), with a total population of 405,625<sup>10</sup>. La Mojana is characterized as a fluvial-deltaic overflow plain, which provides diverse ecosystems with multiple structures and functions, including wetland systems and interconnected marshes that act as a buffer system for the Magdalena, Cauca, and San Jorge Rivers-- all of which flow from the Andean region (Figure 2b and 2c).

**Figure 2. Location in Colombia and general characteristics of La Mojana region**



14. La Mojana's location in a deltaic plain makes it subject to increasing annual floods that vary in scale depending on the intensity of precipitation in the upriver mountainous region. It is divided into a flood prone area (swamps, lagoons, streams, and rivers) (accounting for approximately 32.9% of the total area), where flooding occurs for more than 6 months each year; a transitional zone (17.7%) that is flooded for 3 to 6 months per year; and emergent lands (49.4%), which can be flooded for 3 months or less during the year (only 10.3% of the area usually does not flood)<sup>11</sup>. The annual precipitation varies between 1,000 and 4,500 mm. Climate change, however is having an impact on current regional averages. Climate projections state that most of La Mojana will see a reduction of total precipitation levels by 14% coupled with higher temperature projections (0.9°C- 2.2°C by 2100)<sup>12</sup>.
15. The El Niño Southern Oscillation (ENSO) phenomenon has an important influence on the climate in La Mojana. During La Niña years, La Mojana experiences extreme rainfall patterns and higher flood levels. Its delta plain characteristics makes it particularly susceptible to flash flooding during La Niña years. La Mojana was severely affected by the La Niña event of 2010-2011 which coincided with La Mojana's secondary rainy season. The IADB

<sup>9</sup> Achi, Ayapel, Caimito, Guaranda, Magangué, Majagual, Nechí, San Benito Abad, San Jacinto del Cauca, San Marcos

<sup>10</sup> Official National Projections by DANE for 2015 based on 2005 National Census. <https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/proyecciones-de-poblacion>

<sup>11</sup> Aguilera, M. (2004) La Mojana: riqueza natural y potencial económico. Banco de la República, Cartagena de indias. 73 pgs

<sup>12</sup> IDEAM (2015). Tercera Comunicación Oficial: Nuevos Escenarios de Cambio Climático para Colombia.

and ECLAC recorded 162,368 people (48% of the total population at the time) and 25,364 homes (38.4% of all homes in the region) as affected in the region.<sup>13</sup>

16. La Mojana is also vulnerable to anomalous prolonged dry seasons particularly during El Niño years. These pose a significant threat to water supply throughout the year. In 2015, and the initial months of 2016, the effects of the El Niño affected all of La Mojana, resulting in a reduction of the wetland areas by approximately 70%. The cumulative economic, environmental, and social impact was significant in the region. During this event, the entire rice harvests was lost resulting in significant food insecurity (see pg. 173 of Annex II). The concern is that while the occurrence of such events is not uncommon, they have become more prolonged. Data from the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) indicates that the average dry periods (days with no rain) is currently 85 days/year. However, when climate projections are taken into account, including a 35% reduction in precipitation in the most affected districts,<sup>14</sup> the number of dry days extends to between 97 and 115 days.

### Population Vulnerability

17. While Colombia has made great strides in poverty reduction, positive impacts have not been evenly spread among all regions. This is the case in La Mojana, where poverty levels exceed 1.5 times the median poverty levels in the country. According to the last municipal measurement to the Multidimensional Poverty Index, La Mojana it is one of the poorest regions of the country. In 2005, 83.8% of the population of La Mojana was classified as poor (as measured by GoC's multidimensional poverty index) when compared with 49.6% of the national average<sup>15</sup>. This situation is a result of highly climate vulnerable work (agriculture and livestock based) that has been recurrently affected by extreme climate (flooding and extended dry periods), rural isolation, lack of basic services (water, sanitation and health) and low education achievement.
18. The relative isolation of La Mojana also played an important role in limiting the GoC's capacity to enhance climate resilience. The armed conflict in Colombia has had an important impact in local governance conditions and has hindered the development of the communities inhabiting that territory. La Mojana's location as a corridor and connector inside the country has made it the subject of dispute between different guerrilla groups for control of territory as well as a subject of smuggling and drug trafficking routes. Between 1999 and 2012, there were, on average, 4,000 displaced people/year arriving in La Mojana. Poverty and limited access to government support have increased the vulnerability of these populations, making them more vulnerable to climate dynamics. In addition, mining related water pollution was common, mainly in the upper basins of the Cauca and Nechi rivers<sup>16</sup>. This is exacerbated by increased rainfall and subsequent runoff. This creates complex problems to those undertaking fishing and farming practices<sup>17</sup>. Additionally, only 49% of the population has access to health services. This affects the local vulnerability to extreme events, as the increased frequency and intensity of floods results reduced access to good quality food. Investments foreseen by the NAF include investment in health centers and hospitals to attend to this health access gap. From that perspective, La Mojana represents a strategic region in the context of post-conflict in Colombia and provides an opportunity for the GoC to invest in long term resilience and development plans.
19. Access to reliable sources of safe drinking water is one of the most critical issues in La Mojana. Over 42% of the population has no access to drinking water, and where water is available, the access is extremely unequal. 20% of the population in Magangué lack access to water. In contrast, more than 80% of the population in Achi and Ayapel do not have access to safe water. This situation is only going to be compounded and exacerbated by the projected reduction in precipitation and the higher incidence of more intense and frequent extreme events such as floods and prolonged dry periods. These extreme events, which are already observed today, will not only affect water supply (particularly during prolonged dry periods), but also water quality. During floods, polluted water infiltrates wells and results in contamination of groundwater. The impact on increased morbidity among the population is a concern. For example, in Achi, the second leading cause of death for children under 5 is acute diarrheal diseases (ADD) related to poor drinking water quality<sup>18</sup>.

<sup>13</sup> The IADB and ECLAC (2011). Valoración de daños y pérdidas Ola invernal en Colombia 2010-2011. The report collects the findings of a joint mission conducted by IADB and ECLAC to Colombia to quantify immediate damages.

<sup>14</sup> IDEAM (2015). Tercera Comunicación Oficial: Nuevos Escenarios de Cambio Climático para Colombia.

<sup>15</sup> DANE, (2005). 2005 figures are used as this is the date of the latest official census. In 2015, national poverty estimates calculated poverty levels at 42.4% still considerably higher than the national average.

<sup>16</sup> Please find a description of efforts the GoC is making to address mining related pollutions in Annex 2K of the Feasibility Study and included in ESMF

<sup>17</sup> Marrugo, Lans, & Benítez, 2007; Marrugo, Verbel, Ceballos, & Benitez, 2008; Núñez, Negrete, Rios, Hadad, & Maine, 2011.

<sup>18</sup> Municipal Mayor's Office of Achi (2012) *Diagnostico de infancia y adolescencia en el municipio de Achi, Bolivar* [Diagnosis of childhood and adolescence in the town of Achi, Bolivar]. Achi: Municipal Mayor's Office of Achi.

20. The economic base of La Mojana is mainly rural, with high dependence on agricultural activities. The reliance on agriculture makes the area extremely vulnerable to climate variability and the impacts from floods and prolonged dry seasons. In recent years, towns in the region have had changes in their production systems attributable to floods and droughts. This includes the disappearance of sorghum<sup>19</sup> and the shortage of fodder for cattle.
21. The main economic activities are livestock production (practiced in 395,000 hectares), followed by mixed livestock and agriculture systems (in 376,000 hectares), agricultural production (in 274,000 hectares) and fishing and hunting (in 58,900 hectares)<sup>20</sup>. In terms of land use by activity, 70% of the land is under pastures followed by 24% under traditional and mechanized rice production.
22. At the same time, agricultural activity affects the natural water flow dynamics in La Mojana, as there is increased pressure from cattle ranching on the natural wetlands, as well as water use from crop and livestock production that affect the natural ecosystem and water regulation in La Mojana (see Figure 2c). It is also important to mention that in La Mojana, there are seasonal changes in water levels (called *pulsos*) that create an aquatic-terrestrial transition zone called *playones*, with particular ecological characteristics, where all species are adapted. These *pulsos* or river pulses are key to most of the productive activities in the region (i.e. fishing, livestock, rice, hunting), turning them into events that are closely related to economic activity and food security in La Mojana.

### Ecosystem Vulnerability

23. Thirty-seven percent of La Mojana is wetlands. Wetlands provide valuable ecosystem services particularly in relation to water management. In La Mojana, community livelihoods are based on the services provided by the wetlands. The wetlands also provide important services in the form of natural flood protection, water and sediment purification and water supply as well as their economic value through agro-productive use (water for livestock and agriculture and fishing)<sup>21</sup>. Recent studies developed by the NAF for the region identified fifty environmental services provided by the region's wetland ecosystems including supply services (food, materials and minerals, plant resources, forest cover and fauna, etc.), regulation services (drains and treatment, reproduction, shelter, etc.) and cultural services (identity, leisure and learning). Supply services are the most important for the region as they provide 50% of total services to the population.
24. Climate change has increased the community's reliance in these services as water has become more scarce due to prolonged dry periods that have overtaxed the existing water infrastructure. Flooding in the region has and will become more frequent as climate change intensifies, increasing the need for the wetlands to act as buffer to the region. However, the capacity of the local wetlands, already stressed due to management inefficiencies and pollution, is compounded as a result of extreme weather events. The increased intensity and frequency of floods has destroyed forest areas and extended dry periods have stopped the regeneration processes of the riparian forest and river mangroves (*zapales*), both which have an important role in water purification (see details in pg. 217 of Annex II).
25. Climate change has had, and will continue to have, significant consequences for La Mojana ecosystems including its biodiversity. Habitat fragmentation, erosion and sedimentation is increasingly common. The projected temperature increases for La Mojana will have detrimental effects on the composition and structure of key ecosystem functions. Growth rates of living forms adapted to the early ecological succession phases could be affected by the projected higher temperature and evapotranspiration rates, limiting their capacities to colonize their natural habitats areas and leading to introduced species or pastures proliferation.

### National and Sectoral Policies

26. The GoC has developed a number of important national and local policies and strategies related to climate risk management and climate change adaptation. These include, the National Development Plan 2014-2018 (NDP), the national policies for Land Use Planning, Disaster Risk Management, Climate Change, Agriculture and Water Resource Management. The NDP 2014-2018 includes strategic goals focused on achieving resilient growth and reducing vulnerability to disaster risks and climate change. The NDP provides for the formulation and implementation of sector plans for adapting to climate change under the responsibility of the sectoral ministries. At the same time,

<sup>19</sup>Economía y Desarrollo Rural, Corpoica Ciencia, Tecnología, Agropecuaria (2013)14,(2), 165-185

<sup>20</sup>DANE (2014). Tercer Censo Nacional Agropecuario. <https://www.dane.gov.co/index.php/estadisticas-por-tema/agropecuario/censo-nacional-agropecuario-2014>.

<sup>21</sup>Corpomojana (2016), Draft Action Plan 2016 -2019. Development Corporation Sustainable of Mojana and San Jorge.

the NDP provides that the National Adaptation Fund may structure and execute comprehensive projects for risk reduction and adaptation to climate change, identified through the national planning system, in order to strengthen its competencies and contribute to the reduction of fiscal vulnerability of the State. The National Adaptation Plan for Climate Change (PNACC) seeks to reduce risk and the socio-economic and ecosystem impacts associated with variability and climate change in Colombia. To attain that, the national government provides a series of methodological inputs to guide sectors and territories. One of those inputs is to incorporate climate risk management in the sector planning, budgeting and territorial development processes. The experience and results of the project will serve as a template for similar interventions in other regions of the country. The project will also support other inputs included in the PNACC: a) generate a better understanding of the potential risks and actual impacts, which includes its economic assessment; b) seize the opportunities associated with change and climate variability; c) identify, prioritize, implement, evaluate and monitor adaptation measures to reduce vulnerability and exposure of socio-economic systems to climatic events.

27. The GoC has formulated a financial strategy to reduce the State's fiscal vulnerability to natural disasters and events. The implementation of the financial strategy is based on strengthening risk reduction measures, collective insurance of public goods, implementation of the Disaster Risk Management Law, contingent financing for future events and assessment of financial protection instruments (capital market instruments to enable transferring and reducing fiscal risks).
28. To mainstream climate change mitigation and adaptation with national and local policies in 2016 the GoC established the National System for Climate Change (SISCLIMA). SISCLIMA aims to align and monitor sectorial, regional and local planning actions with national climate change and adaptation policies such as the National Policy of Climate Change, the National Adaptation Plan, the Colombian Strategy of Low Carbon Development and the Policy Strategy for Public Financial Management of Natural Disaster Risk as well as Integral Regional Plans of Climate Change. SISCLIMA is coordinated through the Interagency Commission for Climate Change (comprised of the Ministries of Finance, Environment, Interior, Energy, Agriculture, Transport, International Relations and the DNP) and Regional Nodes for climate change (interinstitutional consultation committees at a local level) to ensure that planning and decision making at a sectorial and regional level is articulated in a coordinated manner with national policies. The project will be benefited through this national and local coordination structure.
29. The Integral Regional Plans of Climate Change are a key tools to align local planning with climate change mitigation and adaptation actions. These regional plans acknowledge the cross-cutting nature of climate change between mitigation and adaptation and furthermore, between public and private sector as well as civil society. Hence, their implementation requires a vertical alignment between the national, the regional and the local conditions when executing mitigation and adaptation actions. In that sense, the Mojana Project will contribute to the local adaptation goals of this region, while supporting the broad guidelines of the national policies, through an inter-institutional coordination of activities. The implementation of the La Mojana Action Plan, with the support of the GCF, provides an important paradigm for the future implementation of such regional plans and puts itself forward as a strategy for integrating climate needs at all levels.
30. As such, the proposed intervention in La Mojana forms part of the GoC's national vision for climate change adaptation. Its broader vision for long term climate adaptation and resilience to this region, will serve as a guide to future disaster risk strategies in the country. In this context, adaptation to climate change, disaster risk management and local development represent common challenges which focus on reducing the vulnerability of human populations, decreasing their level of exposure and handling the environmental degradation conditions. The project's objective, in keeping with the GoC's national vision for La Mojana, is creating resiliency in La Mojana to climate impacts (flooding and extended dry periods). The joined articulation of the project to the SISCLIMA will facilitate its alignment with the national policies constituting the frame upon which the system operates.

## C.2. Project / Programme Objective against Baseline

31. The climate change scenarios for La Mojana suggest the following:
  - *Reduced total precipitation.* According to IDEAM studies, climate change scenarios from 2010 to 2040, 2040 to 2070 and 2070 to 2100 predict reductions in rainfall in most of La Mojana with an average reduction across the entire region of 14%. Municipalities hardest hit from precipitation reduction include Majagual, Sucre and Achí that will see a 35% drop during the years of 2071- 2100 in comparison to current reference years (1976-2005). However, the coastal zones of Bolívar, San Marcos and Ayapel will see up to a 10 % increase in precipitation during the same time period.

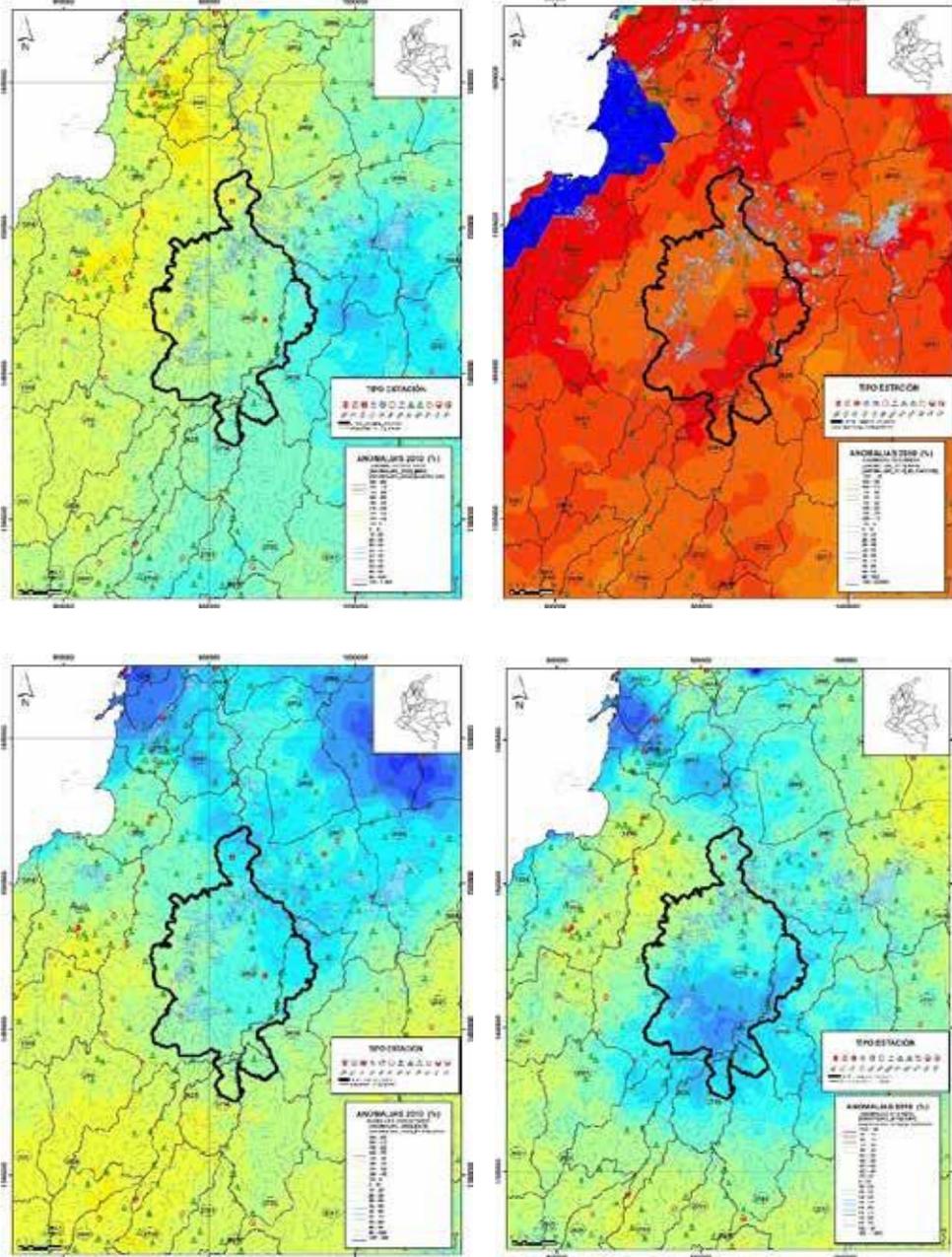
- *Increased average temperatures.* Temperatures are expected to increase by an average of 0.9° for the period 2011-2040 and 2.2°C for the period from 2071 to 2100<sup>22</sup>.
- *Increased frequency of extreme events.* The incident of climate induced extreme events (such as extreme rainfall) is likely to increase by 0.9%. The climatic fluctuations in the region will provide a direct impact in more frequent flooding and prolonged dry periods. Projections by the NAF that calculated the flow of the main tributary streams (Rios Cauca, Nechí, Caribona and San Jorge), in light of climate projections that take into account increased occurrences of both El Niño and La Niña demonstrated a tendency for more severe flooding and longer dry seasons within the next 1,000 years (See pgs. 87, 145, 217-218 in AnnexII).

32. These observed trends have a big impact on La Mojana as the increased intensity of rainy seasons will exacerbate flooding including duration. According to the IDEAM, 74.8% of La Mojana is susceptible to flooding and has a high percentage of area with high (60.01%) and very high (3.20%) vulnerability. Recurrent flooding places the population of La Mojana in a state of higher vulnerability. For example, prior to the 2010-2011 La Niña, La Mojana had already experienced severe flooding in 2005, 2007, and 2008, affecting the agricultural, cattle and fishing sectors, which created a situation of food insecurity in the area that placed the population in a more vulnerable position during the La Niña event of 2010-2011<sup>23</sup>. Impact will also be seen in the form of prolonged dry periods as total average precipitation will decrease in the majority of the region, the decrease coupled with higher average temperatures and the higher incidence of climatic cycles such as El Niño pose a troubling scenario to total water access for the region.
33. The third National Communication in the development of Vulnerability Analysis evaluated the indicator "Average percentage of affected municipal area with precipitation anomalies below 40%". This indicator shows that around 80% of the area may be affected by reductions well below normal levels by 2040 for the 11 municipalities in the area of La Mojana (IDEAM, UNDP, Chancellery, DNP, MADS, 2017). In the figure 1, map of anomalies for dry and wet months are presented. In this, we can observe that dry months may be much dryer in most of the area of the 11 municipalities, while wet months will be wetter in some areas.

*Anomalies for dry months (upper maps) and wet months (lower maps) (Source: Modeling Team- National Adaptation Fund, 2013)*

<sup>22</sup>[http://www.adaptation-fund.org/wp-content/uploads/2015/01/RESUBMISSION\\_PIMS%204805%20Colombia%20AF%20Full%20Proposal%2022May2012\\_no\\_highlight.pdf](http://www.adaptation-fund.org/wp-content/uploads/2015/01/RESUBMISSION_PIMS%204805%20Colombia%20AF%20Full%20Proposal%2022May2012_no_highlight.pdf)

<sup>23</sup> OCHA. Colombia (2010). Temporada de Lluvias 2010. Fenómeno de La Niña. Informe de Situación #6.12/11/2010.



### Disaster Risk Management in La Mojana

34. Given the high vulnerability of La Mojana to extreme climate events, the GoC, with the support of international cooperation, have developed multiple studies, plans, policies, programs and projects for La Mojana almost in its entirety with the objective to prevent flooding. These interventions have had a strong bias towards heavy infrastructure investment in the form of levees and dikes and have usually been timed right after an aggressive La Niña season (see figure 5, the red squares indicate when government intervention occurred in the region).

Figure 3<sup>24</sup>

<sup>24</sup> Fondo Nacional de Adaptacion (2015). Plan de Accion Integral Para la Reduccion del Riesgo de Inundaciones y Adaptacion al Cambio Climatico en la Region de la Mojana.



promotion of adapted infrastructure and the creation of home gardens. The project also innovated in piloting water efficient agriculture techniques for rice, invested in the enhancement of a regional flood early warning system, and promoted regional associations as a manner to inform the local population and local leaders on the impact they will face from climate change in the region. The project is an important foundation for the proposed project including the creation of a governance structure such as the creation of local groups and community organizations, sensitizing climate change projections to local leaders and vulnerable populations as well as to productive associations.

40. The GoC will upscale the efforts of the MADS-AF project through the implementation of the La Mojana Action Plan. For example, while the MADS-AF project has been piloting adaptive housing using vernacular design techniques, NAF, through the Action Plan, has been and will continue to invest in larger scale investments to adaptive building under its Sustainable and Secure Infrastructure Component (which includes flood adapted public buildings (schools, health centers and housing). It also includes the promotion of direct investment in the Enhancement of Governance and Local and Regional Capacities which include support for in local development planning that integrates climate change projections into territorial management plans (POTs). This will be done as part of the GoC's commitment to implementing the La Mojana Action Plan.
41. The experiences from the MADS-AF project will be built upon by upscaling the most successful interventions that were piloted through the project to ensure their implementation in all 11 municipalities in La Mojana. As part of the La Mojana Action Plan, the NAF will also provide co-finance through the implementation of the investments that pertain to healthy habitat (drinking water access and sanitation), adapted socio-economic development (resilient livelihoods) and recovery of environmental dynamics (wetland restoration), in a total of USD 56.1875 million.
42. This project will represent the first time an integrated adaptive approach to climate change informed disaster risk management will be undertaken in Colombia at the territorial level, hence providing a paradigm shift in the way regional and risk planning is carried out. GCF funds will assist and complement the GoC's actions, this includes i) promoting sustainable and climate change resilient water management practices; ii) developing climate resilient productive systems to ensure climate resilient development; iii) restoring key ecosystem functions to enhance its capacity to mitigate climate change induced flood risks; and iv) strengthening local capacities to include consideration of climate change projections in planning and budgeting decisions. To enhance overall climate resiliency in La Mojana, a number of barriers must be addressed.

#### **Key barriers/challenges identified**

43. The key barriers that have held back climate resiliency in La Mojana include: i) Capacity constraints of governments to include climate adaptation and risk management in planning processes; ii) Water related infrastructure that is unsuitable to the increasing likelihood of flooding and prolonged dry periods; iii) Limited capacities and knowledge for treatment of potable water at household and local level in the face of decreasing quality of water as climate change impacts worsen; iv) Access and availability of alternative sources of water for vulnerable households and communities; v) Capacity (technical, financial) of communities and local government on practicing risk informed water and natural resources management techniques (including for wetlands management); vi) Access to and awareness of, early warning services including risk information; vii) Limited knowledge of traditional and technical best practices and their implementation on wetland dynamics including the practice of climate smart agriculture by local communities, productive associations and the public sector; viii) Participation and empowerment of local communities (especially women) and associations on proper wetland management and ix) Control capacity of local government and communities on unsustainable water and agricultural/farming practices

#### *Limited capacities of governments to include climate adaptation and risk management in planning instruments*

44. Technical constraints and institutional and financial capacities of the local governments severely affect the ability of the region to become more resilient to the impacts of climate change, including variability. While information and knowledge on climate change impacts on the lives and livelihoods of the people of La Mojana, including future scenarios of climate change, are available they are not adequately used in local planning processes. There are no clear technical or institutional guidance available. Given that the municipalities are diverse in their livelihood practices as well as natural geography, and local planning is done at multiple levels, including at the municipal level, this downscaled locally-specific climate information is important.
45. In the targeted area for this project, municipalities and departmental authorities play a central role in providing support during flooding and climate-related emergencies. However, they are not always fully aware of the potential long term impact of climate change and the shifts that will incur in the region as a result. This creates an important

barrier as it limits the knowledge base of key technical and political officers about available options (e.g., ecosystem-based management, traditional fluvial management) that go beyond a traditional reactive risk management approach based primarily on engineering solutions that only shift risk to other regions. Bridging this gap in knowledge is critical, as municipal and departmental authorities are ultimately responsible for the formulation and implementation of development and territorial management plans that guide government-based investments, including those potentially related to reducing risk and vulnerability to climate change at the local level. In the case of water supply, the lack of knowledge on aquifer dynamics proves to be an important obstacle in adaptation planning that envisions a scenario with reduced precipitation rates in the region, particularly as illegal ground well digging<sup>26</sup> has become a common response by community members to water shortages.

46. The MADS-AF project has financed the acquisition of knowledge on climate change projections in the region. However, analysis has not been systematized nor shared in a manner that can provide concrete adaptive solutions to protect the region's inhabitants whose access to water has been threatened. While the information gathered through the NAF has been useful it has not been translated into practical guides for the population and those that have been created are solely focused on flood management. The systematization of knowledge and the development of targeted knowledge management products will provide a solution to this barrier.

*Limited access and availability of alternative sources of water for vulnerable households and communities*

47. At the present time, the communities in La Mojana rely on water supply from the wetland areas and canals, micro-aqueduct and superficial/shallow wells as sources of water for drinking, household needs and agricultural purposes. These current practices are challenged by the changes in precipitation rates as well as the extreme events the region is, currently and, projected to experience as a result of climate change. Access to water supply in La Mojana has become more difficult, particularly during prolonged dry periods that currently last 85 days but are projected to extend up to 115 due to climate change.
48. The existing water infrastructure is currently insufficient (covering only 50% of the communities' needs) to meet the existing demand. While the drilling of wells for ground water access via mini aqueducts has been used in the past to address water supply in densely populated areas in La Mojana, this has not been used as an option in rural areas due to cost and the lack of knowledge regarding the aquifer's long term sustainability (aquifer dynamism) as well as the high dispersion rate of the most rural populations. Households in rural areas have in the past used water from the closest natural sources. However, with longer dry seasons many perennial water sources have been disrupted. When this occurs, rural households, walk or rent motorbikes to gain access to the nearest mini aqueduct in areas located within a radius of 60 km every day. For this solution, each family invests up to USD 600 every year in transportation cost and lost daily wages.
49. The vulnerability of rural communities has been further impacted by the diminished capacity of the wetland systems to provide them with valuable environmental services that in the past sustained their livelihoods. There is extensive literature globally regarding the environmental services provided by wetlands systems, particularly in relation to water management (replenishing aqueducts, water purification and surface water supply) and thus restoration is seen as a long term strategy to ensure sustainable water management for the region.

*Limited capacities and knowledge for treatment of potable water at household and local level*

50. The lack of a sanitation system and waste management in the region leads to contamination of surface and ground sources of water. The problem is compounded as the region becomes increasingly impacted by floods and prolonged dry periods. Reliance on ground water through the drilling of wells for water access and the creation of mini aqueducts has been the current main source of water supply in densely populated regions (urban and rural nucleate). This poses a threat as mini aqueducts currently do not have a water filtration system. The NAF will invest through co financing in the development of a water quality and monitoring system for the region, yet support is needed on the proper protocols that will be needed to communicate information to communities and the proper protocols that need to be taken. Communities do not currently have the capacity to treat water at a household level other than treating it with bleach or using household linens as filters. Little information is provided at the household level in a timely manner regarding the proper protocols on water treatment during emergency situations (flooding or extended drought) when water quality can become compromised. This has resulted in a high incidence of diarrheal

<sup>26</sup> All new wells need to be approved by the local environmental authorities, for approval they require a variety of tests to mitigate any possible risks. During field visits a large amount of illegal wells were identified. This situation was corroborated upon interviews with various actors involved in local planning.

cases in the region. In the municipality of Achi, the second cause of mortality for children under 5 is diarrheal diseases. A recent survey taken by the NAF stated that 7 out of 10 inhabitants in La Mojana were ingesting contaminated water.

*Water infrastructure that is not resilient to flooding and prolonged dry periods*

51. The current incidence of prolonged dry periods has strained water resources in the region, particularly affected have been rural communities (51,000 households) of which 13,100 reside in highly remote areas (rural disperse) and 37,900 reside in less remote rural areas (rural nuclei). Over half of the extremely remote households currently have no access to water infrastructure. This has resulted in their use of untreated water (acquired directly from the wetlands and water canals) or people, largely women, must travel long distances via rented motor bike or by walking long distances to the nearest mini aqueduct. In addition, more than 17,800 households within the rural nuclei (rural not disperse) population has no water infrastructure and travel- a shorter distance- to nearest mini aqueduct every to cover their water needs. This has led to an over taxation of the existing water infrastructure, much of which lies in disrepair due to overuse (particularly of the pumping systems) and damage from floods. The traditional water schemes in which these aqueducts are built consist of wells, the installation of an electrical or fuel based water pump, to feed a regulation water tank and community faucets and underground piping. None of these water schemes have water treatment capacities or infrastructure. Currently 45% of all mini aqueducts (550 in both rural and urban areas) in the 11 municipalities have been damaged from past floods with nearly 30% requiring new piping, 70% needing new tanks and 37% needing new pumps.
52. Maintenance of the mini aqueduct systems requires frequent interventions particularly of the pumping system and tubing as these systems have not been adapted to account for climate projection and are not built to be resilient to flood conditions. Mini aqueducts are broken on average 60 days of the year. While the communities themselves are able to repair basic damage or replace basic parts of the pumping system (through community fund raising), when the damage requires the replacement of entire tubing or pumping systems the municipalities are called upon to repair the damage. This can leave communities without water for long periods of time. Adaptation of the mini aqueducts would require the use of sturdier piping, the installation of enclosed solar water pumps to replace current fossil fuel based pumps, enhanced and elevated water tanks to protect them from flooding and water filtering systems. It should also be noted that current mini aqueduct systems do not treat the ground water, this presents a health risk to communities reliant on these systems. Increased flooding and drought pose an increased threat to the quality of the water supply as seepage from human activity will become more likely as the current water infrastructure has not been constructed to withstand increased climate impacts. In addition, there is threat that current pumping practices may prove to be unsustainable to current aquifer dynamics. Currently during dry conditions, it is not uncommon to see pumps working over 10 hours a day to meet water needs. As the aquifer is not provided enough time to recharge, less water becomes available and more pumping is needed to fill tanks. Damage is caused as the pumping system exhausts itself and its capacity to pull up water is reduced.

*Limited capacity (technical, financial) of communities and local government on water and natural resources management (including wetlands)*

53. The continued degradation of natural resources in the region adds uncertainty to the ability of ecosystems and local communities to face climate change and variability. As flooding becomes more prevalent due to extreme climate events, the capacity of wetlands to serve as hydrology regulators and to mitigate floods becomes more important. Production activities and flood mitigation infrastructure has had a high impact on natural ecosystems. The loss of wetland channels and floodplains is evident due to levee construction and the impacts on the original hydrological dynamics. This has caused the reduction of physical connectivity, the decline of fishery resources and area for cultivation, and the intervention or disappearance of riparian forests and natural vegetation areas.
54. Among the primary drivers of wetland degradation is its over extended use by livestock activities. Currently, an estimated 8,000 cattle ranchers and 500,000 heads of cattle reside in La Mojana. Livestock, along with rice farming, represent 94% of land use in the region. As water has become scarce and the duration of dry seasons have extended due to climate change, pastoralist from adjoining areas to the region have begun to drive their own cattle into the wetlands creating a further strain on the wetland system from overgrazing and erosion. This creates a long-term threat to economic and environmental services provided by the wetlands.
55. Efforts to enhance wetland functions through their protection and rehabilitation have been limited. The relationship between increased flooding and opportunities for having healthy wetlands as part of an adaptation and mitigation strategy has not been implemented consistently, nor at a large enough scale, to ensure impact. While restoration

through local initiatives has been occurring in La Mojana, these have been mainly funded through municipal funds and some international cooperation (including pilots by the MADS-AF project). Their limited scale has not transformed into a widespread strategy for risk-informed management practices. The focus has mainly been on heavy infrastructure solutions (dikes and levees). In this context, GCF and GoC co-financing funds will allow for a larger scale approach to restoration as a risk management solution that focuses both on the main wetlands themselves as well as in water cause restoration.

56. Climate risk informed wetland management will also be required to ensure that wetland restoration is sustainable in the long term and delivers the environmental services the region needs to adapt to climate projections. This will in turn require a modification of agro productive practices from the communities residing along the wetland restoration areas and whose livelihoods will be immediately impacted. This strategy has yet to be implemented in parallel to restoration activities as it requires more complex actions that go beyond immediate restoration.

*Limited participation and empowerment of local communities (especially women) and associations on proper wetland management*

57. Despite the high climate vulnerability of the region Mojana, there is a low level of participation and ownership from local communities. As mentioned above, past interventions in the region focused primarily on heavy infrastructure while failing to attend the overall climate vulnerabilities of the region's inhabitants.
58. Historically the abundance of water for economic activities created a false sense of security regarding the permanence of this resource. As total precipitation has begun to decrease and the extension of dry periods to increase, the true value of water has become truly apparent to the region's inhabitants. Community level consultations and vulnerability assessments carried out over the years, including most recently by the MADS-AF project, highlighted the recent sense of urgency to this matter.
59. The MADS-AF project has been unique in its approach of involving and enhancing community associations. This in fact has been a key factor in the success of many of its interventions, particularly in the case of wetland restoration where women's groups have been targeted. In fact, this has been cited in project reports as a key lesson learned for future project development. Involving communities directly in wetland management and providing them with the capacities to ensure their maintenance is critical for the long-term success of any restoration activity. While communities may be aware of the services provided by the wetlands, particularly in the supply side, their immediate needs may force them to undertake actions that enhance degradation such as through over grazing of livestock. By acknowledging community needs and providing adaptive actions that are compatible to livelihood actions the communities will no longer have to face this complicated tradeoff at the expense of the wetlands.

*Limited access and awareness of early warning services, climate variability and risk information;*

60. The design of a functional, cost effective and easy to maintain early warning system (EWS) that provides critical real-time information is essential in helping communities make decisions to save lives, livelihoods and adapt infrastructure. Climate variability and the increased probability of prolonged dry seasons and flooding will have an immediate impact in the lives, health and livelihoods of the communities in La Mojana. Hydro-meteorological early warning systems in Colombia are operated by the IDEAM the National Hydrometeorological Service for Colombia that serves also as a research institution attached to the Environmental Ministry. They operate the national hydro-climatological monitoring network and generate main climate alerts in the country. However due to the high rainfall variability in Colombia, IDEAM has begun to promote the design of regional EWS clusters with regional forecast centers to allow continuous hydro-meteorological monitoring in smaller areas with a higher level resolution. A regional forecast center in La Mojana with an improved hydromet network is expected to improve local and regional hydromet weather and forecast predictions in a better spatial and temporal resolution.
61. In the context of the MADS-AF Project, IDEAM designed a regional program for La Mojana to enhance the existing regional hydromet network. The project has already invested in 10 automatic hydrological stations to provide real time information in flood prone areas in 3 out of the 11 municipalities in La Mojana (San Marcos, San Benito de Abad and Ayapel). The distance between these stations is 60-100 kms, much further than the 30 kms recommendations by the IDEAM for adequate spatial variability due to fast changing river dynamics. The fact that large areas remain uncovered by the existing EWS system creates significant gaps to enable the development of more accurate hydrological risk modeling systems for La Mojana that will be more useful in management decisions.

62. The current regional network in La Mojana is comprised of 54 active weather stations of which only 10 (those invested through the MADS-AF project as mentioned above) provide real time information. Most, incoming data from the regional network is not in real time and thus cannot be included into the national network. In addition, none of the stations in La Mojana are currently integrated into the newly created national flood early warning system (FEWS)<sup>27</sup> thus providing a coverage gap of the system in a critical river convergence area prone to rapid flooding. This gap is particularly relevant due to the declining capacity of the wetlands to absorb flooding (as a result of degradation) and La Mojana's location. If no action is taken, the likely impact from flood damage on both lives and livelihoods will be exacerbated as climate projections demonstrate increased rain intensity during rainy seasons.
63. Currently, flood alerts are provided via IDEAM in the form of bulletins that are provided through its website or to local authorities on a regular basis. The information contained in these are at a high and overarching level. Information coverage for La Mojana is grouped within a larger area, so while these forecasts are not national they are also not locally specific. These communications are sent to stakeholders but do not contain the information nor are packaged in a manner that is necessary to have an impact in the decision-making process. The bulletins are provided to national authorities but are not provided directly to the communities nor packaged in a way that is easily understandable by them nor made relevant towards their daily activities (for example alerts received by the local population contain information such as 'increased La Nina activity projected for the year') thus constraining actionable results.
64. Through a framework agreement with the University of Cordoba created under the MADS-AF, a regional forecasting center in the University will be created to house incoming hydromet data. However, there is still a need to invest in data processing software that also works to integrate local with national data to create better modeling and forecasting as well as providing tailored weather and climate products particularly the agro-meteorological alerts that are needed for the adaptation of livelihoods.
65. Furthermore, despite the frequent extension of dry periods, the regional network does not provide seasonal forecasting to protect farmers and agro systems from drought and productive loss. IDEAM does provide agromet bulletins but these again are not specific to La Mojana whose main vocation is agriculture and livestock. Investment in enhanced early warning systems with access to local data, that is integrated into the national network, with clear standard operating procedures and that provides regionally relevant alerts and data products is necessary to enable the communities and authorities in La Mojana to prevent risk, and enable smart adaptive decision making.

*Limited knowledge of management best practices and their implementation on wetland dynamics and climate smart agriculture by local communities, productive associations and government*

66. Reduced access to sustainable water sources has created a negative impact in the productive capacity of agricultural activities in La Mojana, an area which has traditionally relied on income derived from rice production and livestock- both water intensive activities- and from fishing. Traditional agricultural practices employed by rural communities (small scale agriculture and cattle ranching) and that are finely tuned to seasonal climate variations have been placed under increasing pressure from prolonged and unpredictable flooding. According to the National Survey of Mechanized Rice Production (ENAM), floods in the first half of 2014 and the significant reduction of rainfall in the second half, resulted in the total loss of rice crops in different growth stages. The National Federation of Rice Farmers calculated that year that 73.4% of a sample area that was surveyed in La Mojana was affected by long dry periods. Average yields in 2014 obtained by farmers in La Mojana reached 1.25 tons per hectare, well below historical averages (3-4 tons/ha). Currently, little information has been developed on productive alternatives that can be adapted to the region to improve water use and compensate lack of productivity in the region.
67. Efforts from the government and development agencies to help local communities sustain food production under climate uncertainty have not successfully addressed the need for combining traditional knowledge with climate resilient soft and hard technologies and practices in a manner that is suitable for small scale landholders. This includes the application and access to flood and drought resilient best practices such as the use of mulch for soil cover, elevated gardening techniques, drought and flood resilient crops, improved livestock management techniques, as well as alternative methods for food production for those communities that will face extreme flooding

<sup>27</sup> Program created in cooperation with UNESCO-IHE through the use the flood forecasting system Delft-FEWS (Flood Early Warning System) to predict the level and drainage of water for daily operational predictions. Its strength is that it can connect existing sources of data and hydrological models (from both national and regional institutions) to the system thus promoting sharing of real-time water statistics. It is currently only active in in the Bogotá River, Upstream Basin of the River Cauca and the Magdalena River between Puerto Salgar and Barrancabermeja, thus not providing full coverage and not providing information for LaMojana.

or reduced precipitation rates.<sup>28</sup> Presently, technical assistance or rural extension programs are limited to the efforts that producer associations have in the region and that they develop according to the number of members and local production. These support schemes are based on the needs of each value chain, and there are no integrated programs that include elements of land management, climate change adaptation or risk management.

68. The MADS-AF project has experimented, at a small scale, with supporting farmers to adjust crop rotations and use of more suitable seeds such as sesame, cantaloupe, and beans. However, the information derived from these small projects has not been systematized nor socialized through extension services to the community nor has climate adaptation been streamlined to traditional rural extension services. An adapted agro productive map has not been created to facilitate productive planning and guide water use management. Colombia has had national success in introducing sustainable silvo-pastoral practices and in climate resilient rice production, involving national producer federations, but neither have been adapted to the particular conditions of La Mojana nor have they been adapted to the realities facing small land holders (under 5Ha) who are most vulnerable to climate change and have less capacity to adapt. Market linkages have also yet to be identified to assess the long-term sustainability of the introduction of new crops and practices to fully promote crop diversification as part of adaptation responses.

*Limited control capacity of local government and communities on unsustainable water and agricultural/farming practices*

69. Rice and livestock compromise an estimated 94% of the productive land use in La Mojana, with rice accounting for 20%. Currently, rice, corn and fish make up the main diet of the population in La Mojana. Climate change is affecting the capacity of the population of La Mojana to have access to these products. The concern is that climate change projections will have a direct impact in water management as water resources will need to last longer forcing agriculture and livestock to adapt and become more water efficient
70. A reduced variety of crops in the region has created a high dependence on a few products thus decreasing crop resilience to climatic events. As mentioned above, flooding has in the past wiped out entire crop productions of rice and corn and has also had a detrimental impact in wiping out native seeds. Drought is depleting the stock of fish and has reduced the availability of water for agricultural home consumption and agricultural productive activities. Access to more climate resilient crop varieties will improve the adaptive capacity in the population during dry periods and flooding while the introduction of both flood and drought resilient home productive practices will increase food security during the extreme climatic events that are becoming more common.

### **Project Objective, Outputs and Impacts**

71. The overarching goal is to enhance climate resilience of vulnerable communities in the La Mojana region. This will be achieved through long term adaptive solutions that address the supply, use and risk management pertaining to floods and lack of water. The solutions are both technical in nature and include systemized knowledge management mechanism and activities that will ensure that the information is shared with relevant stake holders at a community, rural productive and local planning level thus addressing the information and capacity gaps identified above through active community participation.
72. Including community engagement as well as a variety of new stakeholders in the form of respected local and national institutions as key allies in creating resiliency and disaster risk management in the region is highly innovative for Colombia. Not only does it break from past experiences that were isolated from the communities they were trying to protect but it also provides an opportunity for actions to be highly informed so that they are locally appropriate and address information barriers in a manner that favors practical consultations and best practices. It also ensures ownership, governance, and sustainability.
73. Interventions through the proposed project will provide practical solutions that are compatible with community needs as identified through the implementation of the MADS-AF project. In addition, key results such as crop diversification and water supply access will be seen within the project lifetime thus creating a positive incentive for active community engagement. Linking solutions that are directly linked in improving the lives of the community has been among the lessons learned from both the MADS-AF project and past infrastructure based interventions that failed to address overall risk to the region.
74. Partnering with local and national institutions such as the Institute von Humboldt, FEDEGAN and FEDEARROZ, and local universities among others will provide an opportunity not only in ensuring that lessons learned are spread

<sup>28</sup> UNDP Project Document: Reducing risk and vulnerability to climate change in the region of La Depresión Momposina in Colombia (2012)

throughout a large variety of stakeholders but also for them to see their own role in comprehensive risk management. This will be particularly the case of universities, knowledge institutions, rural extension workers and productive associations.

75. Technical solutions for water supply as proposed in section C3 make special consideration to low maintenance and operation cost to ensure sustainability, prioritizing locally available technologies. This is the case with the water tanks and the adaptation of the current hydrological water infrastructure. Training through the knowledge management and rural extension component will ensure that maintenance and operation of the equipment is provided to the community members.
76. The project will directly benefit 203,918 people (45% of which are women) that account for the rural population in La Mojana. This cohort of people has been targeted due to their high level of climate vulnerability as a result of their isolation, proximity to flood prone areas and limited access to sustainable alternative water sources<sup>29</sup>. The target population can be classified in terms of their rural isolation with those living in the most remote areas as the rural disperse population<sup>30</sup> (44,714 people of which 20,269 are women<sup>31</sup>) and those residing rural areas at a closer proximity from urban centers as the rural nuclei population (159,264 people). Both populations account for nearly 50% of the total population in La Mojana and are the most vulnerable to climate shocks. Vulnerability for this project has been identified through water source access, thus favoring the population whose water access is limited by lack or insufficient water infrastructure and whose reliance is mainly through untreated surface water. This will address the most critical vulnerability to the population to current climate projections. It should be also noted that these are also the communities that have been most affected by the shifting of risk through past disaster risk management schemes. Hence, the implementation of this project will have a large direct impact as it is attending the most vulnerable population in the country.
77. Indirect beneficiaries will be an additional 201,707 people (49% women)<sup>32</sup> who reside in more urban areas within the region and who will benefit from EWS alerts.

#### **Spatial Prioritization of Intervention Areas and Selection of Direct Beneficiaries**

78. A spatial analysis for prioritization of intervention areas has been developed using the concept of Total Risk Index. The total risk index (defined as TR), is obtained starting from descriptors or input variables for both the physical risk and the context risk (socioeconomic fragility and resilience.). For the analysis of La Mojana, physical risk and risk context scenarios have been created. The physical risk (PR) was determined by normalizing the results of expected annualized losses (EAL) on the exposed value of each municipality (pure premium) to the minimum and maximum values of the entire portfolio. Since the results of EALs are different for each stage of intervention, they have unique physical risk factors for each option. The risk context (aggravating factor F) was estimated based on socioeconomic fragility and resilience factors that "aggravate" the physical risk or direct impact of an event. Finally, the total risk (TR) is determined by adding the aggravating factor (F) and the physical risk factor (RF), weighted by their dimensions. The physical risk indicators and the aggravating factor were applied to the municipal level with the aim of making a comparative assessment for decision-making and prioritization of investment. The analysis indicates that the municipality of San Marcos with a relative EAL greater than 30.7% and one average aggravation factor with the greatest total risk (TR), while the towns of Achi, Majagual, Sucre and San Jacinto del Cauca present the highest risk of context values (F). Figure 6 shows the results for each component of the total risk index for eleven municipalities shown.

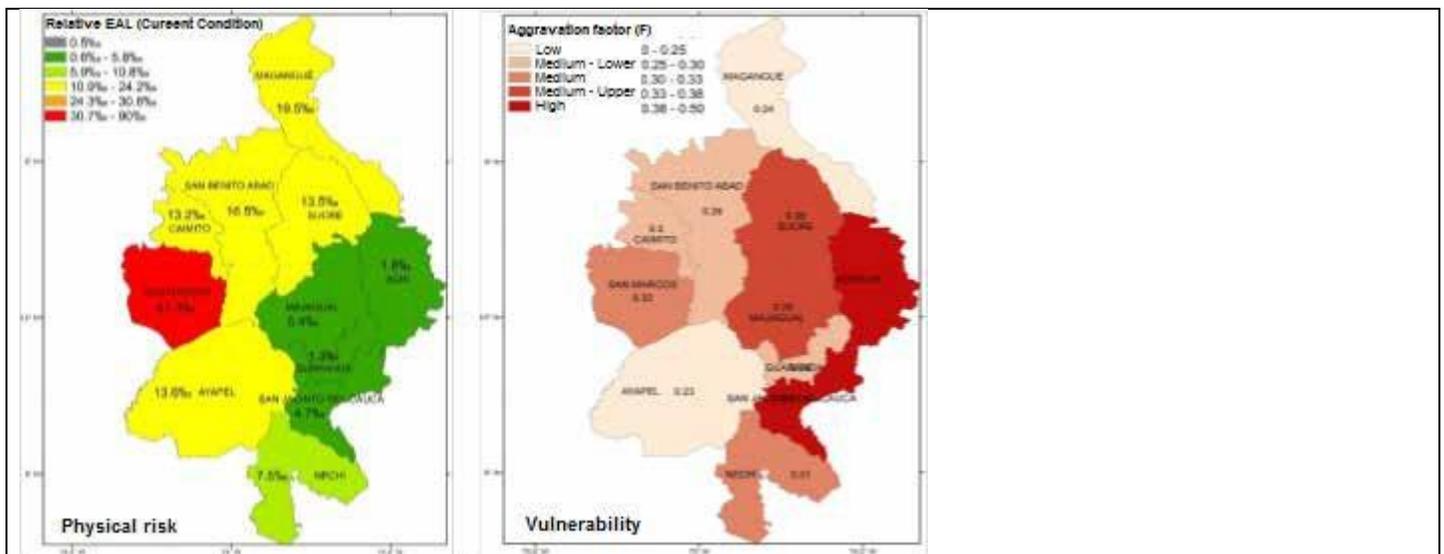
**Figure 6. Municipal Project Prioritization according to the Total Risk Index**

<sup>29</sup> DANE (2014). Tercer Censo Nacional Agropecuario. <https://www.dane.gov.co/index.php/estadisticas-por-tema/agropecuario/censo-nacional-agropecuario-2014>. The census documents, 8,223 of rural disperse households currently having no access to water infrastructure and travel to the nearest mini aqueduct requires a 3-hour long motorcycle ride. While 17,813 rural households have no access to water infrastructure yet are a shorter distance away from a mini aqueduct.

<sup>30</sup> The DNP classifies rural disperse areas as population centers with less than 50 inhabitants/km<sup>2</sup>.

<sup>31</sup> DANE (2014). Ibid. The total rural disperse population can also be grouped into 13,100 rural disperse households

<sup>32</sup> DANE (2013) Información Estadística Proyecciones de Población por Municipio al 2015.



79.

### C.3. Project / Programme Description

80. With the support of the GCF, and domestic finance, Colombia seeks to implement an integrated approach to improve the adaptive capacity and resiliency from climate impacts related to climate change in region of La Mojana. The **objective** of the programme is to **enhance the resilience of vulnerable communities in the La Mojana region to climate change risks**. GCF resources will be used to support: a) a strengthened understanding and systemization of knowledge on the impacts of climate change to water management in the region; b) water system infrastructure and ecosystem services; c) early warning systems adapted to climate change; and d) water resilient agroecosystems to enhance rural livelihoods. Project resources will allow the implementation of long term solutions for community water supply and adaptive livelihoods from flooding and drought that have been affected as a result of climate change. This includes the restoration of environmental services derived from the wetland ecosystems as well as creating institutional and community capacities to ensure resilient and sustainable adaptive capacity within the region. GCF Funds will complement GoC funds and efforts to implement a national action plan for La Mojana that addresses long term adaptation to climate risks.
81. The project will focus on the core region of La Mojana, consisting of the 11 municipalities within the plains bound on the east by the Cauca river, on the west by the San Jorge river and the Ayapel marsh, on the northeast by the Loba branch of the Magdalena river and on the south by the Ayapel Mountain Range. The targeted interventions will affect an area of 1,089,200 hectares approximately in four departments (Bolívar, Sucre, Córdoba and Antioquia). An estimated 203,918 people will benefit directly from this intervention, which accounts for the entire rural population of La Mojana. This intervention is innovative in creating a disaster management solution that is based on enhancing resiliency through an environmental and adaptive approach to climate change that if successful will create a paradigm shift in the GoC's approach to disaster risk management for the country as a whole.
82. A new disaster and climate risk management model for La Mojana based on adaptive and not reactive solutions will ensure long term resiliency to climate change scenarios that signal the need for comprehensive water use management solutions which are adapted to address increased flooding and longer dry periods. The solutions proposed account for household and agricultural climate resiliency and reestablish the natural capacity of the ecosystem to (through restored eco-systemic functions) to reduce the impacts of extreme climate change events while providing the local capacity to prevent loss of life and livelihoods through early warning alerts and correct planning. Once implemented, these integrated measures will help local authorities better manage flooding and overcome water shortages during periods of prolonged dry seasons. The measures will significantly reduce the vulnerability of people, communities and their assets.

**Output 1. Systemizing knowledge management and dissemination of the impacts of climate change on water management for planning.**

83. Under **Output 1**, the project will use GCF funds to ensure that knowledge is managed and disseminated effectively to enhance decision making and long term planning in a manner that streamlines adaptation to identified climate risks in the region. This will be done through the development of technical models and guidelines. It will also include a knowledge management program and capacity building system (see output 4.2) that will be cross cutting and will ensure the systemization of knowledge for use as a planning tool not only in the region but also nationally. The output is structured across 2 activities.

**Activity 1.1. Develop technical models and guidelines to enable decision making for long term water management planning for La Mojana**

84. GCF funds will be used to develop a groundwater flow and quality model to ascertain the long-term dependability of groundwater solutions- (a solution that has been implemented in the past through both legal and illegal ground water wells at a household and productive level and has become more common as water has become more scarce). The analysis for this model will include information on aquifer dynamics (recharge and yield capacity) to understand long term sustainability in view of the existing demand as well as an inventory of legal and illegal (artisanal built) water wells to measure current demand. The model will provide an estimated lifespan of the aquifer to provide valuable information on the quantity and quality of ground water for the region. GCF Funds will also be used to develop a guide for decision makers in the region (Corporaciones Autonomas, local mayors) to help them use this model in future planning and decision making thus ensuring that the technical results are transferred into practical planning actions and decision making. The guide will be presented to decision makers and will include training and support and on how to apply it in daily decision making. Results from this model will be a key component for integrated water management and adaption plans the region.

**Activity 1.2 Management of adaptation knowledge on water management**

85. GCF funds will implement a knowledge management program that will create a data bank on adaptive water management, systematize lessons learned and implement training and capacity building programs targeted to relevant stakeholders at the national, regional and local level. The data bank will systematize the lessons learned from the GCF Project and will serve to develop knowledge management tools created to target stakeholders in the region such as municipal authorities, community councils, community leaders, extension workers, productive associations and national authorities. This will include the development of training material (web courses, workbooks, planning guides, etc.) and targeted workshops. The databank will be maintained by a service provider. The Provider among other activities, will establish an electronic platform to ensure information and knowledge products are made available publicly as well as develop the knowledge management tools that are required for relevant stakeholders. Both the Universidad de Cordoba and the Universidad de Sucre (local universities) have been identified as potential service providers and could act collaboratively to conduct this activity. Both institutions have access to research facilities, staffing and funding necessary to continue to the performance of this service once the program ends have stated their interest to participate in this project and commitment to continue it beyond GCF Funds. Selection of institutions will follow UNDP procurement rules to ensure compliance with UNDP criteria. Technical criteria for the identification of the service provider will also be based on their experience working in La Mojana region, as well as their capacity (human and institutional) to provide ongoing support and commitment beyond the duration of the GCF financing in this project.

86. The National Adaptation Fund will work with the selected entity to ensure that the information is tailored towards practical solutions for the region. Particular emphasis will be made to providing training to local and municipal authorities. Knowledge management will provide support to the GoC's efforts in establishing a regional interagency water board that that will serve as an interagency planning mechanism to ensure that all planning decisions (economic, development, infrastructure) streamline water management impact and use in the region.

87. Technical and knowledge management support (as part of co-financing) from the Presidential Agency for Cooperation (PAC Colombia) will also be provided through its national Col-Col Cooperation Program to diffuse best practices from La Mojana to similarly impacted regions in Colombia as well as through its South-South program to share international best practices.

88. This Activity will also complement the GoC's efforts to develop a multipurpose land registry to serve as a land management and territorial database for La Mojana that will be developed through co financing. The database will provide georeferenced information and territorial management for agricultural and livestock activities as well as wetland management. This tool will ensure that water management and adaptation planning is streamlined in zoning

decisions and is used in adaptive landscape planning. In this case GCF funds will provide the knowledge management platform to consolidate the information required to establish the land registry database.

**Output 2. Promote climate resilient water resources infrastructure and ecosystem restoration by vulnerable households and communities**

89. Activities through this output are focused on diffusing regionally appropriate climate change risk sensitive water management solutions among rural communities in La Mojana (among both rural disperse and rural nuclei). Under Output 2 GCF funds will procure goods and services to put in place flood resilient water infrastructure and undertake wetland restoration works. These solutions will advance climate resilient, sustainable and safe water access to La Mojana's most water vulnerable communities<sup>33</sup> and be congruent to regional climate projections. Sub activities are adapted and differentiated to address the different access needs based on the level of dispersion and water vulnerability of the population

**Activity 2.1 Establish Climate Resilient Water Solutions**

90. The GoC is looking to implement through the GCF funds long term regionally appropriate integrated water solutions that look to multiple water supplies to address this vulnerability, these include: the use of rain water harvesting technology (the average annual precipitation rate of 2,793ml <sup>34</sup> in the region) and the adaptation of current water infrastructure to be made climate resilient.

**Activity 2.1.1. Provide household water solutions for the most water vulnerable populations in rural disperse areas.**

91. Under this activity, GCF resources will be used to invest in household rainwater harvesting tanks (for both water collection and storage) to provide sustainable drinking water access for a four-month period (120 days)<sup>35</sup> to 19,512 people that make up the rural disperse population in 7 of La Mojana's most water vulnerable municipalities that currently has no access to water infrastructure (4,878 households). The project will make the funding available to ensure year-round access to safe drinking water for the targeted population via the placement of 4,878 tanks (5,000 liters per tank) on households (one per household). This solution will provide storage for over 40L per water a day for a four-month period (120 days) for each 4-person household<sup>36</sup>.

92. The water tanks will be built by the community themselves with guidance of extension workers (see Activity 4.2). This technique has been used widely in development projects and locally in an area near La Mojana, called Emaus that has documented the building practice and has established technical guidance<sup>37</sup> (see Annex 2). The water tanks will be treated (inside coated) through epoxic paint for potable water tanks to ensure tank durability. Maintenance of this tank is minimal and can last over 20 years without any treatment other than annual cleaning. The water tanks will be raised through concrete ringed structures that will allow the individual tanks to be built above projected water flooding levels. Levels will be measured using the existing hydrological water model produced by the NAF. Rooftop structures through wooden stiling will be built or roofing of existing structures (constructed shades for washing in the patio, etc.) will be adapted to ensure proper roofing exists to channel rain water unto tanks (guttering, use of eternity sheet for roofing structure, see pictures in Annex II). Inventories of the current households in the region have demonstrated to have 46m<sup>2</sup> well above the required size and patio space (see pictures in Annex II) <sup>38</sup>. Based on the experience of the Emaus project USD 970 per household is needed per tank. This includes the adaptation of roof tiling and the actual cost of the material to build the tank and include a water filtration system.

93. The current houses are built with a mixture of palm leaves and zinc tiling. Houses have ample patio spaces for storage, keeping animals and washing. In many cases, the houses have additional roofing. Roofing structures (wood stiling) will be created or adapted to include gutters and downpipes (cost included in budget). Guttering will be fitted with steel mesh to stop leaves entering the gutters. This will have a two-fold benefit. Firstly, accumulated leaves can result in the rusting of the gutters over time. By not allowing the leaves to enter the gutters, this will significantly reduce this impact. Secondly, by not allowing leaves to accumulate in the gutters and decompose, this will provide better quality water into the rainwater tanks. Within the downpipe at first flush diverters will be installed on all guttering

<sup>33</sup> Based on a survey conducted by the National Adaptation Fund that identifies the most water vulnerable populations based on their access to reliable water supply.

<sup>34</sup> Based information from 44 weather stations in La Mojana during the past 25 years.

<sup>35</sup> Projections based on IDEAM (2015) *Nuevos Escenarios de Cambio Climatico para Colombia 2011-2100*.)

<sup>36</sup> The Agrarian Census averages 4 person per household.

<sup>37</sup> Marin Ramirez, Rodrigo (2004). *El Agua un Derecho Intransferible*. MISEROR.

<sup>38</sup> Satellite imaging has demonstrated that confirmed that the existing roofing exists, calculations in terms of capacity can be found in Annex II.

to remove residue that might accumulate on roof of buildings over time. To ensure water quality each household will be provided with a 40L water container and ceramic water filters to further purify water. These water filters require no maintenance other than regular cleaning (with a dish towel) and have a 4-year lifespan. The program will ensure that each household has 2 filters to last at least 8 years. Commercial costs per filter are estimated at USD89 with replacements costing USD20 and are locally available and sold<sup>39</sup>. The project will look to establish long term procurement agreements with a local provider that provides extension service on their use and to ensure cost efficient agreements that may be applicable beyond the scale of the project.

94. Given that the region receives more than 2,500 mm of rain a year, these tanks provide the most practical and sustainable solution to meet the demands of the 4,878 households residing in the rural disperse regions of La Mojana. A household level intervention is required due to the high level of dispersion in the region. Due to distances between households, there are no real spaces that are central for community based solutions in water distribution.
95. Water capture and retention from the rainwater harvesting tanks will fulfill the total daily water requirements for 4,878 households (39,470,400 liters or 40L a day for 120 days per household) based on available rainfall data even in the worst-case scenario (three-month dry season). The tanks would be topped up during rainy seasons thereby providing a constant and very important water resource, even during the projected extended drought scenarios and considering the projected reduction in average precipitation.
96. Support will be provided to the local communities via the rural extension program (Activity 4.2) to ensure proper water treatment as well as the operation and maintenance of the system. This will ensure that the communities understand the process for water purification and how to ensure its quality.
97. Alternatives developed at La Mojana are related to the construction of shallow (and in some cases deep) wells connected to community tanks. Extraction is performed using fuel-based pumps. Shallow wells schemes have been affected by prolonged dry periods, whereas pumps have been affected by recurrent flood events. In the absence of a numerical hydrogeological model able to simulate current and projected scenarios of deep intensive water extraction, sustainability of the aquifer may be at risk. The reported cost of deep-water solutions ranges from USD 50,000-70,000 for each community water supply scheme. In addition, due to the high dispersion rate of this population, investment in tubing would be prohibitive. An alternative solution considered for this activity was the investment in community water tanks. However, the high dispersion rate obligated community members to travel long distances (over 30 kms) for basic water access, therefore rules this out.

#### Activity 2.1.2 Provide community water solutions for water vulnerable populations

98. Activity 2.1.2 will use GCF funds to invest in community water supply solution to target an additional 8,560 rural households of La Mojana with no access to water infrastructure. Dispersion rates in these communities (less than 500 meters per household) allow for community based solutions. This activity is focused on ensuring that drinking water supply covers the entire rural population of La Mojana that currently had no access to water infrastructure.
99. Funds for this activity will be used to build 2,514 twenty thousand (20,000) liter rain water harvesting tanks<sup>40</sup> that will be installed in 2,140 households, 334 existing schools<sup>41</sup> in rural areas and 40 buildings that will be built through GoC co financing funds through the NAF (12 health centers and 28 schools). This will ensure that these areas have access to quality drinking water, particularly as they may serve as shelters in case of climate contingencies. The twenty thousand liter tanks to be built in the 2,140 households have been identified by their central location based on geo-referenced data using aerial photography by the NAF and local census. Building each water tank costs USD 2,679 including costs of filters, guttering and rain catchment.
100. The tanks located in households will be communal in nature attending to 16 people per tank, thus providing water for 4 households located within 500m of each other (no more than 20 minutes walking distance). Tanks require approximate 55 m<sup>2</sup> of space as demonstrated through the experience of the Emmaus case study. Ample patio space is available to create stilted roofing structures for these tanks at a household level. In the case of schools and health centers roofing will be adapted by guttering and canals, roofing area of new buildings will allow for multiple tanks to be installed at these locations. First flush filters on all guttering will be included to remove residue that might

<sup>39</sup> Based on estimates from Ekofil and Aquafil companies and the Emaus project that uses local skilled artisans to make these filters.

<sup>40</sup> Carrying capacity is feasible based on the building capacity of soil of La Mojana using exiting information from NAF (soil map).

<sup>41</sup> Calculating 1 tank for school in rural disperse areas and 2L per day per student for a four-month period (120 days).

accumulate on roof of buildings over time. The water tanks will be built by the community themselves with ferrocement with guidance of extension workers (see Activity 4.2). This technique has been used widely in development projects and locally in an area near La Mojana, called Emaus that has documented the building practice and has established technical guidance.<sup>42</sup> The water tanks will be treated (inside coated) through epoxic paint for potable water tanks to ensure tank durability. Maintenance of this tank is minimal and can last over 20 years without any treatment other than annual cleaning. The water tanks will be raised through concrete ringed structures that will allow the individual tanks to be built above projected water flooding levels. Levels will be measured using the existing hydrological water model produced by the NAF.

101. Water management (use and quality) and system maintenance will be agreed upon by the household groupings (4 households) that will receive support from the rural extension program in creating necessary agreements that may be needed to maintain (yearly cleaning of the tank by the community members themselves) these systems as well as to establish water supply protocols. Each family will be provided with their individual 40L water tank and ceramic filter to filter the rain water they use at home. The project will provide water filters for at least 8 years of the project. Filters have an average lifespan of 4 years and are locally made and available.
102. Plastic 40-liter water containers with ceramic filters will also be provided. These have an initial cost of USD 89. These filters have a lifespan of 4 years and replacement filters have a cost of USD 20 when bought commercially. The project will establish long term procurement agreements with a local provider that provides extension service on their use and to ensure cost efficient agreements that may be applicable beyond the scale of the project. To sustain these systems hospitals and health centers will use their own funds while schools will be able to collect a fee from students (a fee per family) that will feed into the community water board system. These arrangements are common in Colombia (usually averaging USD 0.50) and often used to fund raise when improvements are needed to the school.
103. Household groupings and targeted schools and hospitals will also receive the support of the rural extension service (Activity 4.2) on training on system management and water quality monitoring. Support from the knowledge management service (Activity 1.2) will also be provided to ensure that correct governance capacity exists within the community assemblies and to provide assistance in the creation of water boards and to establish community agreements in fee collection and maintenance plans, this includes the support in developing revolving funds to collect fees.

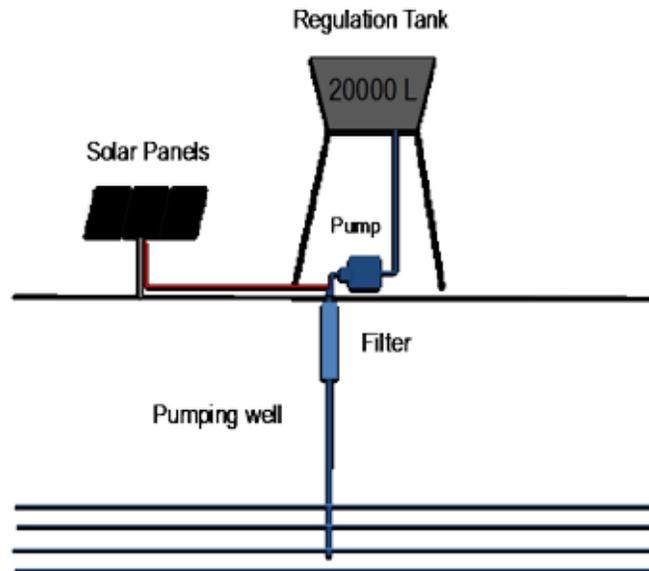
#### Activity 2.1.3. Adaptation of existing water infrastructure solutions in the region.

104. GCF funding will go to reinforce 96 existing mini aqueducts in rural areas in 7 of the most water vulnerable municipalities in La Mojana to withstand climate change induced pressures. These micro aqueducts, that currently provide water to 48,840 people<sup>43</sup>, have been consistently failing due to old pumping and tank systems. This has caused shortages in the daily supply of water required to meet the needs of the communities. Municipalities have stated that each of these aqueducts have been experiencing functional failure for an average of 60 days a year, often leaving communities without water for long periods of time- particularly during the long summer dry seasons when the system reaches over exhaustion. With the increasing needs for water due to longer dry periods, the current systems are becoming more prone to functional failure and increasingly vulnerable to flooding and contamination. Through GCF funding, repairs will be made to these micro aqueducts to ensure that they are more resilient to climate change so as to provide sufficient water according to current and future needs, to better withstand flooding and operate at full capacity. This will include:
  - **Sustainable pumping system:** All fuel/electrical based pumps will be replaced by solar powered pumps that have the required power capacity to extract water during dry periods. Solar panels have been used successfully in the region (see Annex II) and require little maintenance other than cleaning the surfaces. The solar panels have long life spans and few movable parts. Current pumping systems, which form the most common cause of malfunction in fuel/electrical based pumps, represent the highest portion of costs due to over pumping, high electrical consumption and electrical malfunction. The solar panels will provide power for only three hours of continuous pumping which will prevent over pumping and allow time for the aquifer to recharge. In addition, the power produced will allow the tanks to fill up to meet water needs.

<sup>42</sup>Marin Ramirez, Rodrigo (2004). Ibid.

<sup>43</sup> A survey was sent in February 2017 to 7 targeted municipalities to pertain exact figures of targeted populations, which includes 12,120 households or 48,480 people.

- **Climate resilient regulation tanks and filtration systems:** This includes: investments in larger tanks when needed; enhanced well casing to ensure that leakage and contamination are prevented and proofed from projected increases in flooding; the relocation of well screens to ensure higher water yields during prolonged dry periods; the replacement of initial and end caps to prevent surface and deep contaminated water leakage; the installation of new piezometers to assess well efficiency; and the inclusion of an activated carbon filter.



**Figure 4 Scheme of resilient micro-aqueducts**

105. To ensure that the climate adapted mini aqueducts are sustainable for the long term, the GoC will look to the municipalities to ensure funding for maintenance and upkeep (see co financing letters). Municipalities currently spend USD 6, 800 per month in electricity to maintain the current pumping systems.<sup>44</sup> Money saved through solar paneling will allow municipalities to further invest in system maintenance. While communities organize themselves to provide funding for general system maintenance, municipalities are called upon when more difficult structural problems arise (such as replacing the entire water pump or tubing). Total co-financing from the municipal authority for micro-aqueducts and new water supply schemes based on ground water wells is US \$1,000 per year, which will ensure the provision of spare parts and maintenance of the system. This does not include the money that will be saved from solar paneling. This co financing will be complemented by existing water tariffs that are collected by community water boards that are legally mandated to provide system maintenances.
106. Currently, communities are organized to provide funding for general system maintenance through community elected water boards. Households provide USD 1.80 per family per month to cover the costs of system repairs. These are sufficient to ensure the maintenance of the new systems, particularly as energy costs will no longer be incurred. Community water boards consist of 20-40 households located in disperse rural areas. They are in charge of collecting the fees for system repairs. These fees are used to pay for overall supervision of the system, basic system maintenance and for necessary expenditure related to purchasing spare parts and costs of hiring engineers as needed. The project will work with water boards through extension services and access to existing government subsidies (see Annex II) destined for this purpose to ensure that water tariffs are used for direct system maintenance through the development of water board revolving funds that will be housed in formal local financial institutions.
107. Proper maintenance of the micro aqueducts will further be supported through the rural extension service (Activity 4.2) that will provide guidance to community assemblies on how to properly maintain the resilient micro aqueducts. Support will also be provided through the knowledge management service (Activity 1.2) to community assemblies that do not have water boards in order to help them develop water boards and establish community agreements needed for collecting fees, establishing revolving funds to house fees and develop and implement maintenance programs.

<sup>44</sup> Based on consultations with municipalities

**Activity 2.2. Increase the adaptive capacity of natural ecosystems and ecosystems-based livelihoods**

108. GCF funds will be used to prepare and implement community restorations plans for 41,532 ha of the wetlands (lentic ecosystems) as well as to address the main underlying causes of wetland degradation- livestock use and over grazing. GoC co financing funds will restore 50 km of wetland channels to reestablish the natural water flow of the three rivers in La Mojana. Restoration will ensure community participation and ownership through strategies aimed at reincorporating wetlands to their livelihoods. GCF funds will also be used for preparing a guide and prioritization plan for future restoration work by the GoC.

Activity 2.2.1. Establish an integrated wetland restoration plan and monitoring system.

109. GCF funds will be invested in the development of a restoration management plan for the 41,532 ha of wetlands in La Mojana and the development of a monitoring system that measures wetland dynamics (flood pulse and water retention) and water flow in a manner is consistent with the restoration management plan. GoC co-financing from the NAF will go into the restoration of a further 800 ha of wetlands as well as 50km of wetland channels; local environmental authorities will also provide co financing for further areas of wetland restoration that will prioritize wetland channels.

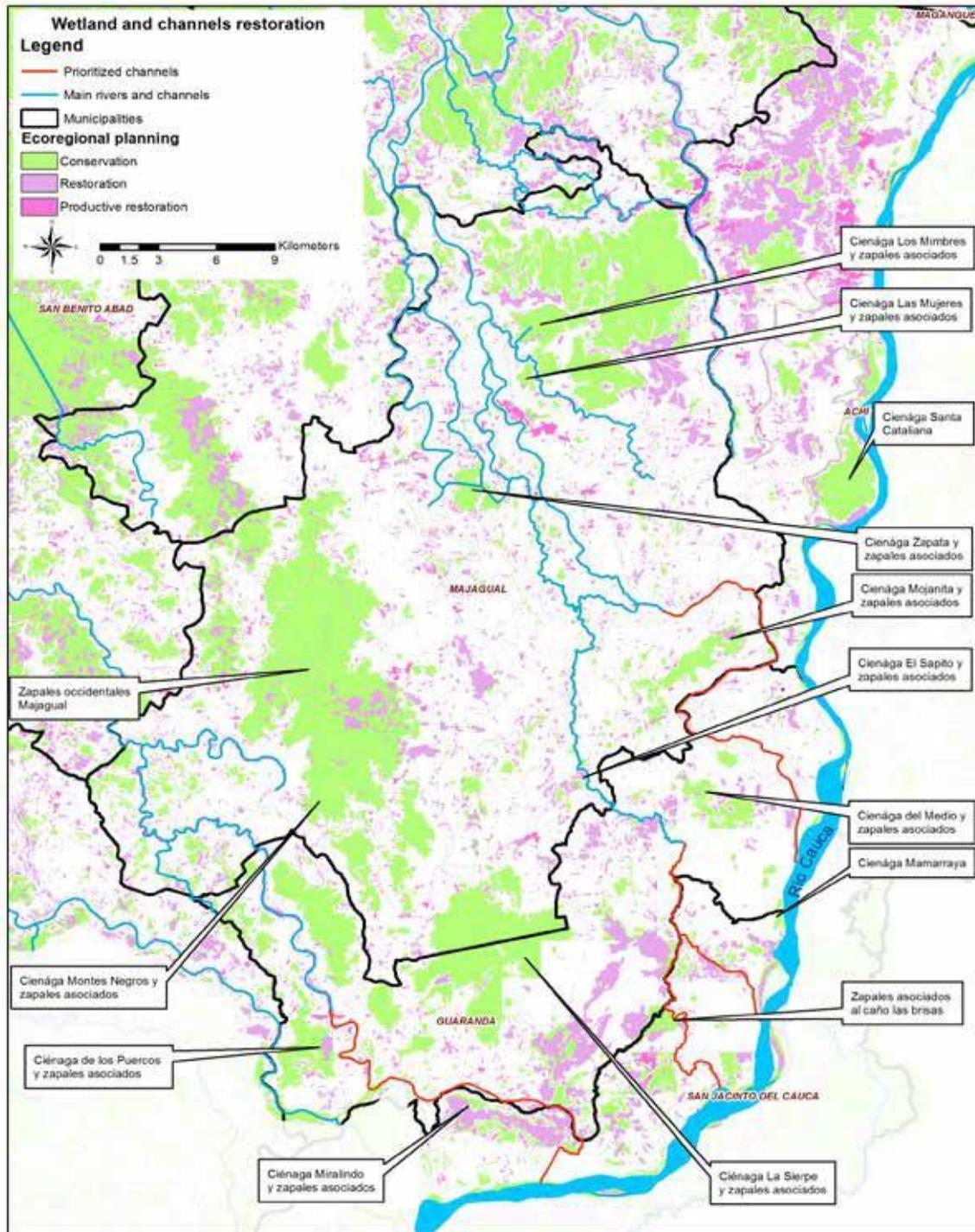
110. The NAF will work with the Ministry of Environment and the Institute for Investigation of Biological Resources Alexander von Humboldt, the research arm of the GoC's National System of Environment (SINA,) and coordinate with the local environmental authorities (Corporaciones Autonomas) to develop a wetland restoration and monitoring plan. The plan will employ a landscape management approach and consultation with communities to guide the recovery of the wetland areas. Rehabilitation efforts will be carried out through the joint participation of local environmental authorities and landowners of the areas selected for rehabilitation. Furthermore, rehabilitation efforts will include the establishment of permanent conservation areas, protection of stream banks and buffer areas, reforestation of the riparian forest, and improvements in connectivity among forest and other ecosystem remnants.

111. Restoration for the 40,000 ha of wetlands will include reforestation and the reintroduction of native species to natural ecosystems that are resilient to both flooding and climate change as well as management actions to reduce pressures and ensure the rehabilitation of wetland functions. Buffer areas will include the establishment of natural (and temporary) physical fencing. Restoration areas will include both *zapa* and riparian forest areas that provide valuable water management services to the region. Direct restorative work will be developed by the communities themselves (Activity 2.2.2) thus ensuring that knowledge of wetland management will be kept within the communities and will be coupled with territorial management. Implementation of the restoration activities will be guided directly by the Ministry of Environment and will act on the lessons learned from the baseline adaptation projects in La Mojana that have successfully employed a four-phase methodological approach for the prioritization, socialization and implementation of restorative actions.<sup>45</sup>

112. The MADS National Restoration Plan has prioritized the restoration of 121,614 hectares of wetlands in La Mojana (see Annex II and below Figure 8). Spatial identification along with community consultation will be used to prioritize more areas for restoration. Satellite imaging has already identified key areas with potential for restoration seen through affectedness from past flooding, potential for ecological connectivity opportunities and evidence of severe transformations due to land degradation and land use change. In addition, the NAF has a hydro dynamic model of the wetlands that evaluates flood pulse and flow which has provided further support in identifying strategic areas (see Annex II). Agreements have been made with the local environmental authorities and the NAF to ensure complementarity of prioritized areas. Through these processes, wetlands in Guaranda, San Jacinto del Cauca, Majagual and Achi have been identified as areas of intervention (See Annex II). Consultation with the communities in close proximity to the wetlands will be approached to prioritize more areas of restoration on the basis of the environmental services provided to the region and to community livelihoods.

**Figure 5 Prioritized wetland restoration areas**

<sup>45</sup> The four phases are: 1) collecting information in areas with restoration potential; 2) analysis of possible conflicts on land tenure and land use in possible restoration areas and prioritize restoration areas based on technical and cultural criteria; 3) socializing and establishing agreements with land owners, designs the most appropriate landscape arrangement for ecosystem restoration and determines the environmental safeguards needed; 4) implementing and monitoring restoration activities in the prioritized areas through the creation of a baseline using indicators measuring wetland dynamics (flow, water absorption, etc).



113. The MADS and the Institute von Humboldt will work to assist affected communities in establishing community restoration plans that include a landscape management approach in areas selected for restoration. This includes targeting specific areas for conservation, areas for sustainable agroforestry and areas for silvo-pastoral activities. A sustainability analysis will be carried out to ensure long term sustainability of the restoration process and to ensure that land tenure conflicts do not arise from restoration actions. This phase will include community outreach directed at collecting local knowledge of wetland management as well as establishing community restoration plans and agreements on long term maintenance and commitments to wetland management. This process has been carried out successfully in a limited number of areas by the MADS-AF project and as such is being used as a best practice

for this process. Guaranda, San Jacinto del Cauca, Majagual and Achi will be targeted as they are located in the prioritized wetland areas. Activities and costs will be agreed on by communities and will form a part of the restoration plan as a formal community agreement.

Community agreements will include the following:

- The names of responsible community leaders and their duties;
- Description of work in quantifiable terms and photography to show the current situation of the work site;
- The total amount of work-hours required to complete the work;
- The means of recruiting local people to undertake the work;
- The tools and materials that will be purchased throughout the program
- The means of verifying the completion of agreed works (before and after photographs)
- The means of verifying the work-hours by establishing a time sheet
- Description of how tools will be distributed in the community after the completion of the works
- The start and end-date of the Community Agreement.

114. The land ownership aspects of these community agreements are supported by a land tenure diagnoses developed by NAF. Based on this, NAF, the National Planning Department and the National Land Agency will build a multipurpose cadaster through government co financing and work to regularize all the land ownership at the eleven municipalities of La Mojana.

115. An estimated one hundred restoration management plans will be enacted (depending on county size and community agreement), each covering an average of 400 ha to cover the full the 40,000 ha of wetland area.

116. The monitoring system created under the restoration plan will be managed and housed by the Institute Alexander von Humboldt which is consistent to their role as the investigative arm of the SINA. An impact evaluation framework will be used within the monitoring system to ensure that wetland impacts are being assessed. Direct monitoring will be enacted by the women's group of La Mojana who will be trained to develop this activity as detailed in Activity 2.2.4 Monitoring will include the use of relevant variables such as changes in plant structure and composition, presence of wildlife, changes in water levels, extent of flooding as well as monitoring of total suspended solids which will allow assessment of changes in sedimentation. Women's groups of La Mojana will be trained to collect the needed samples and record observations on paper and photographic form which will then be collected and housed by the Institute Alexander von Humboldt.

#### 2.2.2 Implementing community restoration plans for integrated wetland restoration plan.

117. Co-financing funds from environmental local ministries and the NAF will be used in the implementation of the community restoration plans enacted under Activity 2.2.1. An estimated 100 integrated wetland management restoration plans will be implemented by communities under the guidance of the Institute van Humboldt. While the MADS and the Institute Alexander von Humboldt may guide the wetland restoration activities, the actual restoration work will be developed by members of the communities themselves. This strategy will: 1) build community ownership of the wetland restoration processes and 2) provide training to the communities on wetland management and restoration practices thus addressing the immediate barriers caused by the lack of technical capacity of communities in water and natural resources management. Community identification for this intervention will be concerted with the regional and local Governments that will identify target communities located in the most strategic wetlands.

118. Each community restoration plan will provide a basis for activity planning. Women's organizations and community members from nearby communities that partook in the planning process will be directly involved. This practice builds upon the successful experiences of the MADS-AF project in which women and children from nearby wetland communities were involved in restoration work. The NAF will work with the MADS and the Institute Alexander von Humboldt to guide the restoration activities and training programs for the involved communities.

119. Estimated costs of implementing a rehabilitation plan based on an integrated landscape approach is US\$58,400.00 which includes: necessary isolation costs (fencing) for conservation areas, planting and maintenance to establish silvo pastoral areas; costs of reforestation, including nurseries; and costs of monitoring. Reforestation and planting in one ha of wetland for restoration is about US\$1,650. Estimated plant density is 2,500 seedlings per ha, including trees and shrub species. Community nurseries of 600m<sup>2</sup> built for each community plan produces about 40,000 seedlings a year during the five-month wet period. The average cost to establishing a community nursery is

about US\$ 2,102, including costs of all materials needed to plant 40,000 seedlings. Implementation of each community restoration plan, which includes the above indicated costs, is estimated at USD 58,400.

120. Co-financing from the NAF will also be used for the restoration of 50kms of wetland channels. This will have the objective of regaining the hydraulic connectivity of wetland channels that have been degraded by reduced precipitation and occurrence of extreme events (floods and droughts), as well as the construction of dams and roads. Channel restoration will be guided on the basis of a prior connectivity study developed by NAF and will ensure full compliance with ESS framework.

#### 2.2.3 Create ecosystem compatible livelihoods.

121. The restoration process provides long term benefits to the communities in La Mojana, it may have an immediate negative impact on livelihoods as access to some areas may be limited. This situation will be managed through the establishment of community consensual restoration plans with a productive landscape approach. In addition, GCF funds will be used to identify best practices in wetland management for agro-productive activities that maintain the natural balance of the wetland, which includes the management of community nurseries for plant supply used in reforestation activities.
122. GCF resources will be used to support an estimated 18,379 people residing in the restoration areas by identifying economic opportunities and best agro-productive practices that are compatible with long term wetland management and are available to the people. GCF funds will thus be employed in conducting market assessments to identify climate resilient livelihood options in line with the community restoration plans such as fishing, harvesting medicinal plants, adapted agriculture and etc. Resources will also be used for consultations with communities, investigation of best practices appropriate for wetland management and analysis of feasibility and market development. Special consideration will be given to economic opportunities led by women (the management of native species nurseries, harvesting and etc.). The assessments will be conducted through a local university (identified through a procurement process), that will act as a service provider to the program in areas of agro-ecosystems livelihood diversification research, in conjunction with the Institute Alexander von Humboldt, who will be leading the restoration activities. Extension and training will be implemented by the agro extension service described in Activity 4.2.
123. These activities will build on analysis of lessons learnt and good practices generated from a number of initiatives and institutions, including the MADS-AF project (specifically in aspects such as wetlands restoration, home gardens, silvopastoral systems, efficient irrigation and water management), Institute Alexander von Humboldt (wetlands restoration and biodiversity, ecosystems services and land use monitoring), Federation of Cattle-ranchers of Colombia (Fedegán) – through its Colombian Sustainable Cattle Ranching project-, and the National Federation of Rice Farmers (Fedearroz)- Through its research and applied programmes on climate, environmental change, soil, water, seed, agricultural work and social aspects.

#### 2.2.4 Enhance women's leadership in ecosystem restoration informed by climate change risks.

124. This activity will contribute to the empowerment of women residing in the restoration areas who undertake activities that promote ecosystem restoration by taking climate change risks into account. GCF funds will be directed towards the designing of curricula, training materials and workshops for approximately 8,526 women who reside in the restoration targeted areas. Through the funds, women's roles in wetland ecosystem restoration, monitoring and incorporating correct wetland management in their home practices will be enhanced. Training and targeting of the women will be done through the 35 existing women's associations in La Mojana, many of which have already been actively establishing nurseries of native plant species for their restoration in the region. The training program will be designed jointly by the Institute Alexander von Humboldt and the National Adaptation Fund and will be implemented by the rural extension institution identified in Activity 4.2. The training provided will be focused on wetland management, including adaptive agro-productive activities, and will include information regarding the environmental services provided by the wetland systems for adaptation (particularly as buffers for flooding) as well as a comprehensive view of restoration activities, its impacts and monitoring. Through this activity, women will have a leading role in the restoration process as well as in subsequent monitoring activities, with a specific role in observing and monitoring the buffer capacity of wetlands in absorbing flood water and in water management (filtering) services. This activity will serve not only as a tool to empower women and the existing women's associations but also as a way to ensure that women have a leading role in protecting the wetland restoration process and policing their use in the future.

#### 2.2.5. Develop code of practice for cattle livestock along the wetlands.

125. Activity 2.2.5 will use GCF funds to address a key driver of wetland degradation and support the long term sustainability of community wetland restoration plans by developing a code of good practices for cattle livestock in wetlands. The code of good practices will include provisions for limited cattle access to wetland restoration areas, processes for defining minimum pasture cover and grazing periods, among others. The code will be self-regulated and will be designed in consultation and through socialization with the 66 cattle associations in the region (such as FEDEGAN). Based on participatory exercises, it will support the definition of a management plan for cattle-ranching in La Mojana, proposal of good practices for cattle ranching (suitable areas and periods for grazing, improvement of pasturelands, silvo-pastoral practices) and provisions to limit cattle access to wetland conservation areas. Enforcement of the code will be through the cattle associations themselves who will generate social pressure for the compliance of their members. This code of conduct will be a useful tool to the Ministry of Agriculture, can be extended for use in other environmental fragile areas in Colombia or can be transformed into a formal normative action after the lessons learned from this programme have been institutionalized.
126. Through this activity the Cattle Ranchers Association will be strengthened to enforce the application of the code and support compliance among their members. The Colombian Sustainable Cattle-Ranching project (lead by Fedegan) will provide technical assistance to the restorations plans based on relevant lessons learned, support the elaboration of the management plan with a territorial/landscape approach specific for La Mojana and will support the implementation of good practices among local farmers. All those activities will be implemented in close coordination with National Cattle Ranchers Federation (Fedegan) in such a way that technical assistance that this organization provides to their members involve best practices for La Mojana and promote agreements to reduce pressure on wetlands. It is important to high light that cattle ranchers recognize that increasing pressure on wetlands affect the productivity and efficiency of their business, so cattle ranchers are willing to implement alternative practices that reduce risks of economic loses.
127. Promoting a landscape approach for restoration would also contribute to reduce pressure of cattle ranching on wetlands. The Project is intended to support local farmers in the implementation of silvopastoral systems and best practices for cattle –ranching, integrated to restoration measures and involved in the proposed community restoration plans (Activity 2.2.1, Activity 2.2.2). These actions will build on existing experiences of the MADS-AF project, which has successfully been promoting cattle ranching best practices integrated to wetland management in close coordination with the Colombian Sustainable Cattle Ranching project lead by the. More details about the Landscape Approach for wetlands restoration can be found in the Section 5.2 of Annex II- Feasibility Study. In order to prevent risks, best practices resulting from the code of practice also will be involved in the integrated rural extension program that will be implemented under Output 4, Activity4.2.
128. Enacting this code of best practices is included as a simple and cost effective solution to address a key driver of wetland degradation, thus ensuring the long term sustainability of wetland restoration. It will also create awareness among large land owners that have not been addressed through the project but whose involvement is important to ensure proper landscape management for the wetlands and continued ecosystemic adaptive functions. This activity will also serve to complement the GoC's efforts to invest in sustainable livestock production through silvo-pastoral strategies in the region. Together these practices will also promote sustainable landscape management for the wetlands.

### **Output 3. Improved Early Warning Systems for Climate Resiliency**

129. **Output 3** will apply GCF funds to enhance the current early warning system through improved monitoring and forecasting capacity, increased hydrological coverage, and the dissemination of regional and productive relevant alerts that are tailored to users' needs and communication channels. Management arrangements for the implementation process will include national government agencies such as IDEAM, the local environmental authorities (Corporaciones Autonomas), and the Regional Forecasting Center that is being created with co-financing from the GoC.

#### **Activity 3.1. Enhancement of EWS**

130. GCF resources will be used to enhance the current early warning system in La Mojana by increasing the region's forecasting capacity through real time data processing from the current stations, enhancing data management capacities and integrating data in the national monitoring system managed by IDEAM and the FEWS network. Funds will also be aimed at enhancing the ability of the networks to develop weather alerts with regional information that is tailored to users' needs and communicated through relevant messaging and communication channels.

Implementation will be managed by MADS, IDEAM and the University of Cordoba, through the Regional Forecasting Center, who will be responsible for system management and operation during and after the life of the GCF project.

131. Funds will be used for capacity building and staffing of expert meteorologists and hydrologists on meteorological, hydrological and climatological numerical modeling, data and signal analysis, building experience in GIS and GDB construction as well as purchasing hydromet equipment and software licensing for data modeling and forecasting. Specifically, funds be used for the following actions:

- **Consolidation of the available climate and risk data for the region:** This action will include the consolidation of hazard and risk maps, the analysis and completion of historical data, the identification of climate variability indicators for rainfall and temperature and consolidation of all available data for La Mojana from national and regional sources in GDB format.
- **Integration of hydrological and regional models:** This includes the construction of meteorological models to improve spatial and temporal resolution forecasts, integrating hydro- meteorological real-time stations, meteorological forecast WRF00 and hydrological and hydraulic modeling of La Mojana into the FEWS-Colombia system, and providing capacity training to local experts on meteorological, hydrologic and hydraulic modeling. These experts will work directly in the regional forecasting center.
- **Installation of automatic hydromet equipment to increase coverage and of forecasting and data processing software:** This includes hydromet and forecasting hard and software to ensure coverage of the 11 municipalities in La Mojana as well as to provide the system requirements to enhance forecasting and real time data monitoring. Investments have been prioritized by IDEAM based on a regional plan created for La Mojana to enhance its regional network. The acquired hydro meteorological stations will be integrated into IDEAM's network. IDEAM will be responsible for their use and maintenance during and after the end of the GCF project. Forecasting software, server and equipment will be integrated into the Regional Forecasting Center that is being established at the University of Cordoba that will be responsible for operation and maintenance during and after the end of the GCF project. Hard and software to be acquired include:
  - i. Three new hydrological stations with rainfall and level sensors, a data collection platform, a Yagi antenna, a satellite transmitter, a solar energy feeding system and protection system with a lightning rod and cabinet construction. Stations will be located as follows: 1 station along the Cauca River between existing La Coquera y Las Varas, 1 station along the San Jorge River between existing Marralú and San Antonio, 1 station along the Caribona River upstream the confluence with the Cauca.
  - ii. Two climatological stations with rainfall, temperature, humidity, atmospheric pressure, radiation, wind speed, path and direction sensors, a Yagi antenna, a data collection platform, a satellite transmitter solar energy feeding system, protection system with a lightning rod and cabinet construction. Locations of the stations are as follows: 1 in the San Jorge basin, 1 in the Cauca Basin.
  - iii. Forecasting software
  - iv. Funds will also be used to refurbish the equipment of two hydrological stations located in the San Jorge River basin to allow the generation of real time data and the integration of the data into the national system. This will be done by changing the water level sensors, adding a rainfall sensor, a Yagi Antenna, a GOES Satellite transmitter, a data collection platform and a solar energy feeding system.
- **Capacity building to generate alert products based on continuous monitoring of all regional stations** (those already existing and those that will be invested through Activity 3.2): This includes the generation of monthly agro bulletins; real time information products; alert bulletins at an hour, daily and weekly basis as well as 1, 3, and 6-month weather and climate prediction bulletins. Capacity building will be geared at training meteorologists within the regional observation center and local environmental authorities (Corporaciones Autonomas) and will be focused on identifying specific alerts and messaging required to address climate and weather information needed by the users.
- **Enhance capacity to reach communities with early alert messaging and ensure actionable results:** This will include consultations with the existing risk management local committees (RMLC) as well as providing capacity building on EWS protocols and mobilization strategies, designing emergency evacuation plans at a community level and providing communication equipment (radio) to the RMLC (11 total) to ensure a direct communication line to community leaders in the case of emergencies. This action

will harness the existing communication network (radio, television) that exists within the Universidad de Cordoba and will become an integral part of the early warning system.

132. Further information on the EWS, technical and budget details are presented in Annex 2H. of the Feasibility Study

**Output 4 Enhance rural livelihoods through climate resilient agroecosystems**

133. **Output 4** is focused on the promotion of agro-diverse and climate resilient crops in the region and the implementation of climate adapted productive practices to enhance rural livelihoods and enable resiliency to future climate outlooks for La Mojana. GCF funds under output 4 will be used for research and implementation of adaptive local agriculture and livestock practices to favor correct water management at a household, productive and landscape level. The output will enable water resiliency in the region to ensure that livelihoods are adapted to climate projections.

**Activity 4.1. Conduct Agro-ecosystems based livelihood diversification research**

134. To support climate-resilient agriculture practices in the region, GCF funds will support research on adapted agro-ecosystems. Local universities (e.g. such as the Universidad de Cordoba and Universidad de Sucre), that will act as a service provider to the project, in consultation with productive associations will be engaged in researching water efficient best practices for adapted agriculture, crop rotation and livestock production adapted to the region and their market impact. Both local universities have the capacity to conduct this activity as they have the research facilities and funding necessary to continue to the performance of this service once the program ends. Both Universities have demonstrated their interest to participate in this project and to continue this program beyond GCF funds. As the selected institution will be receiving GCF Funds for this action, selection will follow UNDP procurement rules to ensure compliance with UNDP criteria. Technical criteria for the identification of the service provider will also be based on their experience working in La Mojana region, as well as their capacity (human and institutional) to provide ongoing support and commitment beyond the length of the GCF project.

135. Investigation will also be made in the identification of local seed varieties that are resilient to flood and drought and that can provide alternative productive livelihoods for the region. Technical information to develop technological packages for best practices will be recorded based on project implementation, systematized for their use in the region and utilized to project possible yields and income derived from their use. Results will be shared among rural extension service providers and financial institutions in the case that they provide loans to the productive associations. Lack of this information has often prevented accurate predictions on yields and risks that are difficult to predict without highly technical inputs.

136. To ensure that local knowledge, particularly that associated to indigenous groups, is collected and built upon, the service provider will be instructed to support directly at least 9 indigenous associations (cabildos) to lead collection of local knowledge and identification of traditional productive practices relevant for climate change adaptation as well as to facilitate, with GCF funds, the in-field testing of those production practices in their communities. In field experimentation will be led by the cabildos (indigenous associations) in their own communities and fields under the guidance of the service provider (to ensure scientific standards), who will then work to record and systemize the information. Through this effort the project will promote local knowledge as well as provide a forum to rescue traditional adaptive practices and create an opportunity for local communities to define their own adaptive solutions.

137. An agroproductive territorial management map that will support improved landscape and water management in La Mojana will be developed. Information derived from this activity will be structured in technological packages (set of best practices) to guide the information disseminated through the climate resilient agriculture extension service (Activity 4.2). A partnership will be formalized with the government Unit for Rural Agro Livestock Planning for long term sustainability and impact as well as with FEDEARROZ and FEDEGAN.

**Activity 4.2 Improve rural extension for climate resilient adaptation and production.**

138. GCF resources will be used to design and implement an integrated technical assistance programme through extension services targeted to train a minimum 17,000 to 20,000 local producers to cover the 17,722 Agricultural Production Units recorded in the last agricultural census. Extension services will include water supply practices, wetland restoration, agro-ecosystems and early warning systems as well as promoting and socializing the best practices and research identified through Activity 4.1 for the diversification of agroecosystems. GCF funds will also be used to tailor the extension program to support the maintenance of water supply schemes identified in Output 2 as well as to support beneficiaries of the home gardens who will be implementing Activity 4.3.

139. The technical assistance programme will be provided by a local university (such as the Universidad de Cordoba, Universidad de Sucre) or research institute that will act as a service provider to the project. As they will be receiving GCF Funds for this action, selection will follow a competitive tender process that prioritizes local learning centers and ensures that all bidders must comply with UNDP criteria. Technical criteria for the identification of the service provider will also be based on their experience working in La Mojana region, their experience providing rural services, their level of expertise in rural productive development (a nationally recognized school or program associated with the institution that specializes in productive rural development) as well as their capacity (human and institutional) to provide ongoing support throughout the length of the GCF project.
140. The rural extension programme will use a farmer field school approach that implements participatory methods in which the land users have the opportunity to learn about specific crop production problems and solutions through their own observation, discussion and participation in practical learning-by-doing in their own land/parcels. Curricula development will be in association with agriculture associations, communities, women's group and indigenous *cabildos*. Its design will be based on the following analysis to be conducted as part of this activity: i) characterization of target areas and activities ii) assessment of target potential beneficiaries, their needs, and local extensions workers. This assessment will allow the formation of rural extension units (REU), which will group a number of municipalities or farmer associations depending on the characteristics of the territory and needs for facilitation in training implementation and execution of capacity building activities. The service provider will be in charge of creating and implementing participatory capacity building plans targeted for each REU based on their needs (per activity) and special circumstances. An REU tailored for indigenous peoples will be implemented in indigenous communities to ensure that training and capacity building considers traditional knowledge and best practices related to climate change adaptation. The extension work will complement GoC's efforts and government co-financing to provide productive extension services for rice and cattle production to larger productive units.
141. The service provider will work with the information produced in Activity 4.1 and will work with the community leaders and productive associations to provide training on how to implement best practices for correct water management in the region, and how to use of climate resilient crops and adapted agriculture techniques appropriate for La Mojana. This will ensure that not only communities receive training but also that local extension officers are created, thus enhancing local field capacities and life time of the project.

#### **Activity 4.3 Improve water resource management in vulnerable households for food production systems**

142. This activity will support the establishment of home gardens as sustainable household food systems to reduce household vulnerability during extreme events such as floods and droughts. These gardens will not only address immediate household climate vulnerability but will also diversify food consumption in the region thus addressing region wide climate vulnerability. The gardens will be built using techniques to reduce drought risks (such as irrigation, soil and water conservation and agro-ecological practices), as well flood damages (such as using elevated garden beds or linear dikes). Through the use of water efficient practices such as drip water irrigation and the re use of grey water, households will be ensuring correct water management to address the water scarcity in the region. In order to meet the demand of water hungry staple crops at a household level, households with enough means are currently digging illegal wells to compensate for water shortages thus exacerbating ground water sources. This activity prevents this phenomenon by building upon an existing best practice implemented by the NAF through the MADS-AF project in three municipalities of La Mojana. The experiences from the MADS-AF demonstrate benefits both in household income and health (due to greater variety of food). For further technical details of adaptive home garden techniques please see Annex 2J in the Feasibility Study (Annex II to the FP)
143. Through the GCF project, the experience from the MADS-AF will be up scaled to include 4,878 households located in rural disperse communities that in turn have been identified as the most water vulnerable (Activity 2.1.1).

##### Activity 4.3.1. Improving household water use for climate resiliency.

144. Rural disperse households will receive a home garden preparation kit that includes material to prepare a homemade filter made of sand, clay and gravel to enable the reuse of household grey water and soil to elevate the garden beds and provide plastic covering to make them resilient to floods, crop shading and mulching. This will prevent evaporation of water and the fitting of recycled hoses and sprinklers as irrigation pipework. Support from the rural extension program will be provided through activity 4.2 to guide households in the preparation of their home gardens including the creation of filters and treatment of grey water for irrigation. These technologies are simple and require little maintenance. The initial capital cost will be provided through GCF funds to facilitate uptake; however,

the cost of maintenance will be the responsibility of the households themselves. It should be noted that the experience from the MADS-AF has shown that the total cost of the gardens is offset by the households after the first year as a result of extra income from trading or selling the planted crops as well as by the reduction of food expenses.

Activity 4.3.2 Enable crop diversification for climate change resiliency.

145. This activity will be focused on establishing nurseries, fields and seedbanks for crop research of local seeds and varieties to their resilience for climate change and their suitability for home gardens. Research will be focused on collecting, testing, and systemizing best agricultural practices for home gardens including the creation of dry gardens (through mulching and drought resilient crops), implementing methods to address soil fertility through soil treatment or the planting of leguminous trees and other barriers that have been faced in various parts of the region.
146. Research and investigation will be conducted through the use of the service provider for Activity 4.1 and through community engagement (community producer associations), particularly women and indigenous groups (*cabildos*) who are already actively creating local nurseries to ensure seed provision. The promotion of best practices and knowledge exchange among the households will be implemented through the service provider in charge of Activity 4.2.
147. Research activities will include:
- Identification of native crops to be prioritized through this initiative based on their value (nutrition, local preferences and diet) to the community as identified through household surveys and their potential economic value as well as to their resiliency to flood and extended dry periods. Crop identification should also be sensitive to the specific conditions of each district within La Mojana to ensure local solutions.
  - Replication and in field testing of best practices and their endurance to extended dry seasons and flood conditions as well as temperature increase. Information will be collected on productive techniques and costs, resiliency, yields and environmental impact.
  - Systematization of the information produced through the infield testing through the creation of technological packages and manuals and information targeted at rural extension workers, productive associations, rural financial institutions, rural development practitioners and communities.
148. The research will test and build upon the anecdotal experiences, local knowledge and best practices that have been identified through the MADS-AF home garden program so that they may be packaged and up scaled throughout the region. This includes highly specific information needed for planting and to predict projected yields for each crop variety.
149. To ensure that local knowledge, particularly that associated to indigenous groups, is collected and built upon, the service provider contracted through Activity 1.2 will support directly at least 9 indigenous associations (*cabildos*) to lead the collection of local knowledge and identification of traditional productive practices relevant for climate change adaptation as well as to facilitate with GCF funds the in-field testing of those production practices in their communities. In field experimentation will be led by the *cabildos* (indigenous associations) in their own communities and fields under the guidance of the service provider (to ensure scientific standards), who will then work to record and systemize the information for replication. Through this effort the project will promote local knowledge provide a forum to rescue traditional adaptive practices and create opportunities for local communities to define their own adaptive solutions.

#### **C.4. Background Information on Project / Programme Sponsor (Executing Entity)**

150. The National Adaptation Fund (NAF) is a public entity ascribed to the Ministry of Finance. It is responsible for the execution of comprehensive risk management projects and adaptation to climate change in regions where the most vulnerable populations in Colombia live. The Adaptation Fund was created in 2010 in response to the 2010-2011 "La Niña" phenomenon, the worst rainy season that Colombia has suffered in its history. The NAF has the mandate to structure and implement integrated projects for risk reduction and adaptation to climate change, in order to strengthen its competencies and contribute to reducing fiscal vulnerabilities of the State. Public investments executed by the Adaptation Fund are long term, with an annual execution of 1.2 thousand million pesos (around USD 430,000). The Fund's activities focus on disaster risk mitigation to avoid and reduce damage from similar or larger events over the next 50 to 100 years, reducing fiscal costs to rebuild public infrastructure and social and economic impacts.

151. The Adaptation Plan of La Mojana (Action Plan) is one of the NAF strategic projects which aim to reduce risks in eleven municipalities in the region through the management of water resources and the adoption of structural and non-structural measures. Additionally, a public policy document is being drafted which will help to frame all investment resources in La Mojana with the articulation of the national government and regional and local authorities so that the continuity and sustainability of the development model adapted is guaranteed.

152. The Action Plan, led by the National Adaptation Fund, is articulated to the SISCLIMA. The Finance Ministry, under which the Adaptation Fund lies, together with the Ministry of Environment (MADS), the Ministry of Agriculture, the Ministry of Energy, the Ministry of Transportation, the Ministry of External Affairs, the Ministry of Internal Affairs and the Department of National Planning (DNP), conform the Inter-sectorial Committee that is one of the consultative organs of the SISCLIMA. The committee has local nodes (inter-institutional consultation committees at a local level) that include the local environmental authorities (Corporaciones Autonomas) to ensure that planning and decision making is articulated in a coordinated manner with national policies. Hence, the project will be benefited through this national and local coordination structure.

153. The Adaptation Fund is currently executing one of the baseline projects in La Mojana, as well as coordinating with other donor agencies such as UNDP other activities and projects. For the proposed project, the Adaptation Fund will be in charge of the management and execution of the project, given its experience in Colombia with these type of projects.

### C.5. Market Overview (if applicable)

154. Not applicable

### C.6. Regulation, Taxation and Insurance (if applicable)

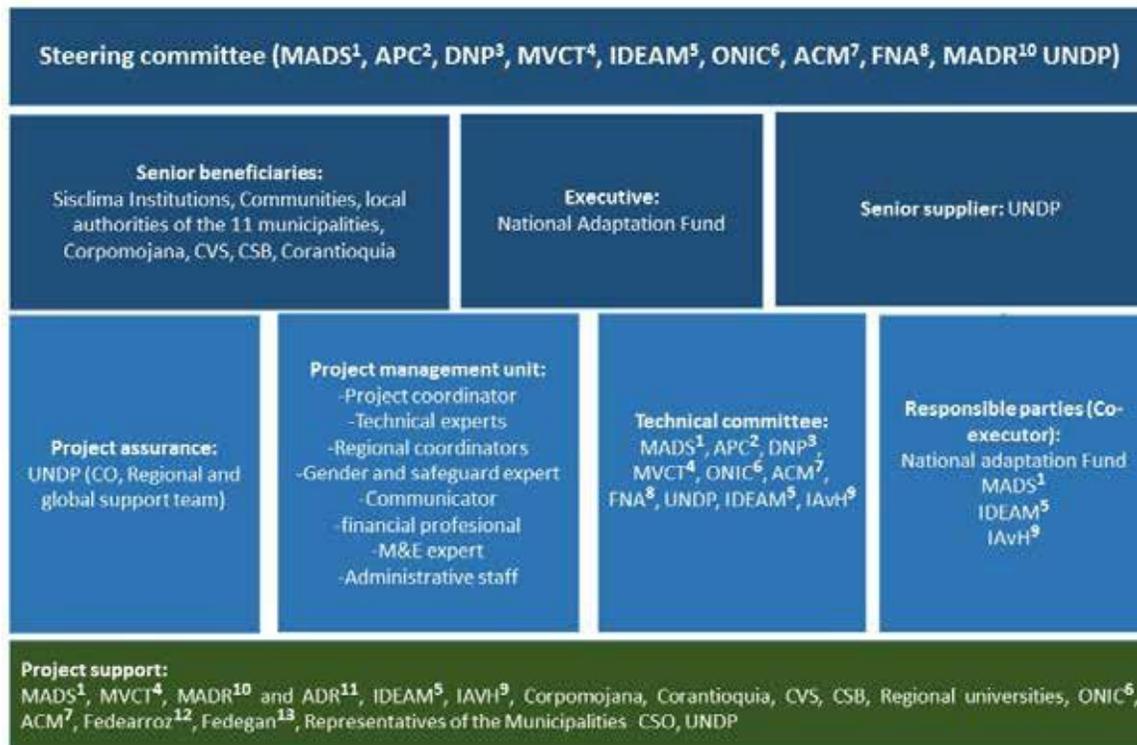
155. The Government of Colombia has signed a Standard Basic Assistance Agreement (SBAA) with UNDP. Under the SBAA, taxes are not applicable. Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter alia, that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for utilities services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. If the services are procured directly by the Adaptation Fund, then the national procedures apply, which entail the payment of the value-added tax (IVA) amounting to 16% where applicable.

### C.7. Institutional / Implementation Arrangements

156. The project will be implemented following UNDP's Support to National Implementation Modality (NIM), according to the Standard Basic Assistance Agreement (SBAA) signed in 1974 between UNDP and the GoC, the Country Programme Document, and policies and procedures outlined in UNDP's Programme and Operations Policies and Procedures (POPP) (see <https://info.undp.org/global/popp/ppm/Pages/Defining-a-Project.aspx>). The national executing entity - also referred to as the national 'Implementing Partner' in UNDP terminology - is required to implement the project in compliance with UNDP's rules and regulations, policies and procedures (including the NIM Guidelines). In legal terms, this is ensured through the national Government's signature of the UNDP SBAA, together with a UNDP project document, which will be signed by the Implementing Partner to govern the use of the funds (once the funds are secured).

157. The management arrangements for this project are summarized in the chart below<sup>46</sup>

<sup>46</sup>1: Ministry of environment and sustainable development 2: Presidential Agency for International Cooperation 3: National planning department 4: Ministry of housing 5: National institute of hydrology, meteorology and environmental assessments 6: National Indigenous Organization of Colombia 7: Presidential Council for women's equality 8: National Adaptation Fund 9: National institute of biological resources research "Alexander von Humboldt" 10: Ministry of agriculture 11: Agricultural development agency 12: Rice producers federation 13: Cattle Farmers Federation



158. UNDP provides a three – tier oversight and quality assurance role involving UNDP staff in Country Offices and at regional and headquarters levels. The quality assurance role supports the Project Board by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. Project Assurance must be independent of the Project Management function; the Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. The project assurance role is covered by the accredited entity fee provided by the GCF. As an Accredited Entity to the GCF, UNDP is required to deliver GCF-specific oversight and quality assurance services including: (i) Day-to-day oversight supervision, (ii) Oversight of project completion, (iii) Oversight of project reporting. The 'project assurance' function of UNDP is to support the Project Board by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. The 'senior supplier' role of UNDP is to represent the interests of the parties that provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing). The senior supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project

159. The Implementing **Partner** for this project is the National Adaptation Fund (NAF). As stated in Financial Regulation 27.02 of the UNDP Financial Regulations and Rules, an implementing partner is "the entity to which the Administrator has entrusted the implementation of UNDP assistance specified in a signed document along with the assumption of full responsibility and accountability for the effective use of UNDP resources and the delivery of outputs, as set forth in such document." By signing a project document an implementing partner enters into an agreement with UNDP to manage the project and achieve the results defined in the relevant documents. The accountability of an implementing partner is to:

- Report, fairly and accurately, on project progress against agreed work plans in accordance with the reporting schedule and formats included in the project agreement;
- Maintain documentation and evidence that describes the proper and prudent use of project resources in conformity to the project agreement and in accordance with applicable regulations and procedures. This documentation will be available on request to project monitors (project assurance role) and designated auditors.

160. The NAF is accountable to UNDP for managing the project, including the monitoring and evaluation of project's interventions, achieving project outcomes, and for the effective use of UNDP resources. UNDP, in agreement with the GoC, will provide extensive implementation support (support to NIM) as agreed in the letter of agreement (LOA)

signed between NAF on behalf of the GoC and the UNDP. UNDP will also provide oversight through the Country Office in Colombia, and BPPS/UNDP Global Environmental Finance Unit in Panama and HQ.

161. A Responsible Party is defined as an entity that has been selected to act on behalf of the implementing partner on the basis of a written agreement or contract to purchase goods or provide services using the project budget. In addition, the responsible party may manage the use of these goods and services to carry out project activities and produce outputs. All responsible parties are directly accountable to the implementing partner in accordance with the terms of their agreement or contract with the implementing partner. Implementing partners use responsible parties in order to take advantage of their specialized skills, to mitigate risk and to relieve administrative burdens. The following institutions will work with the NAF and Responsible Parties during the implementation of the project to guide activities: Ministry of Agriculture and Rural Development and the agencies that are part of this Ministry such as the Agency for Rural Development, Biological Research Institute Alexander von Humboldt (IAvH), Environmental Autonomous Corporation<sup>47</sup> (Carsucre, CVC, Corpomojana, Corantioquia, Cardique), the associations of productive sectors such as rice, livestock and fisheries, Departamento de Prosperidad Social (DPS), Paisajes Rurales and the UNDP.
162. **The Project Management Unit**, will have one national coordinator and four regional coordinators. There will be a team of technical experts to support the correct implementation of each component at the local and national level and to liaise with responsible parties for each output also one expert supporting the knowledge management and monitoring and reporting tasks. There will be also a gender and safeguard expert, a communications specialist, and a team for supporting administrative, procurement and financial tasks.
163. The **Project Board** will be comprised of representatives from the Ministry of Environment and Sustainable Development, Presidential Agency for Cooperation, National Planning Department (that acts as the Colombian DNA-Designated National Authority, Climate Change Secretariat), Ministry of Agriculture and Rural Development, Ministry of Housing, Cities and Territory, Institute of Meteorology and Environmental Studies (IDEAM), a Representative of the Indigenous People from the National Organization of Indigenous (ONIC), National Council of Women Rights, the National Adaptation Fund and UNDP. As the Senior Beneficiary, the implementing partner is part of the board and the Manager of the NAF will chair the board. Furthermore, as the Senior Supplier, UNDP will be part of the board and provides quality assurance for the project, ensures adherence to the NIM guidelines and ensures compliance with GCF and UNDP policies and procedures. There could be invited as observer representatives from each responsible party. The Project Board<sup>48</sup> is responsible for making, by consensus, management decisions when guidance is required by the Project Manager. Project Board decisions will be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case a consensus cannot be reached within the Board, final decision shall rest with the UNDP (represented by the UNDP Programme Manager). The Project Board will meet at least twice year or more as needed.
164. A Technical Committee (TC) will be comprised of representatives in a technical level of the same institutions that are part of the steering committee (MADS, APC, DNP, MVCT, IDEAM, ONIC, ACM, FNA, MADR, UNDP), Project Team and relevant technical agencies could be also invited (Humboldt Institute, Rural Development Agency, CSO). The TC will be delegated to provide more regular and periodic (quarterly) guidance and implementation support to the PMU. It will advise the UNDP about the quarterly disbursements to the NAF or any responsible party under support to NIM modality, against the achievements of the planned activities. UNDP will participate in sub-committee meetings in its oversight capacity as and when needed.
165. The **Project Manager** will run the project on a day-to-day basis on behalf of NAF and the Responsible Parties within the constraints laid down by the Project Board. The Project Manager function will end when the final project terminal evaluation report and other documentation required by the GCF and UNDP has been completed and submitted to UNDP. The Project Manager is responsible for day-to-day management and decision-making for the project. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The annual work plan is prepared by the Project Manager and reviewed and approved by PB. However, the final approval is provided by the Sustainable Development Programme Specialist at the country office, the Regional Technical

<sup>47</sup> Local environmental authorities (Corporaciones Autonomas)

<sup>48</sup> Sample ToR for Project Board: [http://cfapp2.undp.org/gef/documents/1/g5710/g2\\_20672/PIMS3603TORProjectBoard.pdf](http://cfapp2.undp.org/gef/documents/1/g5710/g2_20672/PIMS3603TORProjectBoard.pdf)

Advisor, Global Environmental Finance Unit of UNDP as part of the quality assurance role. The Project Manager is also responsible for managing and monitoring the project risks initially identified and submit new risks to the project board for consideration and decision on possible actions if required and update the status of these risks by maintaining the project risks log according to the NIM Guidelines.

166. Local stakeholders and community members have a key role in the implementation and monitoring of the project. During the inception phase of the project, NAF working together with UNDP, will consult with all stakeholders, including vulnerable community members, CSO, academia, etc. and facilitate an understanding of the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The project's logic framework (indicators, means of verification, assumptions) will be reviewed and the quarterly and annual plans will be refined engaging the communities from the targeted regional clusters (municipalities). The stakeholders will also be engaged during the mid-term and final evaluations to assess the progress of the project and enable adaptive project management in response to the needs and priorities of the communities.

### C.8. TIMETABLE OF PROJECT/PROGRAMME IMPLEMENTATION

Please provide a project/programme implementation timetable in [section I \(Annexes\)](#). The table below is for illustrative purposes. If the table format below is used, please refer to the activities as numbered in Section H. In the case of outputs, please mark when all the required activities will be completed.

See Annex X.

## D.1. Value Added for GCF Involvement

167. GCF resources are vital to allow GoC to meet the additional costs of climate change while realizing paradigm shift in managing flood and drought related risks at the territorial level. The GoC through the NAF has prepared the Climate Change Action Plan for La Mojana which envisions a radical change from past retroactive risk management actions that had solely focused on flood protective infrastructure and ultimately proved to be inefficient and counterproductive. The present model and that is reflected in the La Mojana Action Plan is an integrated preventive approach to risk that combines adaptive infrastructure with resilient water supply, agricultural productive activities, restoration of wetlands for enhanced ecosystem functions, and effective EWS combined with institutional strengthening. For this purpose, GoC and NAF has allocated 134M USD as baseline funding to cover the immediate adaptive infrastructure investment, but it is only through additional GCF funding combined with NAF co-financing that the envisaged integrated and holistic model can be implemented, thus covering the other intervention areas mentioned above. This is Colombia's first proposal to GCF, thus it will provide an important modality for GoC's effort in ensuring climate-resilient territorial development. In the territorial context, La Mojana is a key region for the country to address urgent adaptation needs, given the high levels of vulnerability that are coupled with poverty.
168. While the MADS-AF project has been implementing adaptation measures in the envisaged adaptation topics, its outreach is limited only to 3 of the 11 municipalities and only part of its vulnerable population. Therefore, GCF funds will be critical in:
- Scaling up resilient solutions for the provision of safe and year-round water supply
  - Scaling up rehabilitation of wetlands and their hydrology in the target area as a means to reduce risk to flooding and drought associated with climate change and variability;
  - Strengthening climate change-resilient agroecological practices that enable local communities to reduce their vulnerability to the impacts of climate change;
  - Strengthening existing hydroclimatological and environmental information system for use by local and regional stakeholders;
  - Strengthening the capacity of relevant institutional and social structures in the provision of extension services in support of climate resilient field practices and for mainstreaming climate risk management and adaptation measures into planning and decision-making processes.
  - Promoting a vision for community based adaptation and social cohesion in areas heavily isolated by conflict thus enabling the GoC's effort to fully integrate these areas
169. The GoC is investing considerable resources country-wide through national policy and investment frames such as the National System for Climate Change (SISCLIMA), the Contract and Peace Plans. With the support of GCF funds, the project will reach out to the most vulnerable and poorest regions in the country and direct investments will target the most vulnerable population of La Mojana, directly benefitting 203,918 people (basically its total rural population), improving resilience of vital amenities, water and food security.
170. GCF support will address a range of financial, technical and institutional barriers that impede the realization of the envisaged integrated territorial development model with climate risks mainstreamed including: maladapted water infrastructure to floods and prolonged dry periods; limited capacities and knowledge for treatment of potable water at household and local level; limited access and availability of alternative sources of water for vulnerable households and communities; limited access and awareness of early warning services, climate variability and risk information; and limited capacity (technical, financial) of communities and local government on water and natural resources management. Financial limitations are due to a situation of precarious institutional development, manifesting in low capacity and low resources of Municipalities and of the Regional Autonomous Corporations (CAR in Spanish) to fulfil their mandates, in a dominantly informal economy context and low level of property, industry and trade tax to support public functions. The project and border programme will help to improve this situation- e.g. through strengthening producer associations and upmarket linkages- and to support municipal level development planning processes- e.g. to ensure that needed O&M costs of adaptation investments are incorporated in budgetary planning.
171. Finally, this integrated territorial model implemented through GCF support has very high replication potential in other regions of the country, as it can be promoted and attached to national level development frames, such as the Contract and Peace Plans and the National Adaptation Fund and can harness existing territorial planning

frameworks such the Watershed Zoning and Management Plans (POMCAS) and municipal level Territorial Zoning/Landuse Plans (POTs). Potential sites for replication include hydrological systems at the immediate downstream area of La Mojana towards the Caribbean coastal area. The Mojana model also has broader replication potential in regions and departments in Colombia with similar tropical climate and associated climate induced risks for development.

172. Given that public funding from sources such GCF are scarce and need to be used only when necessary, assessments were conducted for all the above-mentioned activities without GCF grants. In this case, the grant requested from GCF is replaced with high cost micro-credit from the domestic Micro Finance Institutions. It was clearly demonstrated that except for Activity 4.2.1, all the other activities were not financial viable. The scenario analysis also pointed out that even with the assumption of significantly improved benefits or significantly reduced costs, the project was not turning out to be financially viable. This clearly demonstrates that the GCF grants are not just additional to GoC co-financing, but are also very integral in achieving financial viability and operational sustainability for the activities mentioned.

## D.2. Exit Strategy

173. The proposed project has been designed in close consultation with and involvement of relevant government agencies at the national, regional and local levels, as well as with community based organizations in the target area of La Mojana. These consultations and discussions (detailed in Annex XIII), combined with tried and tested models for improved and resilient water management that are detailed out in the Feasibility Report (Annex II) provide the project with a sound approach and suite of interventions which are implemented with strong community participation and engagement of local officials. Building on this foundation, the project ensures that the investments as well as the results of the interventions are sustained beyond the project period and in the longer-term through the following elements of project design and implementation.
174. A key innovative feature of the project is the strengthening of associative capacities of community and farmers' through participatory approaches. This represents key arrangements towards longer term sustainability and replicability of the adaptation measures introduced at community level. Output 2 of the initial project will manifest in establishing and strengthening community water associations for the operation and maintenance of the rainwater harvesting and storage facilities and the micro-aqueducts. These water associations will be attached to existing community governance structures and elected from community members by the assembly of Communal Action Committee, and as part of an O&M manual it will define minimum charges (according to economic possibilities of the community) to cover costs, the formalization of these through community revolving funds that will be housed in local financial institutions, as well as support arrangements harmonized between the community associations and the municipalities. Associative and co-management arrangements will be promoted also for the longer term and sustainable management of wetland conservation efforts, involving local communities and landlords, and the application of a code of practice for livestock
175. The longer term sustainability of the project investments will be assured through a combination of elements and mechanisms that builds ownership and the technical, financial, operational and institutional capacities of the national and sub-national governments and local communities to maintain and derive economic, social, environmental benefits from the proposed investments:
- Leveraging co-investments by the National Adaptation Fund and considerable community co-investments for the proposed activities in the installation and O&M of water solutions, home gardens and wetland restoration processes. The project will thereby promote ownership and catalyse further public sector financing to sustain activities beyond the project lifetime
  - Building on and further strengthening the community associative structures rooted into existing community governance frameworks, such as the Community Action Groups and community water boards, will have a key part in O&M functions of the decentralized water supply solutions to be introduced and wetland conservation efforts as well as the producer associations that will give continuity to the agricultural livelihood related measures. Under the MADS-AF projects, community councils and dialogue platforms (roundtables) were created and can be replicated and harnessed for longer term sustainability of the acquired community's capacities.

- Establishing a regional interagency water board, through the GoC's co-financing contribution, will serve as an interagency planning mechanism to ensure that all planning decisions (economic, development, infrastructure) streamline water management impact and use in the region for the long term.
- Building partnerships with regional and national Universities and Research Centres for the long term and continuous provision of training programmes, supported through the development of training materials, and knowledge management and communication actions of the propose project. These partnerships will also support institutional functions, such as the provision of climate early warning information, e.g. through the envisaged Regional Forecasting Centre, to be operated through the University of Cordoba, or the provision of support to wetland monitoring functions by the Institute for Investigation of Biological Resources Alexander von Humboldt
- Building on traditional systems with innovative climate-resilient technologies and best practices, particularly considering the traditional knowledge of use and management of wetlands and natural wetland channels, or the operation of micro-aqueducts and home gardens that will be enhanced with adaptation techniques and technologies, in order to continue to operate these for recurring benefits that will ensure operational and financial viability beyond the project period;
- Promoting entrepreneurship among communities and producer associations to deliver a suite of new technologies for water resilient agriculture and agro-ecosystems, drinking water and climate information. The project will particularly target women as stewards of wetland restoration, home gardening and water supply functions, which will increase livelihood options and income sources that will enable financial viability and impact of the project beyond its lifetime.
- Supporting institutional capacities of regional and municipal authorities to ensure O&M costs are budgeted into municipal and regional development plans, while territorial planning instruments (POMCAS, POTS) will ensure systematization of wetland conservation processes.
- Promoting low maintenance technological solutions through the project to ensure that O&M costs are minimal requiring little else than manual effort (cleaning of tanks, maintenance of home gardens). This will be linked to considerable technical support to communities to ensure that they have the capacities to maintain these solutions and ensure their quality.

176. The following O&M arrangements are built into the project design. Systematization of knowledge on long term climate-resilient water management solution, health and water quality monitoring and alert system and agroecosystems livelihood diversification (Output 1)

177. The information base and knowledge generated through these studies and assessments will be crucial for the NAF and the National Planning department to give continuation to this first project through the formulation of the other three envisaged and sequenced project for long term and integrated solutions towards climate resilient management of water resources, related productive sectors and health conditions in La Mojana. The studies conducted under Activity 1.2 will be integrated into IDEAM's data management system in order to complement the EWS for air and water quality. These studies will be accompanied by training activities that will support longer term institutional capacities in these areas. The knowledge management program and data bank to be set up through Activity 1.4 will be managed by NAF in coordination with the University of Cordoba and University of Sucre, as well as the Presidential Cooperation Agency (with a key role of continued dissemination of lessons and good practices and fostering South-South cooperation). The Ministry of Environment and Sustainable Development, under the Climate Change Division is also a beneficiary of this information and will use it for the formulation of different public policies. The training materials will be used for the implementation of the Integrated rural extension program for climate change adaptation described in Output 4.

178. Resilient water supply solutions - rainwater harvesting and micro-aqueducts (Output 2)

Equipment will be sourced with low-maintenance and long life considerations. Longer term O&M functions will be sustained by households themselves as well as by municipal authorities. In the case of community solutions, these are comprised of small household groupings (4) that will collect a small fee from users to cover maintenance costs, the project will work with the groupings to establish water boards and develop revolving funds as mechanism to house water collection fees from which O&M costs will be sourced. Municipalities will provide O&M budget for spare parts and bigger

repairs as needed (e.g. tanks, solar pump, wells). Community water boards and associations also exist and have the capacity and experience to collect small fees.

179. Wetland restoration (Output 2)

Long term maintenance of restored wetlands will be carried out by local community-based association and women groups, which will be trained in managing nurseries and related activities, so that they can continue future restoration projects in the area. The process will promote a landscape productive approach to restoration and wetland management that will ensure that livelihoods will not be substantially impacted or may be complemented through creating alternative livelihood options as incentives such as ecotourism, fishing and handicrafts from non-timber products. It is expected that Regional Environmental Authorities (Corporación Ambiental Regional -CAR) integrate restoration strategies as part of their three-year term plans and continue with the restoration process, supported by local communities aware of the importance of this activity and trained to continue leading local processes. The code for livestock production, to be developed through the project and the silvo-pastoral support to livestock producers to be financed through GoC co-financing will also serve to support wetland conservation against unsustainable livestock practices.

180. Wetland channel reconditioning (Output 2)

Wetland reconditioning will be supported by Communal Action Groups, especially by women, fishermen and boat owners as main beneficiaries. A very small fee will be collected from the stakeholders and beneficiaries to support minor O&M to be carried out by the communities such as periodic vegetative material removal. Labour force from the community is expected to develop these activities. Municipal and regional environmental authority will invest resources to ensure the provision of machinery (backhoe), if needed, as is the current practice.

181. Early Warning System (Output 3):

The current practice is that hydro-climatological stations are integrated into IDEAM's hydro-climatological network. O&M costs and functions of the new stations acquired by the project will be taken care of by IDEAM and also by the University of Córdoba and the CVS that will use the information collected. These institutions will then invest resources to ensure the provision of spare parts and maintenance in general as is the current practice. The information produced by IDEAM will be disseminated to the communities during and beyond project cycle through the local authorities as well as the local emergency committees based in each municipality.

182. Home gardens (Output 4):

As per current practice, home garden operations have a strong community component, in which main actors from the Community Action Groups and women have a very important role. While men's role will be important for setting up the gardens (physical work in preparing beds, fencing, elevated structures), women will have the key role of cultivating and maintaining the gardens. Women will be supported by capacity building and extension program to adopt the above mentioned techniques through learning by doing approach. The project will additionally provide communities with start-up training on best practices, including operations and maintenance processes and techniques, and will articulate the results of this program with the expected phase 2 of the project which will focus on more resilient agro-ecosystems. Low maintenance practices are preferred in the present approach. Only periodic maintenance of the elevated gardens beds and irrigation systems is anticipated.

## E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

### E.1.1. Mitigation / adaptation impact potential

183. The project incorporates lessons learnt and best practices from various ongoing initiatives in Colombia for their replication and upscale in the region of La Mojana. The transformative impacts at a larger regional scale (focusing on all 11 of La Mojana's municipalities) will serve as model for the rest of the regions of the country and also as reference internationally for areas facing similar vulnerability. Key lessons and success factors to be considered include:
- Water supply adaptation, resilient practices in agriculture production, wetland restoration, climate early warning system and municipal level development planning integrating climate risks, from the project *Reducing risk and vulnerability to climate change in the region of La Depresión Momposina in Colombia* (Implemented by GoC with UNDP support, funded by the Kyoto Adaptation Fund). This ongoing project is piloting adaptation measures in 3 of the 11 Municipalities of La Mojana;
  - A set of climate vulnerability, hydrological, environmental and socio-economic assessments developed for the La Mojana region by the National Adaptation Fund.
  - Inclusive Rural Economic Development Strategies for transforming Colombian agriculture (IRED), implemented by UNDP in Colombia, and has developed relevant experience esp. on rural extension programmes
  - Water management and RWH schemes as implemented in the Emaus Community Project with support from the NGO Corporación Tiempos de Vida and the German Catholic Charity MISEROR.
184. The project through its rural extension service and knowledge management activities will also address water-resilient agroecosystems that build on experiences developed by national producer organizations, such as:
- Upland rice production, based on a climate-smart technology package developed by the Colombian Federation of Rice Producers (FEDEARROZ)
  - Enhanced livestock production techniques established by the Colombian Federation of Livestock Farmers (FEDEGAN), through their Sustainable Livestock Programme;
185. The project will advance climate-resilient sustainable development in Colombia by ensuring adaptive actions to climate risk impacts for its rural population and smallholders in the La Mojana region. It will principally contribute to the Fund Level Impacts in increased resilience through improved health and wellbeing, food and water security. The climate-impact potential of the project for GCF funding rests on its integrated approach that deals with management of water resources to strengthen the resilience of rural communities and smallholder farmers in La Mojana region through four inter-related outputs addressing water supply, wetland restoration and management, agro-ecosystems and climate early warning systems, that will be accompanied by interventions to enhance capacities at community and institutional levels. The project's log frame and economic analysis (section H1 of this document and Annex XII) provides detailed information for the assumptions and estimates of the impact potential:
- The project will **directly benefit 203,918 people** (located in vulnerable rural areas of the 11 Municipalities, that represent the total rural population and 50 % of the total population (rural and town areas) of La Mojana. Direct beneficiaries are the target population for Output 2 on Improved water resources management and Output 4, Enhanced climate-resilient agroecosystems-related rural livelihoods
  - The project will **indirectly benefit additional 201,707 people**, involving the population living in town centers in 11 municipalities of La Mojana region, benefitting from the enhanced climate early warning system. The project will further benefit the population) living within the area of influence of the hydrological systems downstream of La Mojana in adjacent sub-regions towards the Caribbean coastal area. Through Output 1, it also includes the potential to benefit a larger community through a knowledge exchange program at the national and international level.
186. The project will have the following impacts in each of its outputs:

**1. Strengthened understanding and systemizing knowledge of the impacts of climate change on water management**

187. The research and technical assessment activities on ground and surface water resources, agro-ecosystems, crops and livestock, waste management and related climate information services will be undertaken while a knowledge management programme and platform to be set up is envisaged to inform a broader professional audience in Colombia and internationally, promoting South-South exchange.

**2. Improved water resources management by vulnerable households and communities**

188. The project will provide year-round access of safe drinking water to 24,958 households (99,832 people) through installing community managed rainwater harvesting and storage facilities and refurbishing existing micro-aqueducts to make them resilient to flood and drought impacts. 40,000 ha of wetlands and 50 km natural wetland channels will be restored (through government co financing), benefiting population through flood and drought regulation functions of wetland ecosystems, as well as enhanced access to surface water for transport and fishing. The project will specifically target women as leaders for the wetland restoration activities. Furthermore, a key support activity for the wetland restoration and conservation, the development and application of a code of practice for cattle livestock along the wetlands, will reach out to some 8,000 cattle ranchers.

**3. Improved Early Warning Systems for Climate Resiliency** will benefit the entire population of La Mojana (over 405,625 people)

**4. Water resilient agroecosystems to enhance rural livelihoods.**

189. The project will benefit 4,878 rural disperse families through the establishment and strengthening of home gardens to be managed with drought and flood adaptation features. These measures will directly enhance household level food-security through the provision of year-round and diverse produce with nutritional and health co-benefits plus generation of extra income. Women are typically the lead in managing these gardens. A rural extension programme, to be set up by the project, will benefit directly 203,918 people, covering the full rural population as calculated in the 2015 Agrarian Census.

190. The proposed project has the key purpose of protecting La Mojana from being locked into a permanent state of extreme climate vulnerability due to the long entrenched practice of focusing solely on large flood-protection infrastructure and retroactive investments without addressing adaptation in a holistic and preventive manner so that it properly integrates livelihood aspects, productive systems and ecosystem functions.

**E.1.2. Key impact potential indicator**

*Provide specific numerical values for the indicators below.*

<b>GCF core indicators</b>	<i>Expected tonnes of carbon dioxide equivalent (t CO<sub>2</sub> eq) to be reduced or avoided (Mitigation only)</i>	<i>Annual</i>	
		<i>Lifetime</i>	
	<ul style="list-style-type: none"> <li>• <i>Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience);</i></li> <li>• <i>Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)</i></li> </ul>	<i>Total</i>	203,918 Direct beneficiaries and 201,707 Indirect beneficiaries (of which 49 % are female)
		<i>Percentage (%)</i>	1 % of the total population of the country As for the target region, project beneficiaries represent 100% of the population

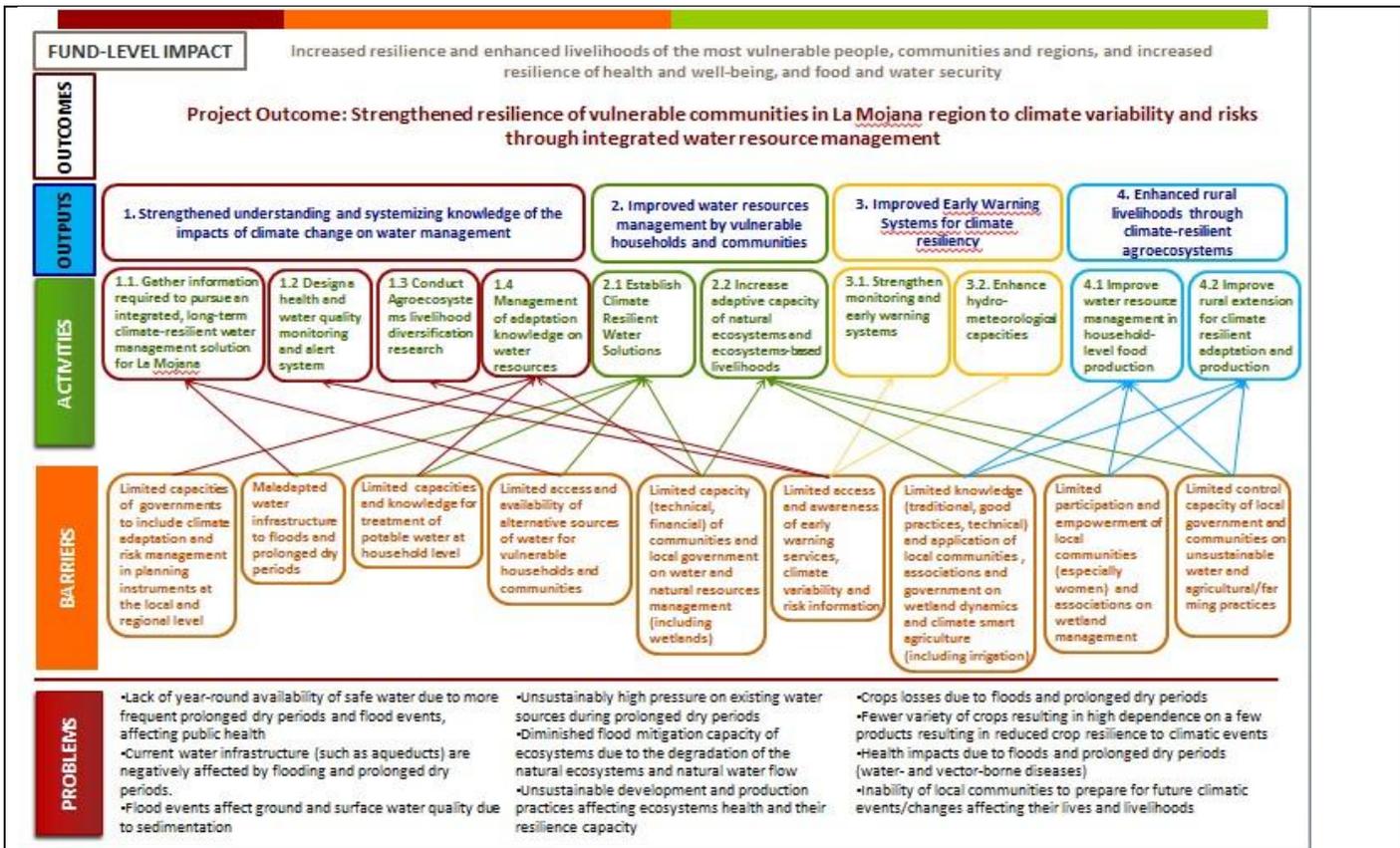
<i>Other relevant indicators</i>	<ul style="list-style-type: none"> <li>Through the project it is expected that the entire population within the La Mojana region (405,625 persons) will enhance their adaptive capacity and reduce their exposure to climate risks through increased capacities of generating (through participatory monitoring) and using climate information services. This will enable, amongst others, better preparedness of municipalities and population in general to extreme flood events through enhanced early warning systems, better operational planning of water supply and agricultural production by the community associations and farmers through short term-regional forecasting and better land use planning through localized climate scenarios and projections.</li> </ul>
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**E.2. Paradigm Shift Potential**

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

**E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)**

191. The paradigm shift potential of this project lies in implementing a model that shifts from an infrastructure focused flood protection strategy that implements a retroactive disaster recovery approach, to a new holistic and integrated strategy based on preventive risk management, through adaptation to both flood and prolonged dry periods. This represents a new model for climate resilient regional development in the country that combines structural measures with livelihood-focused and ecosystem-based adaptation solutions. In the case of La Mojana this integrated model will mean complementing baseline infrastructure investments (adaptive housing, flood protection structures) with the proposed community managed water supply solutions for year-round access of safe water, adaptive measures in a set of agriculture production activities by smallholders, wetland restoration for enhanced flood and drought regulation functions, as well as institutional capacity building for climate early warning processes. Another key feature of the holistic approach is the integration of actions in various levels, from site specific to landscape level, and from community to local, regional and national institutional levels.
  
192. The project, thus, revolves around restoring the original hydrology of the wetlands of the La Mojana region, adapting the local economy and livelihoods to the natural variation in the level of water in the wetlands through the seasons and their projected changes. This results in a clear paradigm shift towards resilience in the context of climate change, away from the historical “rationalization” of water management, wherein water was evacuated rapidly from the region to allow for agricultural intensification.
  
193. The theory of change articulated below details the problems the project must address in order to achieve greater resilience in La Mojana. The diagram also details the outputs and activities of the project that were designed to address identified barriers. Results of the project will be monitored and documented, building an evidence base to support further replication and upscaling in priority basins. Water resource management tools, which include climate change and variability considerations for water basins, are a priority under Colombia’s Nationally Determined Contribution (NDC), as is integration of climate change into key sectors including agriculture and health. Potential sites for replication include hydrological systems downstream of La Mojana towards the Caribbean coastal area. The Mojana model also has broader replication potential in regions and departments in Colombia with similar tropical climate and associated climate induced risks for development.



**194.** Output 1 is designed to lay the foundation to the project by addressing key institutional capacity and information gaps related water management and the and systematization of knowledge on adaptive planning to projected climate shocks: both flood and reduced precipitation as viewed in prolonged dry seasons. A comprehensive knowledge management programme will be established and maintained at a local university, to document and share the results of these studies allowing the systematic capturing and dissemination of lessons learned and best practices, as a key vehicle for further upscaling and replication of experiences generated in La Mojana. Importantly, this knowledge base will complement the work of the GoC on addressing water quality monitoring and general regional planning. Replication and upscaling of project results and lessons learnt will be also facilitated through the National Adaptation Programme, and its National System of Climate Change (SISCLIMA), a framework of coordination that involves sectors, territories and communities (as described in section 2.4.3 Annex II, Feasibility Study). Furthermore, and as described in various co-financing letters (Annex VI) a number of key national agencies, including the Rural Development Agency, Ministry of Housing, City and Territory and the Ministry of Rural Development expressed direct interest and means of up-taking and further replicating results and experiences generated through the projects across the different regions of the country.

**195.** Output 2 addresses water supply needs affected by flood and drought conditions of the most vulnerable rural population of La Mojana, through community managed systems combining rainwater harvesting and storage (RWH) and climate-proofing of existing micro-aqueducts. In order to comprehensively address adaptive management of water resources under this output, major wetland and natural channel restorations will take place, through direct involvement of communities, especially women, while providing training to communities on the importance of wetlands in providing water-related ecosystem services and adapting their livelihoods to a sustainable landscape approach that protects wetland services in water management. And Output 4 builds the agriculture extension services to support effective water management and climate-smart agriculture at the community level.

196. Output 3 will strengthen early warning and climate information services, and related capacities (including the observation network, data management, generation and dissemination of early warning and climate information products) – generating practical and user tailored information to allow decision making in the management of water resources, agricultural production and health services, thus enabling the implementation of preventive and effective adaptation measures. Climate information can be further tailored to address other sectors detailed in the NDC, specifically transport, energy, housing, trade, tourism and industry.

197. Appropriate mechanisms to support replication of this new integrated and climate resilient regional development model are the National Adaptation Fund and Contract Plan processes (combining state and regional department level funding). These are the main vehicles of the overarching National Development Plan 2014-2018 “*Todos por un nuevo país*” (“All for a New Country”). The National Adaptation Plan for Climate Change (PNACC) seeks to reduce risk and the socio-economic and ecosystem impacts associated with variability and climate change in Colombia. In order to attain that, the national government aims to provide a series of methodological inputs to guide sectors and territories. One of those inputs is to incorporate climate risk management in sector planning and territorial development processes. The experience and results of the project will serve as a model for similar interventions in other regions of the country, in the frame of PNACC. The project will also support other aims included in the PNACC: a) to generate a better understanding of the potential risks and actual impacts, which includes its economic assessment; b) to seize the opportunities associated with change and climate variability; c) to identify, prioritize, implement, evaluate and monitor adaptation measures to reduce vulnerability and exposure of socio-economic systems to climatic events.

#### E.2.2. Potential for knowledge and learning

198. The project foresees various opportunities for knowledge and learning including a knowledge management program that will systematize and package information related to water management. In the case where funds are set aside for research and investigation, an implementation component or guide is included to ensure that the information is actionable. This will facilitate easy upscale and replication at a regional, national and possible international level. Linking the program through the GoC’s Col-Col Program facilitates the dissemination of this lessons in a cost effective and seamless manner.

199. The rural extension program will also ensure that research on adapted livelihoods and on the ground investigation regarding best agro-ecological practices are recorded and packaged in a manner that can be used by rural extension workers and even financial institutions when analyzing loans. The execution of the extension program also facilitates the sharing of lessons learned in the region on subjects of high impact at a household level such as water treatment and management as well as household irrigation systems for home gardens.

#### E.2.3. Contribution to the creation of an enabling environment

**Enabling effective and sustained participation of private and public sector actors:**

200. The project invests in improved technical capacity and knowledge of government agencies and community organizations on integrated water resources management and enhances coordination among the stakeholders. This project and the broader programme builds on existing experiences of community participation and strengthens a range of community associations and local enterprise development. Sustained participation of various actors is ensured through training within the projects various interventions. This includes the use of community monitoring, water management and in producer associations to develop climate smart agriculture practices and in encouraging the use of seasonal forecasting and early warning systems within the communities. Focus on associative productive systems enables viable business models and sustained ownership of the local communities in long-term water security.

**Market development and transformation**

201. The project also proposes support to enhance the private sector within the community through rural extension support not only in crop production but also in the development of market studies to determine market-oriented climate smart crops and in the creation of infrastructure to strengthen market linkages through value chains for agricultural products from La Mojana that will enable and incentivize private sector investment beyond the project life time. The implementation of enhanced productive capacities that take into account adaptive needs ensures the economic sustainability of the project not only through environmental indicators but also in projected household income.

**Enhanced multi-layered coordination**

202. The paradigm shifts of the project hinges on an integrated approach and promotes an enabling environment for such integration across many levels. The project addresses the 'business-as-usual' and fragmented nature of local level decision making in multiple ways across agencies (horizontal) and at various levels (vertical):

- Horizontal coordination: The project ensures cross-sectoral integration through inter-linked investments and project implementation arrangements to build capacities long-term. It will build capacities to support integration of measures related drinking water, agriculture, wetland management and climate information in a holistic manner to address resilience of rural population and smallholder producers. The inter-linked activities for design, planning, and implementation brings together the key agencies across these sectors. Sectoral plans of the relevant agencies are implemented sub-nationally, locally in an integrated manner through Watershed Zoning and Management Plans (POMCAS), and municipal level Territorial Zoning/Landuse Plans (POTs) and targeted capacity building activities that will sustain the coordination beyond the project lifetime. Implementation arrangements and the project management framework also advance institutional coordination by creating best practices through this project.
- Vertical coordination: The project links local, community level water management with municipal level, watershed, regional and national level plans, ensuring a bottom up and top-down integration through participatory processes. In addition, the EWS functions will involve coordination and dissemination of information through IDEAM's national and regional platforms to municipal authorities, community and producer user levels for early warning and short term seasonal

**E.2.4. Contribution to regulatory framework and policies**

203. The proposed project will contribute to policies and strategies outlined by GoC at various levels, including the National Development Plan, sectoral policies for Land Use Planning, Disaster Risk Management, Climate Change, Agriculture and Water Resource Management; the Plan of Regional Priorities for Sustainable Development of La Mojana; as well as municipal level development and land-use plans.
204. Through the above policy and planning processes, the project will contribute to the implementation of the following underlying regulatory frameworks: The Law n. 1523 of 2012 regulated through Decree No. 1974 of 2013 defines directions for a national development policy to ensure sustainability, territorial security, rights of collective interest, improving quality life of vulnerable communities, environmental management and participatory planning processes. This regulation stressed the need for a more preventive approach and set the basis for the National System of Disaster Risk Management and brings together relevant agencies bearing the following principles:
- Identification of risk factor scenarios, understood as threat, exposure and vulnerability, as well as causes changes over time
  - Risk Assessment, including definition of its dimensions and possible consequences
  - Prospective interventions through preventive actions to avoid generating new risk conditions
  - Rehabilitation and reconstruction of environmental, socio-economic and physical conditions, with security and sustainability criteria to avoid the repetition of similar risk conditions
205. The Climate Change Adaptation Action Plan set up by NAF, and the proposed project for the Mojana is fully aligned with this above Decree.
206. The project will also contribute to the national Peace Contracts system. According to the acts 1450 and 1454 of 2011, the Peace Plan Contracts are intended to achieve concerted state efforts for comprehensive planning of territorial development with a long-term vision, in accordance with the provisions of Article 339 of the Constitution, thus allowing entities or agencies of the national and the Autonomous Regional Corporations to enter into long term commitments and concerted actions with the territorial entities or bodies and the territorial partnership schemes. Through this project, it is feasible that stakeholders will have the capacity to design and implement a Peace Plan Contract for La Mojana, that integrates lessons learned on water and climate risk management and implementation of plans that respond to climate risks, vulnerability reduction and rural development. This process will be supported by those activities listed in Output 1, to exchange experiences and contribute to the formulation of the envisaged broader programme and subsequent child-projects that replicate the lessons learned from the intervention.
207. For contribution to gender-related normative and policy frames please see Section E.3.1. below

## E.3. Sustainable Development Potential

### Wider benefits and priorities

#### E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

208. The project will yield economic benefits at the micro and macro levels, as well as in a direct and indirect manner:
- The 4,878 households to be supported through the establishment and strengthening of home gardens will be able to enhance income through the sales or exchange of surplus produce, above home consumption.
  - The 24,958 households who will enhance access to year round and safe drinking water, will be able to gain through savings from transportation costs (hauling water from long distances using motorbikes), that they currently need to incur in cases of water shortage
  - It is expected that the landscape level wetland restoration and channel reconditioning will contribute to enhanced productivity of larger scale crop and livestock production, through the flood and drought

regulation function of wetlands. It will also contribute to enhanced fish production at the reconditioned channels and improved wetland areas.

- As the local economy is stimulated through project execution and impact, indirect employment opportunities will be created, such as for the fabrication of elements required for the construction and installation of infrastructure and technical parts of the rainwater harvesting and storage facilities and micro-aqueduct schemes, as well as the works related to wetland restoration and wetland channel reconditioning.
- There will be macro level indirect economic benefits derived from savings from disaster recovery efforts and costs, given the flood buffering functions of the restored wetlands and natural channels, complementing the baseline structural flood protection measures being implemented by National Adaptation Fund. The activities selected under the project will reduce the annual expected loss (AEL) in La Mojana by 78%<sup>49</sup>.
- Provision of safe drinking water to 99,382 people will reduce the potential costs of water-related illness, both for the household, and the country's health system.

### Social benefits

209. Smallholder farming communities and dispersed households/farmsteads are located in remote areas with considerable difficulties for access (also impacted by flood conditions), that have impacted in their increased marginalization from participating in local level planning processes as well as receiving government services such as training, climate information and general productive extension services. The project proposes to improve substantially the decision making capacities and reduce barriers of access for these dispersed rural communities and farmers through targeted actions enhancing food and water security, related associative capacity and the related rural extension services. This will result in them becoming more active stakeholders. Their capacity will be improved through training and engaging in implementing project activities for service provision and private sector for value chain and market access improvements. Through working in partnership with existing community governance structures (Community Action Committees), increasing their interface with government officials as community leaders and by acknowledging their existing knowledge and mobilization potential, the project will create significant social capital. Finally, the project will promote social cohesiveness within communities through water supply management and in the creation of water committees. By promoting collective decision making and establishing protocols for wetland restoration reconditioning and use of natural wetland channels at the landscape level and territorial level, the project will advance social and inter-community harmony.

210. The assurance of a safe source of water for consumption will ease the pressure on rural households, especially on women, who are responsible for high water intensity domestic tasks and who have to travel every 3 days long distances via rented motor biked. Prioritized access through the rain capture scheme and the investment of home gardening for internal consumption will also favour their empowerment and relevance within their household and communities, particularly in times of extreme weather events.

211. The project also promotes safety, well-being, and decision-making among farmers through the benefits of EWs and climate information. Communities will benefit from the timely early warnings and reduced disruption to educational activities (access and commuting to schools), family and community structures, and as well as access and communication to urban centres and services. The ability to adjust seasonal cultivation practices and crops according to tailored seasonal forecasting impacts positively on producers' ability to rationalize their inputs and assess their cultivation options for the coming months, preventing undue losses of crops and inputs.

### Gender-sensitive development impact

212. The last National Agricultural Census (2015) determined that 5,1 million people were residents of rural dispersed areas (48% of them are women), and that the percentage of female-headed household increased, from 18% in 2005 to 27,8% in 2014 (DANE, 2016) corresponding to 422,614 women<sup>50</sup>. In rural areas, the vulnerability of female-headed households is higher than male-headed households (UNDP, 2011).<sup>51</sup> Based on information

<sup>49</sup> NAF (2016). La Mojana Action Plan.

<sup>50</sup> DANE. (2016). *Censo Nacional Agropecuario 2015*. Bogotá: Departamento Nacional de Estadística

<sup>51</sup> UNDP (2011). Colección de cuadernos INDH. Mujeres rurales - Gestoras de esperanza. Bogotá

provided by the National Statistics Department-DANE (2016) in Colombia exist 2,2 million Agricultural Productive Units (APUs), 26% of them are operated by women, 61,5% by men, and 12,5% are jointly operated by both woman and man. There is a large gap in terms of health resources available for women in rural areas, employment opportunities, technical assistance in relation to agricultural activities and access to loans.

213. For the above reasons, GCF resources will be invested in interventions that directly impact on women's well-being and livelihood options in La Mojana, through prioritizing female headed households as in the case of home gardens and rainfall water capture technology. Under Output 2, women will directly benefit from the enhanced access to a year-round safe water supply. This will reduce the time spent fetching water from surface sources thus making make domestic tasks simpler and provide for irrigation in the home gardens (under 4.1.) that will become an important source for a healthy, diverse and secure food supply. The project will particularly target women through wetland restoration. Experience from the MADS-AF project shows that women's groups in communities take lead in riparian forest and wetland restoration activities, including in communal nurseries to secure plant supply and these activities have become key factors of women's groups cohesion. Given that forest and wetland restoration activities bear education potential (e.g. through vegetation planting and caring), youth groups and children will be also engaged. The activities related to home-gardens will also strive for a balanced engagement of man, women and youth, while typically men have more role in the physical works of setting up the gardens (elevated beds, fencing, drainage, irrigation, etc.), women are usually the lead in cultivating it. The project will ensure that in the communal water governance structure (community water associations) and as community leaders a gender balanced representation will be enacted. Under Output 3 the project will strive for a gender for access and use of early warning information.
214. The project will yield positive outcomes related to health and well-being, decision making, access to resources, livelihoods, and income generation for women through the project interventions. The time saved through an improved, and in the case of rural disperse households direct, access to clean water supply will facilitate the participation of women in other economic activities. The governance structures created and the role of community leaders will in turn expand women's sphere in decision-making. Women through their involvement in project actions, will benefit from training and educational activities as part of the rural extension program and knowledge management activities and exchanges related to climate change, adaptation and water management. This in turn will serve to empower them within the community.
215. The project will contribute to the implementation of Colombia's normative and policy framework, aiming at reducing the current gender gap. These frames include the Political Constitution of Colombia and its Article n. 43 that includes special considerations about women discrimination, and the Gender Equity Public Policy that seeks to guarantee that all women can exercise their rights based on equal principles and no discrimination<sup>52</sup>.
216. For project specific assessment and action plan for gender, refer to, Annex XIII.

#### **Environmental co-benefits**

217. Project activities will deliver numerous specific environmental benefits that include: a) soil conservation and reduction of erosion of productive lands and river banks, thus reduced sedimentation, and siltation of wetland channels. b) improved tree and vegetation cover in restored wetland and riverine areas, in grazing grounds (measures, like agro-silvo-pastoral practices), as well as in home-gardens. These will have several interlinked environmental benefits such as improved micro-climate, improved soil structure, bioremediation for irrigation and drinking water quality, increased biodiversity; c) restoration of wetland and riparian ecosystem integrity, goods, and services; and d) preservation of agro-biodiversity in home gardens, and in forests. The reduction of chemical inputs, especially fertilizers in home gardens, will avoid contamination of surface and ground water resources. The enhanced vegetation cover in wetland, riparian and grazing areas will contribute to enhanced emissions reduction through enhanced carbon stocks as will a landscape approach to wetland management that includes silvopastoral activity.
218. The project will significantly contribute to the conservation of biodiversity, particularly of the wetlands in La Mojana: Colombia, given its strategic location in tropical zone, has an exceptionally rich and diverse nature, with a broad representativeness of different types of ecosystems. Within this vast mosaic of ecosystems, wetlands represent a large area, and considering their ecosystem services they are key to the national and local economy.

<sup>52</sup> Alta Consejería Presidencial para la equidad de la mujer, 2012

219. According to National Wetland Policy (Ministry of Environment, 2002), the Caribbean region of the country hosts 71% of permanent or semi-permanent wetlands of the country. The Momposina Depression where La Mojana is located is one of the key wetland areas, harboring 22 reptile and amphibian species, 141 bird and 30 mammal species. A particular characteristic of La Mojana is the pulses of flood that generates a terrestrial-aquatic transitional zone, called locally as *playones*, with very specific hydrological and geological characteristics to which all species living there have adapted. These zones have a very high biotic productivity, nurtured through a high level of production and exchanges of organic matter and nutrients, between the terrestrial and aquatic phases.

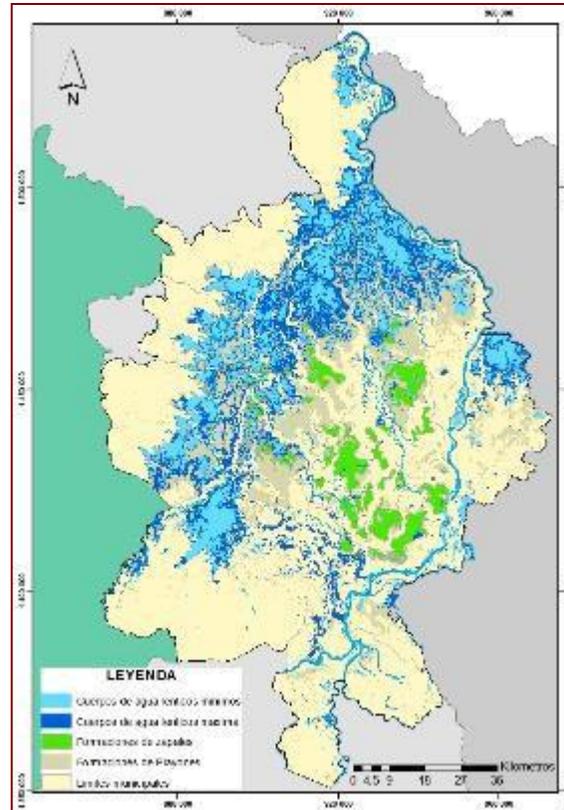


Figure 9. The terrestrial-aquatic transition zones in La Mojana

220. Within the territory of the 11 municipalities of La Mojana a study conducted through NAF has identified 50 different types of ecosystem services, across its range of ecosystems, which will be supported by this project and the broader programme. These services include those of supply provision (food, materials and minerals, forest cover, local fauna, etc.), regulation (sequestration, purification, reproduction, refuge, amongst others), as well as cultural ones (identity, didactical, recreation). For example, the value of supply provision for hunting is estimated at 1.6 M USD/year, for fishing 10.5 M USD/year, and the regulation service through absorbing and storing carbon is estimated at value of 3535 M USD a year.

## E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

221. The region of La Mojana, has been one of the Colombian territories which, because of its geographical location and division of territory, has been most affected by natural disasters mainly related to the effects of flood pulses and drought. The latest great disaster in the region related to flooding was recorded in 2010 and 2011, especially because of its conjunction with the second rainy season which was influenced by the la Niña phenomenon, resulting in an increase in the flood disaster magnitude in the 11 towns in the region.
222. Floods in 6 towns in the department of Sucre (Caimito, San Benito Abad, Guaranda, Sucre, San Marcos and Majagual) affected 102,177 people and 24,981 hectares of cultivated land. In the department of Bolivar, 72,390 people were affected in the towns of Achi, Magangue and San Jacinto del Cauca. In the town of Ayapel, 17,000 people were affected while in the town of Nechi, 13,500 victims were reported. As a result of these floods, the National Disaster Management Unit (UNGRD) reported 180,569 people affected, 19 health centres destroyed, 180 educational sites affected, 9,395 homes destroyed and 316,641 hectares affected.
223. The region of la Mojana is also vulnerable to drought conditions that appear after the floods. Between 2015 and 2016, the country suffered one of the El Niño phenomena with greater economic and social impacts. The decline of flows affected the supply of water for human consumption and irrigation. During this period, the lowest levels were reported on the Magdalena River and more than 200 towns were declared in emergency due to water shortages. According to the report by UNGRD, 719 municipalities in 28 departments of the country had some kind of effect and 367 were declared in public emergency due to partial shortages and water rationing, besides from impacts on agriculture and forest fires. In the Caribbean region forest fires generated economic losses of about \$ 108,778 million, which puts Magdalena half of the losses, with \$ 59,334 million and, incidentally, the most affected in the country.
224. According to studies by the National Meteorological Service (IDEAM) and UNDP (2015), climate change scenarios from 2010 to 2040, 2040 to 2070 and 2070 to 2100 forecast reductions in rainfall in most of the region of La Mojana with an average reduction of 14%, an increased frequency of extreme events (both flood and drought) and an increase by 0.9% of the average temperature for the period 2011-2040 and 2.2 ° for the period from 2071 to 2100.

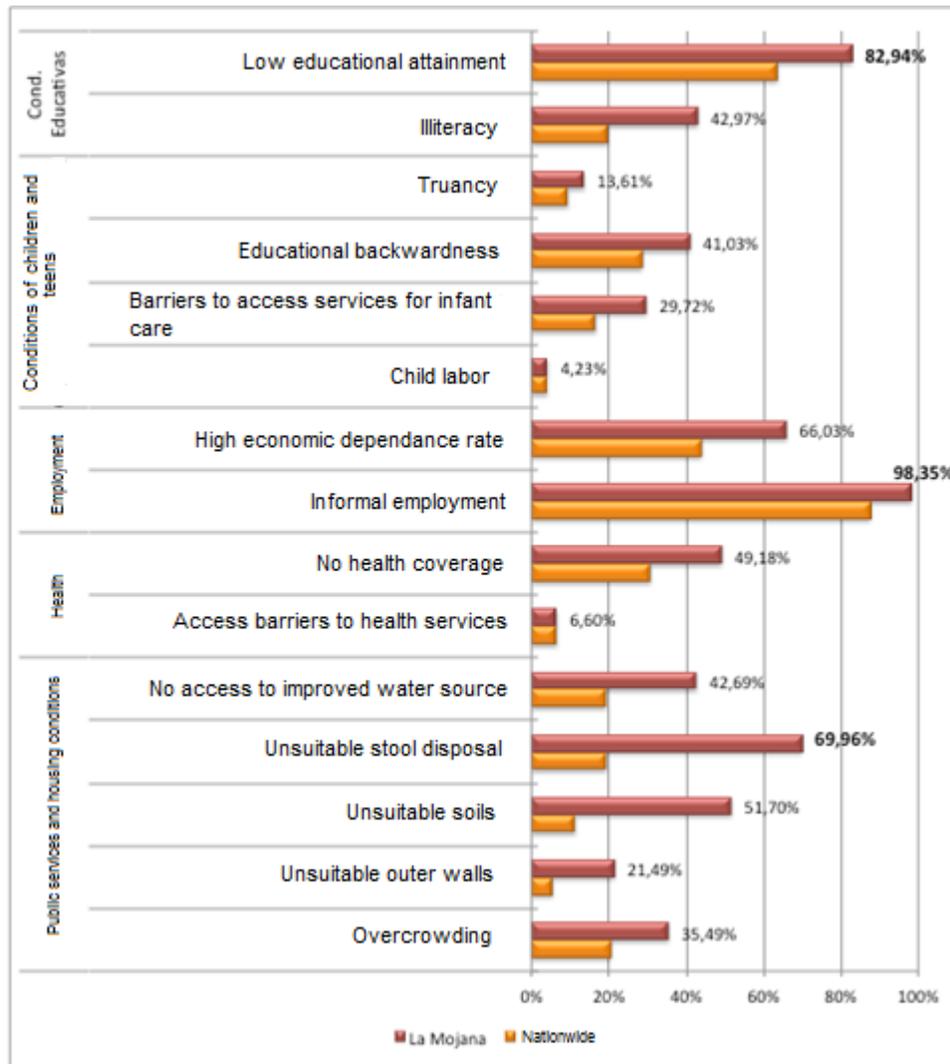
#### E.4.2. Financial, economic, social and institutional needs

225. Between the years 2010 - 2011 Colombia, consequences of the La Niña phenomenon caused damage in much of the country and generated serious social, economic, environmental and political impacts. Because of the magnitude of this natural disaster the government declared the economic, social and ecological emergency (Decree 4579 of 2010) and created the Disaster Fund Management (Decree 4709 of 2010), and later the National Disaster Risk Management Fund (Spanish acronym FNGRD). With this initial action, the government has been strengthening the National Unit for Disaster Risk Management (UNDRG in Spanish) in order to provide protection to the population in Colombian territory, improve safety, welfare and quality of life and contribute to sustainable development. Aligned with this, the National Adaptation Fund was set up in 2010 and has been mandated to structure and execute integrated projects for risk reduction and adaptation to climate change, in order to strengthen the competencies thereof and contribute to reducing the fiscal vulnerability of the State. While the National Adaptation Fund Has prepared a comprehensive CC Adaptation Action Plan for la Mojana and allocated 70 M USD for over the next 3 year period (that serves as baseline and co-financing for this proposed project), these resources fall short with approx. XXX M USD to implement the envisaged total risk management approach envisaged through the CC Adaptation Action Plan for La Mojana that intends to shift from a retroactive and disaster recovery approach through infrastructure works, towards a more holistic and integrated approach with funding support from GCF.
226. At the regional and municipal level, there is low financial capacity to meet the incremental costs of climate change. In this region, current level of institutional development is precarious, manifesting in low capacity and low resources of towns and of the Regional Autonomous Corporations (CAR in Spanish) to fulfil their mandates. Currently, due to the dominantly informal economy, there is a low level of the property tax, industry and trade tax, which are essential for the municipal management of the CARs. The project and border programme will help to improve this situation, e.g. through strengthening producer associations and upmarket linkages, and supporting municipal level development planning processes, e.g. to ensure that needed O&M costs of adaptation measures are incorporated in budgetary planning.

227. Although Colombia has made significant progress in reducing poverty, in the Caribbean region it is 1.5 times the poverty in the country<sup>53</sup>. The Caribbean region has the second highest multidimensional poverty index (MPI) for 2015 (31.2), only surpassed by the Pacific region 33.8 %, and determined by high rates of informal employment (84.1% of households) and low educational attainment (52.4% of households)

228. According to the last municipal measurement to the Multidimensional Poverty Index, La Mojana it is one of the poorest regions of the country. 83.8% of the population of La Mojana was poor in 2005, compared with 49.6% of the national average, which means an incidence 70% higher (DANE, 2005); it is observed that the La Mojana region is in a worse situation than the national average.

Figure 10 Multidimensional Poverty Index in La Mojana



229. Access to drinking water is one of the most critical conditions. 42% of the population has no access to drinking water and these towns have very unequal access conditions. In towns like Achi and Ayapel, coverage is below 20% of the population, a situation that contributes to increased morbidity among the population at La Mojana. In

<sup>53</sup> In the period 2002 – 2015, poverty fell 21.9 percentage points from 49.7% in 2002 to 27.8% in 2015, in the Caribbean fell from 21.1 percentage points from 63.5% in 2002 points 42.4% in 2015, remaining higher than the national average figures.

Achi, the second leading cause of death for children below age 5 is acute diarrheal diseases (ADD) related to the low quality of drinking water. In addition, water pollution with mercury from gold mining mainly in the upper basins of the Cauca and Nechi rivers is one of the most complex problems this population is currently suffering, because it has a fishing and farming tradition.

230. The deficiency in education, expressed in the low educational attainment, illiteracy and truancy has consequences, inter alia, in the low productivity of income-generating activities, and the low level of response to flooding threats. Employment informality at La Mojana results in a very low access to social security (health care and pensions), plus the inexistence of local taxes and, in a wider sense, the existence of an informal culture.
231. In the region there are 249 educational institutions covering a population of 115,856 children between 5 and 18 years. 82% of households in the region are deprived by low educational attainment, the most serious case being in Achí with 93% of its population with low educational attainment. On the other hand, the incidence of illiteracy in La Mojana varies between 34% in Magangué and 56% in Caimito and San Benito Abad, for a regional average of 42%, which is double the national average of 19% (DNP, 2011 calculated with data from the 2005 population Census). The educational backwardness is 41%, with Magangué being the town having the most fallen behind population (43,399 people.)
232. Information on access to health services shows that 49% of the population is not covered by the health system. Majagual and Sucre are the towns with lowest levels of coverage (70% of the inhabitants of each municipality). This condition influences on the increase of the local vulnerability to extreme events that may affect their health as floods, drought, or low access to good quality food.

## E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

### E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

233. The project is in line with the national and local policies and strategies outlined by GoC, including the National Development Plan, the national policies for Land Use Planning, Disaster Risk Management, Climate Change, Agriculture and Water Resource Management. The National Development Plan (NDP) 2014-2018 includes strategic goals focused on achieving resilient growth and reducing vulnerability to disaster risks and climate change. The NDP provides for the formulation and implementation of sector plans for adapting to climate change under the responsibility of the sectoral ministries.
234. The project contributes to the implementation of Colombia's NDCs that address both mitigation and adaptation actions. The adaptation component of INDCs builds on the country's progress on adaptation under the National Plan for Adaptation to Climate Change (PNACC), whose formulation began in 2011 and has been implemented through different regional and sectoral efforts. The PNACC defines the guidelines for the sectors and regions of the country in order to prioritize their actions to reduce vulnerability and include climate change and variability in their planning processes through the formulation and implementation of regional and sector adaptation plans. The project will systemize and provide with lessons learned to help further implementation of PNACC and DNP's national strategy for resilient territories, as this will be the first of such comprehensive and integral territorial level adaptation initiatives that will be implemented in Colombia.
235. The project and the broader programme is also aligned with the GoC's Financial Strategy that aims to reduce the State's fiscal vulnerability to natural disasters and events. The implementation of the financial strategy is based on strengthening risk reduction measures, collective insurance of public goods, implementation of the Disaster Risk Management Law, contingent financing for future events and assessment of financial protection instruments (capital market instruments to enable transferring and reducing fiscal risks).
236. The United Nations Development Assistance Framework (UNDAF 2015-2019) for Colombia is centered on processes of peace construction and sustainable development. Its orientation is defined by the Charter of the United Nations, the National Development Plan (2014-2018), the international treaties and conventions ratified by Colombia. It is also aligned with the Post-2015 Agenda and the Sustainable Development Goals (2015-2030),

which are integrated by GoC as part of its development and peace building strategy. The strategies agreed are based on the accumulated experience of UN in Colombia and are in line with the policy priorities of the State of Colombia, in its national efforts to construct a lasting peace in sustainable social, economic and environmental context. The underlying UN strategy in this Assistance Framework is the international support with the aim of strengthening national capacities. The implementation process will be aided through a permanent dialogue and agreements of joint management arrangements between The State of Colombia and the programmes, agencies, funds and UN offices present in the country. Within the pillar of Sustainable Development and within the implementation frame of UNDAF, the UN System has set as principal objective of supporting Colombia towards sustainable development in its three dimensions, including improvements in equity, closing population and territorial gaps, as well as productive involvement of most laggard zones, integrated environment management, mitigation and adaptation of climate change. Its specific objectives are:

- Colombia will have reached to elevate social and environmental resilience in order to face climate change effects, have sustainable use of natural resources and manage effectively disaster risks.
- Colombia will have reached increased equity by through advances with SDGs and the reduction of economic, social and gender gaps.
- Colombia will have managed to reduce gender gaps, and advanced in applying rights of women under the principles of equality and non-discrimination
- Colombia will have reached increased equity through social and economic inclusion of the rural population

237. Acknowledges that – in the context of climate change – improved disaster management enhances the sustainability of economic growth, particularly in districts that are prone to natural disasters. The proposed project is consistent with the second output area of UNDAF, namely Sustainable Development, and one of its four results: Colombia will have achieved to enhance resilience and social-environmental sustainability in order to tackle climate change effects, and sustainable use of natural resources and effective management of disaster risks.

238. The project is also aligned with the UNDP's Country Programme Document which aims to foster the development of resilient livelihoods in the most vulnerable areas. UNDP will promote gender-sensitive conservation, sustainable use of biodiversity, adaptation to climate change and risk prevention, in partnership with the Food and Agriculture Organization, UN-Women, the National Agency for Extreme Poverty Eradication, the Administrative Department for Social Prosperity, the Administrative Unit for Territorial Consolidation and the National Unit for Risk and Disaster Management. UNDP will develop innovative alternatives for using biodiversity and ecosystem services based on best international practices in order to capitalize on the environmental endowments of Colombia and strengthen livelihoods among the most vulnerable population, particularly women, Afro-Colombians and indigenous people, who live in places with the greatest biodiversity.

#### E.5.2. Capacity of accredited entities and executing entities to deliver

239. The proposal is aligned with UNDP's comparative advantage in the areas of capacity building, providing technical and policy support, reducing barriers and creating enabling conditions for adaptation planning and investments. Specifically, the proposed project will build upon UNDP's comparative advantage stemming from experience in working with governments and communities in Colombia and globally on: i) establishing and strengthening institutional, policy and legislative mechanisms; ii) building capacity; iii) undertaking risk assessments; iv) mainstreaming climate change adaptation, disaster risk reduction and early warning systems into development planning; and v) harnessing best practices and community-based approaches across different thematic areas for climate change adaptation and disaster risk reduction. This includes experience with initiatives focused on transferring knowledge and technology via South-South cooperation.

240. The UNDP Country Office (CO) in Colombia is well placed to oversee the implementation of the proposed project. This is because it has built close connections with the National Department of Planning and other national and regional institutions involved through its support to the implementation of at least 32 projects on enhancing biodiversity, sustainable energy, sustainable land management and forestry, climate change adaptation, disaster risk reduction in the country including with financing from the GEF, AF, Bi-lateral donors as well as national donors. UNDP has played an active role in supporting climate change and disaster risk management related policy processes, including the development of PNACC, the Low Carbon Development Strategy, the territorial approach to climate change applied in 9 territories within the country that have positioned the agency as a relevant stakeholder for supporting the government in incorporating climate change within the local planning process. UNDP has worked also with the government in the production of the national communications on climate change,

and the design of National System for Risk Disaster Management. UNDP in Colombia also serves as Implementing Agency for the ongoing climate change adaptation initiative in La Mojana, funded by the Kyoto Adaptation Fund. It also has been a key partner of the government in the peace talks, providing technical inputs to analyses the environmental implications of the peace building process.

241. UNDP can provide a vital co-ordination role for catalysing enhanced capacity to adapt to climate change risks and impacts across sectors in Colombia. To ensure that the necessary capacities and institutional mechanisms are achieved at the national, regional and municipal levels, UNDP will maintain its upstream focus. Furthermore, UNDP will facilitate and ensure transformational impacts at the community level. UNDP also has considerable experience in providing additional support to National Implementation (NIM) to facilitate smooth project delivery. UNDP has been using an approach based on the principle of optimizing resources and capacities through multi-sectoral and multi-stakeholder driven partnerships in Colombia. The Colombia CO is supported by Regional Technical Advisors at the UNDP Regional Hub in Panama, as well as by policy, adaptation, economics and climate modelling experts in New York, Cape Town and Bangkok. The project will be implemented by the National Adaptation Fund using UNDP's National Implementation Modality, which is designed to ensure domestic systems are used for accountability. The interventions through this project will be compliant with the Fund's ESS and compliant with stakeholder consultations.

242. The project sponsor for this project is the National Adaptation Fund (NAF), which is a public entity responsible for the execution of comprehensive risk management projects and adaptation to climate change in regions with vulnerable population, including La Mojana. The NAF was created in 2010 in response to the 2010-2011 "La Niña" phenomenon, the most extreme so far in Colombia, that triggered a declaration of economic, social and ecological emergency and left nearly four million people affected in 1,004 municipalities, representing 97% of the country. Public investments executed by the NAF are long term, with an annual execution of 1.2 thousand million pesos (around USD 430,000). The Fund's activities focus on disaster risk mitigation to avoid and reduce damage from similar or larger events over the next 50 to 100 years, reducing fiscal costs to rebuild public infrastructure, as well as social and economic impacts. Along with GCF resources, NAF will manage a total of US \$ 70,000,000 to be invested over the next 3 years in la Mojana along the Adaptation Action Plan of La Mojana. A public policy document is being drafted, which will help to frame all investment resources in La Mojana with the articulation of the national government and regional and local authorities so that the continuity and sustainability of the development model adapted is guaranteed.

243. NAF will draw on the capacities of responsible parties, that will be directly accountable to NAF for the implementation support in this project (based on agreements): Ministry of Agriculture and Rural Development and the agencies that are part of this Ministry such as the Agency for Rural Development, Ministry of Environment and Sustainable Development, Biological Research Institute Alexander von Humboldt (IAvH), Autonomous Environmental Corporations (Carsucre, CVC, Corpomojana, Corantioquia, Cardique), the associations of productive sectors such as rice, livestock and fisheries, RIMISP, Paisajes Rurales. UNDP has overall oversight of the implementing partner (IP) and Responsible parties to ensure compliance with its policies and procedures.

#### E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

244. This project is an initiative of GoC, which has requested – through its GCF NDA, the Sub-director of the National Planning Department (NPD) – the support of UNDP for the design and implementation of this funding proposal. The project is based on the Climate Change Adaptation Action Plan of La Mojana, established by the National Adaptation Fund.

245. The proposal was presented in its initial phases of preparation to the Financial Management Committee (June 2016) and to the Collegiate Bodies (Sept 2016). The role of the Collegiate Bodies is to aid decisions on matters related to GCF; it is coordinated by NPD and involves the Ministry of Environment and Sustainable Development, Ministry of Finance and Public Credit, Ministry of Foreign Affairs and the Presidential Cooperation Agency. These meetings reassured the importance of this project to Colombia, stressed the need for its timely formulation and discussed execution mechanisms lead by the National Adaptation Fund and involving range of other relevant national entities as partners.

246. Therefore, the proposal has been formulated with the full engagement of NDA, which has provided guidance and feedback through a range of meetings and exchanges. NDA has provided the no-objection letter following a consultation process involving the above-mentioned national agencies of the Collegiate Bodies.
247. In order to facilitate inputs from various government entities to the proposal, consultations were held on particular aspects of the project with representatives of different government sectors, including different technical divisions of DNP and the Ministry of Environment and Sustainable Development; the Women's Council; the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM); as well as private sector associations (e.g. FEDEARROZ- Rice Producers Federation). As a response to various of these consultations, support letters have been received from the High Commissioner for Post-Conflict, Minister of Housing, Cities and Territories; Vice-Minister for Water; Vice-Minister for Rural Development; President of the Rural Development Agency; Director of the National Adaptation Fund (See Annex XIII, Additional Background Details, Stakeholder Consultations).
248. The High Commissioner for Post-Conflict highlighted the usefulness and importance of this project as it will provide a model on development processes integrating climate variables and risks for other regions of the country that are similarly vulnerable to climate change and have high multi-dimensional indices of poverty, affected by armed conflicts. Therefore, this proposed project has high replicability potential in the country. The Minister of Housing, Cities and Territories stressed that it is of high interest for the Ministry to support this project, particularly its components related to climate resilient infrastructure and provision of water services. The lessons learnt to be derived from the project will be considered in future interventions of this Ministry in support of enhancing water supply in other vulnerable regions of the country. The Vice-Minister for Rural Development indicated that a project like the one being proposed for La Mojana is strategic to link sectoral interventions the Ministry is in charge of, in a way to ensure that rural development is sustainable and compatible with climate trends and risks. He further indicated that this project will be of particular interest for the Ministry's Division of Rural Women, as well as for the Rural Development Agency, which will be engaged in the project through technical assistance on climate change adaptation in rural areas, including the strengthening of capacities of rural women.
249. Targeted consultations were held with IDEAM on the Early Warning Systems component of the project and with the Women's Council on gender aspects, with the Presidential Cooperation Agency on the South-South cooperation actions and other replication mechanisms, and with the Rice Producer's Federation (FEDEARROZ) on current rice production practices, climate change impacts and potential adaptation measures in La Mojana.
250. Meetings were convened with the following national NGOs, to obtain their comments on an overall presentation of the proposal, including the Ruta Pacifica, Ambiente y Sociedad, De Justicia (the latter two are GCF observers on behalf of civil-society), Corporación Humanas, as well as the following women's organizations: Sisma Mujer Corporation (dedicated to the defense of women's right), Casa de la Mujer, Red Nacional de la Mujer (National Women's Network).
251. The project was also discussed at the regional and local levels, involving authorities, such as the Regional Autonomous Corporations (CARs – CORPOMOJANA, CVS, CSB). Meetings were held with municipal authorities in order to discuss local priorities in the framework of this project, and to date support letters have been received from the municipalities of Achi, Caimito, San Benito Abad, San Marcos y Sucre (see Annex XIII).
252. At the local level meetings were held with 16 communities (involving smallholders, producer associations and women's organizations) in the municipalities of Guaranda, Majagual, San Benito, Achí, Nechí, Ayapel, San Marcos, San Jacinto del Cauca and Caimito. In total 590 people participated in these meetings, that served to discuss on the communities' needs, interest, ways of participation, while assuring their awareness and ownership of the process as target beneficiaries (minutes of the meetings are available in Annex XIII).
253. Specific meetings were held with Indigenous People present in the project area. The engagement of Indigenous People in the project area was carried out through recognized and legitimate Zenú Indigenous Peoples representation (initial identification through the Indigenous Affairs Offices of the Ministry of Interior and the Governments of Sucre and Córdoba; Municipal Units for Technical Assistance - UMATAS; and Zenú Indigenous

Councils). The meetings served to obtain their initial agreement to engage, while supporting capacity to participate and make decisions. Field data was collected in the communities of Pital, Montegrande, Santo Domingo Vidal, and Jeguita – Takasuan all of which have indigenous people’s settlements in the project area; in order to assess the potential impact of the project on their natural resources. Community consultations enabled identification of impacts; discussed the relationship of the project with the cultural characteristics of the Zenú people; and assessed the need for capacity strengthening. Indigenous Councils were consulted to discuss project aspects and determine recommendations for activities in each proposed outputs, including: Takasuan Council (from Sispataca, El Limón, Villanueva and La Ceiba veredas), Lomas de Palito Council (Lomas de Palito), Pital, Montegrande, and Santo Domingo. Free, prior and informed consent for the project was obtained based on a set of conditions, that have been incorporated in the project. As a result of the consultations with the Zenú communities in the project area, the recommendations have been summarized in Table 4. Subsequently, and as part of the contributions of the High Regional Council of the Zenú People, Mr. Dario Mejía, the recommendations that were made through his delegate were included in order to accurately incorporate the differential approach and so that the project’s actions successfully generate a positive impact in strengthening of capacities and reinforce the values, traditions, habits and customs of the Zenú people, all of which contribute to the adaptation and survival of their culture. Thanks to this process, the project received a letter of support from the Principal Council of the Indigenous Peoples in Colombia, Mr. Luis Fernando Arias, as a representative of the National Indigenous Organization of Colombia (ONIC).

254. Stakeholder engagement plan: The project would engage multiple stakeholders at national, regional and local level. These will involve national Ministries and Development Agencies, Regional Autonomous Corporations, Municipal Authorities, Community-based organizations (community associations, producer associations, women’s groups), representatives of the Zenú Indigenous People, as well as NGOs and private sector associations. Detailed stakeholder engagement plan by activity level is provided in Annex XIII.

## E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

### E.6.1. Cost-effectiveness and efficiency

255. The effectiveness of proposed solutions has been tested in a number of projects at varying scale. This involves solutions for water supply, home gardens for household food-security, wetland restoration, and climate early warning system that have been piloted through the project *Reducing risk and vulnerability to climate change in the region of La Depresión Momposina in Colombia* (Implemented by GoC with UNDP support, funded by the Kyoto Adaptation Fund). Short term employment guarantee programmes have been widely used in Colombia, specifically in the Manos a la Obra por la Paz Initiatives. The actions planned for the rural extension programme are based on methods and processes well tested through the project “Inclusive Rural Economic Development Strategies for transforming Colombian agriculture” (IREDE) implemented by UNDP Colombia, and through experience developed by the National Technical School (SENA). The geographic, hydro-climatic and socio-economic suitability of the recommended activities offer the most effective and efficient solutions to the climate induced risks on local water resources in La Mojana region of Colombia.

256. The project is substantially co-financed through the National Adaptation Fund, the main government funding vehicle for the implementation of the Climate Change Adaptation Action Plan for La Mojana. In addition, government staff and local communities will provide in-kind co-financing in terms of staff time and facilities. The Climate Early Warning deliverables will be fully integrated into IDEAM’s institutional and technical structure and system. The project and broader programme will build synergies with related initiatives, particularly with those of key national and regional producer associations, like FEDEARROZ and FEDEGAN.

257. The costs of investments have been estimated using comparable benchmarks from other initiatives, including unit costs of installations for rainwater harvesting facilities, refurbishment of micro-aqueducts, or restoration of a Ha of wetland, as these are presented in the detailed budget breakdowns of the technical sheets attached to the Technical Feasibility report.

258. Community participation in the implementation and operational stages will ensure cost-effectiveness of the investments. Previous experience shows that in many instances (e.g. for nursery operations, water supply

installations, etc.) labour is usually volunteered by communities. The RWHs, micro-aqueducts, home gardens and nurseries for wetland restoration will be managed by the communities, thereby reducing the operation and maintenance costs for the government in the long term (coordinated with Municipal support). Similarly, the community contribution (coordinated through IDEAM and local education and research institutions involved) to the management of hydro-meteorological stations can make the maintenance cost-effective because this will reduce the inputs (travel, salaries and accommodation) from the project. The data collected by the communities from the manually operated rainfall and river flow gauges will be made available to IDEAM, which will enhance the current weather information database, and the resolution of forecasting, reducing operation costs of government agencies.

259. Alternative solutions were considered in the design of the proposed interventions: RWH and micro-aqueducts are the 2 most viable alternatives for year-round drinking water in the region, and RWHs systems have been prioritized also considering cost-effectiveness, while existing micro-aqueducts will be refurbished with technologies that are more cost-effective (e.g. solar powered pumps that have less O&M costs than pumps with fuel engine). Both of these water solutions are locally managed schemes by communities which are more cost-effective than larger infrastructure extending the reticulated water supply system from town centers too remote and disperse rural communities the project targets. The use of local technology for the development of the RWH and involving the community directly in its development ensures cost efficiency as well local appropriation.

260. According to the results of the Financial Analysis (Annex XII (d)): Output 1 aims to improve the decision making capabilities of the stakeholders involved such as the municipalities in the long run by equipping them with models, data banks and associated training materials. Output 2.2 will prepare and implement community restorations plans for 41,532 ha of the wetlands (lentic ecosystems) and the restoration of 127 km of wetland channels (lotic ecosystems). OUTPUT 3 will enhance the current early warning system through improved monitoring and forecasting capacity, increased hydrological coverage, and the dissemination of regional and productive relevant alerts that are tailored to users' needs and communication channels. Output 4, except for Activity 4.2.1, is not intended to generate direct cost savings or incremental revenues for the households.

261. The activities mentioned above result in benefits that are macro-economic and indirect. These benefits are larger-good in nature and accrued directly to the environment and the ecosystem, before indirectly impacting the livelihoods through improved productivity. Hence, financial analysis isn't considered pertinent for this output, given the long-term, public good nature of these activities that are unlikely to generate any significant direct and quantifiable financial benefits to any of the project stakeholders.

262. Detailed financial analysis, however, has been conducted for Activity 2.1, Activity 2.1.1, Activity 2.1.2, Activity 2.1.3 and Activity 4.2.1. The FIRR computed in accordance with the GCF guidelines for Activity 2.1, Activity 2.1.1 and Activity 2.1.3 is higher than the WACC / hurdle rate when the GCF grants supplement the GoC co-financing, thus ensuring financial viability and operational sustainability. GCF funding is proposed to be used judiciously to finance primarily training/capacity building/technical assistance/social mobilization costs, with government co-financing being used largely to fund installation of assets etc., indicating that this project's proposed funding structure is planned to include, and not crowd out, public investments.

#### E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

263. Cofinancing from the GoC in the amount of USD 78.717 million is leveraged to support O&M in water resource management; improved water use and climate resilience of smallholder farmers; and enhanced local and regional capacity for water and climate risk management. The NAF will provide (USD 61.8 million) to ensure complementarity with La Mojana's Action Plan. Co-financing will support wetland restoration, agro extension services, the creation of additional home gardens and the development of public structures that will also house communal water tanks. Municipal governments will provide USD 1.358 million along with USD 5.57 million from District of Sucre to increase and sustain the solutions for enhanced water access, particularly in the improvements to micro aqueducts. The local environmental authorities (CVS and Corpomojana) will also provide USD 7.989 million to support the effort in wetland restoration particularly in the areas that will be marked for conservation. The University of Cordoba will dedicate USD 1.09 million in supporting the regional forecasting center as well as in research capacities geared at investigation of climate resilient crops and has stated its commitment at ensuring

continuity of the knowledge management aspects of the project beyond GCF Funding. The University of Sucre will provide an additional USD 688,000 in research facility and work. The Institute Alexander Von Humboldt will also dedicate 182,500 in wetland management research. While the Presidential Agency for Cooperation will provide 35,714 through its South-South cooperation platform. Co-financing will be in kind, and will be managed by the National Adaptation Fund, which will be the project's implementing partner/executing entity. Additionally, and as part of the integrated water and risk management approach, the GoC is financing baseline interventions, including climate resilient infrastructure (housing, schools, urban centers) and improved governance and local and regional capacities. This additional financing (USD 78,387,500) is not included as part of the co-financing figures but is highly relevant for the GCF investment. That is, in total, the GoC would support this project and associated base investments with a total of USD 97.1 million, signaling strong country ownership and drive. In addition, based on the experience of the existing projects in the region, local communities will leverage in-kind donations of local labor as part of the project.

**E.6.3. Financial viability**

264. The public goods nature of this project outputs do not result in reflows back to the government or to GCF. Where income generation opportunities exist, these apply directly to the beneficiaries primarily as household incomes or contributions to sustain O&M (for instance, improved agricultural production and household incomes through home gardens, or fees collected by community actions groups and water associations for the maintenance of RWH and micro-aqueduct schemes). A financial analysis for the project is therefore not deemed pertinent given the proportion of financial flows at the household and community-based organisation level relative to the project costs.

265. Financial **viability** of the project investments is assured through a combination of elements that builds ownership and the technical, financial, operational and institutional capacities of the national and sub-national governments and local communities to maintain and derive economic, social, environmental benefits from the proposed investments. These aspects include: (i) Co-investments by the National Adaptation Fund. It will also leverage considerable community co-investment for the proposed activities in the installation and O&M of water solutions, home gardens and wetland restoration processes. Project will thereby promote ownership and catalyse further public sector financing to sustain beyond the project lifetime; (ii) Building on traditional systems with innovative climate-resilient technologies and best practices, particularly considering the traditional knowledge of use and management of wetlands and natural wetland channels, or the operation of micro-aqueducts and home gardens that will be enhanced with adaptation techniques and technologies, in order to continue to operate these for recurring benefits that will ensure operational and financial viability beyond the project period; (iii) Decentralized water supply solutions with capacity for local community O&M and management: The project will revive community engagement at scale and build capacity and ownership for operation and maintenance of these systems through associative arrangements. The broader programme will also promote entrepreneurship among communities and producer associations to deliver a suite of new technologies for water resilient agriculture and agro-ecosystems, drinking water and climate information. The project will particularly target women as stewards of wetland restoration, home gardening and water supply functions, which will increase livelihood options and income sources that will enable financial viability and impact of the project beyond its lifetime.

266. The result of the financial analysis for Activities 2.1.1, 2.1.2 and 2.1.3 are shown below. It could be clearly demonstrated that the investments in the activities become financially viable and the activity operationally sustainable only when the high cost MFI loans are replaced with grants from GCF.

**Activity 2.1.1 Financial Analysis**

Scenario	FIRR (%)	WACC (%)	NPV
Scenario 1) In the absence of participation from GCF, MFI loans are arranged for the households	8.52%	21.06%	-8,057,011
Scenario 2) GOC co-financing supported by the GCF participation	16.51%	6.6%	13,062,411

**Activity 2.1.2 Financial Analysis**

Scenario	FIRR (%)	WACC (%)	NPV
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Scenario 1) In the absence of participation from GCF, MFI loans are arranged for the households	12.51%	21.06%	-8,087,498
Scenario 2) GOC co-financing supported by the GCF participation	21.95%	6.6%	30,242,331

**Activity 2.1.3 Financial Analysis**

Scenario	FIRR (%)	WACC (%)	NPV
Scenario 1) In the absence of participation from GCF, MFI loans are arranged for the households	10.87%	21.06%	-1,600,550
Scenario 2) GOC co-financing supported by the GCF participation	19.62%	6.6%	4,247,541

The result of the financial analysis for Activity 4.2.1 is shown in the table below.

**Activity 4.2.1 Financial Analysis**

Scenario	FIRR (%)	WACC (%)	NPV
Scenario 1) In the absence of participation from GCF, MFI loans are arranged for the households	110%	21.06%	15,975,929
Scenario 2) GOC co-financing supported by the GCF participation	75%	6.6%	63,355,774

**E.6.4. Application of best practices**

The project will build on best practices developed through the following initiatives:

267. Water supply adaptation, resilient practices in agriculture production, wetland restoration, climate early warning system and municipal level development planning integrating climate risks, from the project *Reducing risk and vulnerability to climate change in the region of La Depresión Momposina in Colombia* (Implemented by GoC with UNDP support, funded by the Kyoto Adaptation Fund). This ongoing project is piloting adaptation measures in 3 of the 11 Municipalities of La Mojana;
- A set of climate vulnerability, hydrological, environmental and socio-economic assessments developed for the La Mojana region by the National Adaptation Fund.
  - Inclusive Rural Economic Development Strategies for transforming Colombian agriculture (IRED), implemented by UNDP in Colombia, and has developed relevant experience esp. on rural extension programmes
268. The project in addressing water-resilient agroecosystems will also build on best practices developed by national producer organizations, such as:
- Upland rice *production*, based on a climate-smart technology package developed by the Colombian Federation of Rice Producers (FEDEARROZ)
  - Enhanced livestock production techniques established by the Colombian Federation of Livestock Farmers (FEDEGAN), through their Sustainable Livestock programme;
269. Building on the above experiences, innovative additional features and technical elements include:
- The MADS-AF project promoted the installation of household level RWH, while this project will provide investment of community level RWH, with enhanced tank design and application of first-flush diverters (see tech sheet attached to the Technical Feasibility Study)
  - Local solutions for water management as seen through the Emaus initiative that developed ferrocement RWH in an area near La Mojana and has seen successful results for over 15 years.
  - The refurbishment of micro-aqueducts will use modern and enhanced technology for well protection, pumping (solar pumps), enhanced capacity of water regulation tanks and improved piping (see tech attached to the Technical Feasibility Study)

**E.6.5. Key efficiency and effectiveness indicators**

GCF core indicators	Estimated cost per t CO <sub>2</sub> eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)
	N/A

	Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)
	N/A
Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)	

## F.1. Economic and Financial Analysis

### ECONOMIC ANALYSIS

#### Approach and Methodology

270. The economic analysis of the proposed project was carried out in accordance with the *Guidelines for the Economic Analysis of Projects of United Nations Development Program*.<sup>54</sup> The economic efficiency of the investment was determined by computing the economic net present value (NPV) with an assumed 10% discount rate, and the economic internal rate of return (IRR). For consistency purposes, all proposals developed with the support of UNDP have opted to use a 10% discount rate, in line with the existing practice of multilateral development banks.
271. Economic values (costs and benefits) are all measured in real terms of 2017. Economic costs of the project are net of taxes, duties, and price contingencies. Furthermore, the analysis assumes a shadow wage rate of 1.00 for unskilled and semi-skilled labour in Colombia. Provided that the economic cost of labour in Colombia is expected to be lower than the market wage rate (financial cost), we expect this assumption leads to significantly over-estimating the economic cost of the project, and under-estimating the true net economic value of the project.
272. As is common when undertaking the economic analysis of investment projects, numerous assumptions were used to delineate the “with project scenario” from the “without project scenario”. These assumptions are presented and discussed in details below. Assumptions were always made so as to under-estimate the true net economic value of the proposed investment project.
273. Details of the economic analysis are presented in Annex XII.
274. Output 2, 3, and 4 have been subjected to an economic analysis. The cost of output 1 and 5 have been distributed across Output 2, 3, and 4 in a manner defined in Annex XII.

#### Output 2: Water supply provision

275. The project aims to provide an additional 20 liters of water per household per day across households. For purpose of sensitivity analysis, the willingness-to-pay is assumed to range between \$0.02 and \$0.08. The net present value (NPV) and internal rate of returns are presented in Table 1 below. The economic analysis shows the favorable economic efficiency of the project even at low willingness-to-pay.

**Table 1**  
**Water Supply Provision: NPV and IRR**

NPV (if WTP = 0.12)	49,440,690
NPV (if WTP = 0.08)	14,148,691
NPV (if WTP = 0.06)	- 3,497,308
NPV (if WTP = 0.04)	- 21,143,307
IRR (if WTP = 0.12)	22.0%
IRR (if WTP = 0.08)	13.6%
IRR (if WTP = 0.06)	9.1%
IRR (if WTP = 0.04)	3.7%

<sup>54</sup> UNDP. 2015. *Guidance on the conduct and reporting of the Economic and Financial Analysis of Climate Change Adaptation and Mitigation Projects and Programmes*. UNDP.

## Output 2: Ecosystem and channel restoration

276. Even under these conservative assumptions, the NPV of Output 2.2 is shown to reach in excess of \$715 million, with an internal rate of return of approximately 60.9%.

### Early warning systems

277. Early warning systems have demonstrably shown capable at saving lives. Early warning systems (EWS) have been subjected to several economic analyses around the world. The benefits include direct tangible benefits (in the form of damage avoided by households and various sectors due to appropriate responses by utilizing the lead time provided by the early warning) as well as indirect tangible benefits such as avoidance of production losses, relief and rehabilitation costs, and costs involved in providing such services. All show high economic returns, with the benefit–cost ratio ranging from 7.33 (Fiji) to 558 (Bangladesh). A key factor explaining these results is that EWSs are cost–effective ways of saving lives, preventing injuries, and reducing damage to assets and infrastructure associated with extreme events.<sup>55</sup> In this economic analysis, only the benefits of saving statistical lives are accounted for. In doing so, the analysis may significantly underestimate the total benefits of the projects as the mitigation of damages to assets and properties are not included.

278. Under conservative assumptions, this component of the project delivers positive NPV (Table 2).

**Table 2**  
**Early Warning Systems: NPV and IRR**

NPV if statistical lives saved is 2.9	\$21,753,022
NPV if statistical lives saved is 1.5	\$8,479,109
IRR if statistical lives saved is 2.9	45.9%
IRR if statistical lives saved is 1.5	26.6%

### Home gardens

279. Results from the Kyoto project show considerable income gains for households with home gardens. Households that plant a variety of garden crops, such as peppers, tomatoes, beans, and squashes have yielded incremental net incomes of approximately \$1,135 per year. This value accounts for reductions in household spending on food and any income that a household receives from selling surplus yields. For purpose of sensitivity analysis, we have assumed a value of incremental benefit of \$1,135 per garden per year, \$900, \$700, and \$500.

280. As shown in Table 3, even if net incremental benefits were less than half of what has been estimated in other projects, this output yields a positive net present value and an IRR in excess of 10%.

**Table 3**  
**Early Warning Systems: NPV and IRR**

<b>NPV if 1,135</b>	20,678,992
<b>NPV if 900</b>	13,284,633
<b>NPV if 700</b>	6,991,561
<b>NPV if 500</b>	698,489
<b>IRR if 1,135</b>	27.3%
<b>IRR if 900</b>	21.4%
<b>IRR if 700</b>	16.2%

<sup>55</sup> Teisber, T.J. and R.F. Weiher. 2009. *Benefits and Costs of Early Warning Systems for Major Natural Hazards*. Global Facility for Disaster Reduction and Recovery, World Bank. Washington, DC. Other references also include: Carsell, K.M. et al. 2004. Quantifying the benefit of a flood warning system. *Natural Hazards Review* 5(3): 131-140.

IRR if 500

10.7%

281. Overall, each key output of the project (Output 2, 3, and 4) yield a positive net present value under a set of conservative assumptions. As shown above, the results are not sensitive to scenarios where expected benefits are assumed to be significantly lower than otherwise estimated in a baseline scenario.

### Economic Efficiency of Entire Project

282. We have assessed the economic efficiency of the entire project under the worse case scenario where the willingness-to-pay for incremental water is assumed to be \$0.04, the net operational benefits of gardening is assumed to be \$500, and the number of statistical lives saved is assumed to be 1.5. The internal rate of return is estimated to be 35.9% under this worse case scenario.

283. We have also computed the economic efficiency of the project assuming that the value of statistical lives saved were to be nil (or alternatively, that the early warning system would result in no lives saved). In this circumstance, the internal rate of return of the entire project decreases to 35.3%. This result indicates that the economic efficiency of the project does not depend on including the economic benefit of saving statistical lives in the analysis.

### Financial Analysis

284. La Mojana is highly vulnerable to climate risks and has suffered repeated economic losses and damages from natural disasters over several decades. In addition, climate change induced pressures are straining the already stressed water sources in the region, affecting both supply and quality. Climate change projections forecast higher average temperatures, reductions in average overall rainfall but increases in extreme precipitation and drought across La Mojana. A new disaster and climate risk management model for La Mojana based on adaptive and not reactive solutions needs to be adopted to ensure long term resiliency to climate change scenarios. Once implemented, these measures will help local authorities better manage flooding and overcome water shortages during periods of prolonged dry seasons. The measures will significantly reduce the vulnerability of people, communities and their assets. More than 203,918 people, the total rural population residing in Colombia's La Mojana region, will be direct beneficiaries, with a further 201,707 people benefitting indirectly.

285. As indicated in the proposal, the project will deliver 4 outputs. These outputs are further classified into activities and sub-activities. In accordance with the *UNDP Guidelines for the Financial Analysis of Projects*, the financial analysis has been carried out only for activities and sub-activities that can produce direct and quantifiable benefits in monetary terms, either to the beneficiaries or to the capital providers. Only Activity 2.1.1, Activity 2.1.2, Activity 2.1.3 and Activity 4.2.1 result in direct quantifiable savings or incremental revenue generation for the beneficiaries and hence only for these activities, the financial analysis has been conducted. In monetary terms, these activities contribute to 44.41% of the total project spending of \$141.7 million.

286. For Activity 2.1.1, Activity 2.1.2 and Activity 2.1.3, when the GCF grants are replaced with high cost micro-credit from domestic MFIs, the investments turned out to be financially unviable since the Financial IRR (FIRR) computed in accordance with the GCF guidelines is lower than the WACC / hurdle rate. However, for Activity 4.2.1, even with the high cost MFI loans replacing the GCF grants, the project continued to be financially viable.

287. In summary, the financial analysis clearly demonstrates and directs that the GCF funding in the form of grant is much needed to achieve the financial viability of activities Activity 2.1.1 (RWH – Households), Activity 2.1.2 (RWH – Communities) and Activity 2.1.3 (Mini Aqueducts). It can also be seen that the Output 2,1, which comprises the above mentioned sub-activities, does not turn financially viable even under improved benefits or reduced costs, as shown by the sensitivity analysis. However, on the other hand, the financial analysis clearly indicates the financial viability of Activity 4.2.1 (Home gardens), even under stressed conditions. The financial analysis also recommends that the GCF funds, however, could be used to subsidize the high interest rates charged by the MFIs, thus leading to strengthened financial viability and operational sustainability for Activity 4.2.1.

## F.2. Technical Evaluation

288. Please provide an assessment from the technical perspective. If a particular technological solution has been chosen, describe why it is the most appropriate for this project/programme.
289. This project focuses on infrastructure facilities and services critical for enhancing and protecting life and livelihoods and reducing the impacts of weather/climate related disasters: irrigation facilities and their watersheds, climate-resilient agriculture, drinking water purification and supply, and seasonal weather forecasting and early warning. The technological approaches to deliver these services are designed to suit the local priorities and needs including the abilities to operate and maintain the infrastructure in a cost-effective way. The project builds on best practices from baseline projects and successful community-based management practices.
290. The drinking water facilities will include a combination of community water supply schemes with simple treatment, that ensures high quality drinking water. The selection of technologies depends on water quality and safe yield of the source, remoteness of the area, and socio-economic factors. Water supply with simple treatment will use the sources with acceptable raw water quality. Rainwater harvesting will target remote areas, areas with topographic constraints, women-headed households and areas having water quality issues, but will be promoted as a sustainable solution among other areas, as well. Accordingly, the design builds on the best practices in Colombia successfully as well as those being used in the MADS-AF Project at a household level.
291. The technologies to deliver improved seasonal forecasting and early warnings were identified by IDEAM on the basis of a regional EWS cluster design for La Mojana. The technology suggested and their location ensure that the data is easily assimilated and integrated into the national and FEWS system. It also ensures future operation and management in accordance to national technical expertise.

### F.3. Environmental, Social Assessment, including Gender Considerations

292. This project has completed the UNDP Social and Environmental Screening Procedure (see SESP and SEMF attached as Annex VI a & b). This screening was undertaken to ensure this project complies with UNDP's Social and Environmental Standards. UNDP's Social and Environmental Standards were reviewed by the GCF accreditation panel and deemed sufficient to accredit UNDP to submit low and medium risk projects. The overall social and environmental risk category for this project is: **moderate**. Specific project risks are listed in Section G below, together with appropriate mitigation measures.

#### Environment

293. The project is expected to have some short term small to medium scale environmental impacts particularly in relation to Output 2, resilient water supply solutions (introducing rainwater harvest and storage facilities and refurbishing existing micro-aqueducts), and the wetland channel reconditioning actions. The risks are mainly related to earth works to be undertaken for the installations of water supply small infrastructure (tanks, pipes, boreholes) and for the wetland channel works. These risks will be mitigated through the preparation of a full site evaluation to be undertaken to assess all sites. Further, any excavations, which are currently anticipated to be extremely minor, will follow the erosion and sediment control plan contained in the Environmental and Social Management Framework. The plan should contain aspects including but not limited to the installation of sediment curtains to reduce sediment movement and the quick placement of footing material. These impacts will be spatially and temporally restricted. It will be also assured that any earthworks will be undertaken during the dry season and compacted sufficiently to reduce sediment movement.
294. In terms of climate change impacts, the project will not result in the production of significant emissions. Emissions will be restricted to works associated with the development of the rainwater tank pads, the use of solar panels in place of electrical/fuel based pumping systems and the rehabilitation works undertaken in the wetland and channels that includes landscape management solutions with silvopastoral and agroforestry practices.

295. The water supply and wetland rehabilitation measures will have significant long lasting environmental and social benefits (See Section E.3.1), including the provision of year-round and safe water supply that will also have positive impact on health conditions, or the enhancements in biodiversity conservation and provision of access to water transport and fishing through the restored wetlands and channels. It should be also noted that a healthy wetland can provide significant mitigation benefits through sequestering carbon dioxide.

#### Social

296. There are limited social impacts associated with the project. These include potential beneficiary conflict on water use from communal water tanks, that will be mitigated through applying a Code of Environmental and Social Practice for the Rainwater Tanks, and through the functions of the Community Action Groups that will serve as local water associations. There is the potential for the project to impact on archaeological heritage (an extensive pre-Hispanic system of channels, ridges and embankments) when works are being undertaken on the mechanical restoration of the river channels. With proper planning and consultation with the community, and in particular Indigenous Peoples, there is less likely to be an impact to archaeological and cultural heritage in the form of the channels. Particular consultations were held with representatives of the Afro Colombian community and the Zenú indigenous people habiting La Mojana (from communities to the level of the High Regional Council of the Zenú People), and as a result an Indigenous People's Planning Framework has been developed for the project (See Annex XIII).

#### Gender

297. The project has 201,707 indirect beneficiaries, of which 49% are female. The project was designed in consultation with women's organizations and CBOs in the field and through a structured consultation (See Annex XIII for Stakeholder Consultations). As a result, a Gender Action Plan has been drawn up (See Annex XIII), specifying gender-oriented actions in each of the activities. Women's leadership is particularly recognized in activities related to ecosystem restoration, as well as in managing home gardens as a key means to ensure household food security in the face of climate change risks.

#### Grievance Redress Mechanism

298. The project has developed a Grievance Redress Mechanism to ensure any complaints or concerns are fully addressed. The project allows those that have a complaint or that feel aggrieved by the project to be able to communicate their concerns and/or grievances through an appropriate process. The Complaints Register and Grievance Redress Mechanism set out in the Environmental and Social Management Plan and to be used as part of the project will provide an accessible, rapid fair and effective response to concerned stakeholders, especially any vulnerable group who often lack access to formal legal regimes. The Grievance Redress Mechanism utilizes existing frameworks that have been proven to work in Colombia through a two tier structure.

## F.4. Financial Management and Procurement

299. The financial management and procurement of this project will be guided by UNDP financial rules and regulations available here: [https://info.undp.org/global/documents/frm/Financial-Rules-and-Regulations\\_E.pdf](https://info.undp.org/global/documents/frm/Financial-Rules-and-Regulations_E.pdf)

Further guidance is outlined in the financial resources management section of the UNDP Programme and Operations Policies and Procedures available at <https://info.undp.org/global/popp/frm/Pages/introduction.aspx>

300. UNDP has comprehensive procurement policies in place as outlined in the 'Contracts and Procurement' section of UNDP's Programme and Operations Policies and Procedures (POPP). The policies outline formal procurement standards and guidelines across each phase of the procurement process, and they apply to all procurements in UNDP. See here: <https://info.undp.org/global/popp/cap/Pages/Introduction.aspx>

301. The project will be implemented following the National Implementation Modality (NIM) following NIM guidelines available here:  
<https://info.undp.org/global/documents/layouts/WopiFrame.aspx?sourcedoc=/global/documents/frm/National%20Implementation%20by%20the%20Government%20of%20UNDP%20Projects.docx&action=default&DefaultItemOpen=1>
302. UNDP will ascertain the national capacities of the implementing partner by undertaking an evaluation of capacity following the Framework for Cash Transfers to Implementing Partners (part of the Harmonized Approach to Cash Transfers - [HACT](#)).
303. All projects will be audited following the UNDP financial rules and regulations noted above and applicable audit guidelines and policies.
304. The NIM guidelines are a formal part of UNDP's policies and procedures, as set out in the UNDP POPP which are available here: <https://info.undp.org/global/popp/Pages/default.aspx>. The NIM guidelines were corporately developed and adopted by UNDP, and are fully compliant with UNDP's procurement and financial management rules and regulations.
305. The national executing entity NAF (also referred to as the national 'Implementing Partner' in UNDP terminology), is required to implement the project in compliance with UNDP rules and regulations, policies and procedures (including the NIM guidelines). In legal terms, this is ensured through the national Government's signature of the UNDP Standard Basic Assistance Agreement (SBAA), together with a UNDP project document which will be signed by the Implementing Partner to govern the use of the funds. Both of these documents require compliance. Prior to signature of the project document, NAF as the national Implementing Partner, needs to have undergone a Harmonized Approach to Cash Transfer (HACT) assessment by UNDP to assess capacities to implement the project. During implementation, UNDP will provide oversight and quality assurance in accordance with its policies and procedures, and any specific requirements in the Accreditation Master Agreement (AMA) and project confirmation to be agreed with the GCF. This may include, but is not limited to, monitoring missions, spot checks, facilitation and participation in project board meetings, quarterly progress and annual implementation reviews, and audits at project level or at implementing partner level on the resources received from UNDP.
306. The Harmonized Approach to Cash Transfer (HACT) framework consists of four processes, namely: i) macro assessments; ii) micro assessments; iii) cash transfers and disbursements; and iv) assurance activities. Assurance activities include planning, periodic on-site reviews (spot checks), programmatic monitoring, scheduled audits and special audits. During micro-assessment, there can weaknesses identified for which actions are required to addresses the gaps. When a spot check finds that the gaps are not addressed it will mean that the level of assurance activities will have to remain higher and modalities of engaging with that implementing partner will have to be reviewed if necessary. All details are available here: <https://undg.org/wp-content/uploads/2015/02/2014-UNDG-HACT-Framework-English-FINAL.pdf>.
307. The project will be audited in accordance with UNDP policies and procedures on audits, informed by and together with any specific requirements agreed in the AMA. According to the current audit policies, UNDP will be appointing the auditors. In UNDP scheduled audits are performed during the programme cycle as per UNDP assurance/audit plans, on the basis of the implementing partner's risk rating and UNDP's guidelines. A scheduled audit is used to determine whether the funds transferred to the implementing partner were used for the appropriate purpose and in accordance with the work plan. A scheduled audit can consist of a financial audit or an internal control audit.
308. All GCF resources will be provided to the executing entity, less any agreed cost recovery amount. Under UNDP's national implementation modality, UNDP advances cash funds on a quarterly basis to the executing entity

for the implementation of agreed and approved programme activities, in accordance with UNDP standard policies and the NIM Guidelines. The executing entity reports back expenditure via a financial report on quarterly basis to UNDP. Any additional requirements will be as in accordance with the AMA as and when it is agreed.

### G.1. Risk Assessment Summary

309. RISK FACTORS ASSOCIATED WITH THE PROJECT IMPLEMENTATION INCLUDE TECHNICAL AND OPERATIONAL, SOCIAL AND ENVIRONMENTAL, and other CATEGORIES. Risks are considered to be low to moderate, and mitigation measures have been identified to minimize effects. These risks and risk mitigation measures are detailed in section G.2.

### G.2. Risk Factors and Mitigation Measures

*Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.*

#### Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
Capacity of IPs and RPs to absorb and to deliver as planned	Technical and operational	Medium (5.1-20% of project value)	Low

#### Mitigation Measure(s)

Implementation arrangements set, including: i) mechanisms to improve coordination at regional and local level (committees, platforms, communications), ii) Procurement plan and arrangements set through the NAF and UNDP to support the mobilization of funds, contracting, monitoring, and financial reporting; iii) UNDP will develop a financial capacity assessment for all regional responsible parties and will provide specific technical assistance and management support to each agency based on the results of such assessments.

#### Selected Risk Factor 2

Description	Risk category	Level of impact	Probability of risk occurring
Long term sustainability of investments	Technical and operational	Medium (5.1-20% of project value)	Medium

#### Mitigation Measure(s)

An O&M Plan will be formalized through the associative community governance mechanisms to ensure that the RWH and micro-aqueduct installations and facilities, as well wetlands will be maintained and remain operational for the long term. The Project is also providing technical capacity building for all infrastructure development and wetland management to ensure that communities and local actors know how to operate and take care of equipment and manage productive practices in a matter that sustains wetland management.

#### Selected Risk Factor 3

Description	Risk category	Level of impact	Probability of risk occurring
Environmental risks associated with earthwork during the installation of water supply facilities (tanks, pipes), and the wetland channel restoration actions.	Social and environmental	Low (<5% of project value)	Medium

#### Mitigation Measure(s)

These risks will be mitigated through preparation of a full site evaluation to be undertaken to assess all sites. Further, any excavations, which are currently anticipated to be extremely minor, will follow the erosion, drainage and sediment control plan (EDSCP) contained in the Environmental and Social Management Framework. The plan should contain aspects including but not limited to the installation of sediment curtains to reduce sediment movement and the quick

placement of footing material. These impacts will be spatially and temporally restricted. It will be also assured that any earthworks will be undertaken during the dry season and compacted sufficiently to reduce sediment movement. Throughout the earthworks there is also a potential for the release of chemicals, nutrients, heavy metals. To mitigate this part of the risk, the EDSCP will involve testing of sediment prior to movement. Furthermore, water quality monitoring for the sources will be designed to identify potential impacts in proactive manner.

**Selected Risk Factor 4**

Description	Risk category	Level of impact	Probability of risk occurring
Limited awareness and preparation of communities can impede adoption of the technologies, practices, and information advanced through the project	Technical and operational	Low (<5% of project value)	Medium

**Mitigation Measure(s)**

The following mitigation actions will be taken: i) As part of the project design, there will be a training programme for community members, community leaders, and civil authorities will raise awareness about locally important issues related to climate change and adaptation; ii) the rural extension service to be set up through the project will directly involve a network of extension workers who will support direct communication of awareness raising and technical assistance information.

**Selected Risk Factor 5**

Description	Risk category	Level of impact	Probability of risk occurring
Security issues in the region disrupt project activities	Other	Low (<5% of project value)	Low

**Mitigation Measure(s)**

Implementation will be informed by United Nations Department of Safety and Security (UNDSS) protocols, and adjustments made to workplans as appropriate.,

**Selected Risk Factor 6**

Description	Risk category	Level of impact	Probability of risk occurring
CLIMATE SHOCKS CAN LEAD TO A RISK OF DAMAGE TO THE PROJECT INVESTMENTS AFFECTING IMPLEMENTATION AS WELL AS SUSTAINED IMPACT POST-PROJECT.	Social and environmental	Medium (5.1-20% of project value)	LowLow

**Mitigation Measure(s)**

The adaptation measures for water supply and agricultural production, and wetland restoration measures will factor in projections of extreme weather events in their design. Construction elements of the project will be timed to minimize impacts during project implementation and infrastructure design. An O&M Plan will be formalized through the associative community governance mechanisms to ensure that the RWH and micro-aqueduct installations and facilities, as well as restored wetland channels will be maintained and operational to withstand projected climate events.

**Other Potential Risks in the Horizon**

*\* Please expand this sub-section when needed to address all potential material and relevant risks.*

## H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's [Performance Measurement Framework](#) under the [Results Management Framework](#).

### H.1.1. Paradigm Shift Objectives and Impacts at the Fund level<sup>56</sup>

#### Paradigm shift objectives

<i>Increased climate-resilient sustainable development</i>	<i>Increased community and local capacity to manage climate change related risk and vulnerability in La Mojana</i>
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Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	

#### Fund-level impacts

<i>A2.0 Increased resilience of health and well-being, and food and water security</i>	A2.1 Number of males and females benefiting from improved health due to safe drinking water supply despite climate shocks and stresses	Project baseline, mid-term and end term surveys.	of which 49% are women	of which 49% are women	99,832	Completed water infrastructure
	A2.2 Number of food-secure households (in areas/periods at risk of climate change impacts)		0	99,832 with access to safe drinking water	4,878	Households and communities are properly trained in the use and maintenance of water infrastructure
	A2.3 Number of males and females with year-round access to reliable water supply despite climate shocks and stresses.		0	4,878 with home gardens installed	99,832	Completed installation of home gardens
				99,382 with access to water infrastructure		

<sup>56</sup> Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that [some indicators are under refinement](#)): [http://www.gcfund.org/fileadmin/00\\_customer/documents/Operations/5.3\\_Initial\\_PMF.pdf](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf)

A4.0 Improved resilience of ecosystems and ecosystem services	.1 Area (ha) of habitat rehabilitated (e.g. reduced external pressures such as overgrazing and land degradation through logging/collecting); restored (e.g. through replanting); or protected (e.g. through improved fire management; flood plain/buffer maintenance)	Project baseline, mid-term and end term surveys.	0	40,000 Ha Under community restoration plan	40,000 Ha rehabilitated	
	4.2 Area of agroforestry projects, forest-pastoral systems, or ecosystems –based adaptation systems established or enhanced	Monitoring system created through the Project	0	40,000 Ha Under community restoration plan	40,000 Ha	

### H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
<b>Project/programme Outcomes</b>	<b>Outcomes that contribute to Fund-level impacts</b>					
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	<i>7.2: Number of vulnerable households with improved productive activities, climate related services and climate resilient plans and strategies to respond to climate variability in La Mojana</i>	Project baseline, mid-term and end term surveys Gender sensitive field surveys in the 11 municipalities	People, of which 49% are women		405,625 people, of which 49% are women	Infrastructure, adapted rural life activities and climate services are completed and implemented successfully in the 11 municipalities of La Mojana covered by project
A6.0 Increased generation and use of climate information in decision-making	<i>Number of climate information products/services in decision-making in climate-sensitive sectors developed, delivered, and used</i>	Project baseline, mid-term and end term surveys. Gender sensitive field surveys	0 products/services with none targeted to women		2 CI products/services relevant to communities that incorporate gender	Regional Forecasting Center is operational and with capacity to deliver relevant climate information. Partnerships with regional productive associations are made to identify relevant needed

					sensitive messaging	products and leverage capacities in messaging Gender considerations are appropriately identified
<b>Project/programme outputs</b>	<b>Outputs that contribute to outcomes</b>					
1. Strengthened understanding and systemizing knowledge of the impacts of climate change on water management in La Mojana	1.1 Water management in line with climate projections for the region integrated into local planning instruments (POTS, etc.) and decision making	Number of tools developed and being used in the decision making process (surveys collected through rural extension service and of municipal authorities)	3 municipalities, 0 departments, 0 (CARs)		1 government plan per municipality, 1 government plan per department and 1 government plan per local environmental authority (CARs) that streamline water management	Willingness of government and local associations to absorb knowledge specific to climate change impact on water management produced by the project  Government and local authorities are willing to adjust existing planning instruments  Alignment project implementation timeframes to cycle of planning and Government priorities  GoC coordination in place for development of land registry
	1.2 Local stakeholders have access to information and increased understanding of the impacts of climate change on water management (tools, people trained)	Training workshop reports, Staff surveys at beginning and end of training, Mid Term Review; Project Evaluation Report	0		Development and use of: 1 decision maker guide on the use of water quality and flow model, 1 multipurpose land registry incorporating territorial water management, 1 data bank.	
		Administrative manuals that detail the flow of decision making (or SSCLIMA meeting minutes) that	0 mayorships, 0 districts, 0 CARs, 0 SSCLIMA nodes		Each mayorship (11), district (4) and local environmental authorities	

		reference the active use of the water quality flow model process or information systemized within the databank in decision making			(4), and SSCLIMA nodes reference project derived information on adapted local water management in their formal decision making processes	
2. Improved access and management of water resources in the region	2.1 Number of households with year round access to reliable and safe water supply	Project baseline, mid-term and end term surveys, Mid-term review and terminal evaluation  Project baseline, mid-term and end term reviews, that includes results from wetland monitoring systems created by the Project	0		24,958 households with access to 40 L per household per day during dry period up to 120 days, meeting national quality standards	No major disaster occurs in the project locations that may delay the implementation of water infrastructure at household and community-level as well as the ecosystem restoration work.  Sufficient rainfall can be collected to help achieve water security.  Local communities are interested in taking part in the ecosystems restoration work.
	2.2 Ha of natural wetland with capacity to mitigate flooding (water flow and retention capacity)	Project baseline, mid-term and end term surveys, Mid-term review and terminal evaluation	0		40,000 Ha and 50 kms wetland channels	
	2.2 Ha of wetlands regulated under a productive landscape approach	Coverage of community restoration plans under active implementation	0		40,000 Ha	

		Signed community agreements	0		100	
3. EWS is established and implemented to protect and promote adaptive actions to climate change for agriculture and flood risk management	3.1 Percentage of population in La Mojana reached by community-based automated early warning systems and other risk reduction measures established (disaggregated by gender, locality and population dispersion).	Project baseline, mid-term and end term surveys, Mid-term review and terminal evaluation	0		100% of which 49% are women	Smooth integration of EWS into the national climate observation network
	3.1 EW alerts with regional information are timely, communicated and promote action at all levels	Products developed (bullets, forecasts), uptake of products	0		1 agromet bulletin and weekly forecasts	Sufficient capacities exists with the relevant authorities to uptake additional mechanisms under the EWS
		EWS SOP developed and applied by local environmental authorities with alert times that compare with international best practices	0		EWS SOP in 4 districts with adjoining mobilization strategies	Agro-hydrometeorological infrastructure established according to the timeline
4. Climate resilient agro ecosystems enhancing rural livelihoods	4.1 Number of technological packages developed that incorporate adaptive water management practices	Technological packages developed and recorded by KM service provider	0		10 of which 3 most be focused for women driven practices	No major disaster occurs in the project locations that may delay the implementation of the household climate resilient agroecosystems
	4.2 Number climate resilient households (food supply and correct water management i.e. treatment and use)	Project baseline, mid-term and end term surveys, Mid-term review and terminal evaluation	1300 households, MADS-AF project		4,878 households	Uptake of training and capacity building on development of climate resilient agricultural practices by local communities
	4.3 Percentage of productive units in the La Mojana implementing water adaptive productive practices	Project baseline, mid-term and end term surveys, Mid-term review and terminal evaluation	0		80% disaggregating those which are women led or made up of mainly female producers	

Activities	Description	Inputs	Description
1.1. Develop technical models and guidelines to enable decision making for long term water management planning for La Mojana	GCF funds will be used to develop a ground water flow and quality model to ascertain the long term reliance of ground water solutions- (a solution that has been implemented in the past through both legal and illegal ground water wells at a household and productive level and has become more common as water has become more scarce). The analysis for this model will include information on aquifer dynamics to understand long term sustainability in view of the existing demand as well as an inventory of legal and illegal (artisanal built) water wells to measure current demand. The model will provide an estimated lifespan of the aquifer to provide valuable information on the quantity and quality of ground water for the region	1.1.1. Develop ground water flow and quality model for La Mojana  1.1.2. Develop a guide for decision maker on how to use the information for long term adaptive planning	1.1.1 The study will provide information on the long term reliability of ground water (a preferred option for the GoC), It will also provide information on ground water quality.  1.1.2The guide will help decision makers use the ground water flow and quality model in future planning and decision making thus ensuring that the technical results are transferred into practical planning actions and decision making. Results from this model will be a key component for integrated water management and adaption plans the region.
1.2. Management of adaptation knowledge on water resources	To address the knowledge gap water management in relation to climate change projections in La Mojana, existing knowledge will be systemized and the targeted knowledge management products will be developed which will enhance local capacities and influence local development planning	1.2.1. create a data bank on adaptive water management  1.2.2. Develop training material and targeted workshops.	The data bank will systematize the lessons learned from the GCF Project and will serve to develop knowledge management tools created to target stakeholders in the region such as municipal authorities, community councils, community leaders, extension workers, productive associations and national authorities.  This will include the development of training material (web courses, workbooks, planning guides, etc.) and targeted workshops.
2.1. Establish Climate Resilient Water Solutions	Prolonged dry periods and flooding have created a strain in water resources, particularly in the rural dispersed communities (8,040 households). A tailored integrated approach will be provided for the most vulnerable communities, those that require adaptation of existing infrastructure (aqueducts), and those that require a longer-term more sustainable solution which potentially combines multiple alternative sources.	2.1.1. Provide household water solutions for the most water vulnerable populations  2.1.2. Provide community water solutions for water vulnerable populations  2.1.3. Adaptation of existing water infrastructure solutions in the region	Rainwater harvesting solutions at household or communal level for the most dispersed and water vulnerable households. This includes provision of tanks, roofs (and supporting equipment), water filters where necessary.  Community rainwater harvesting solutions for rural households without access to water infrastructure and for rural schools and new public buildings.  Climate proofing and repairing existing aqueducts to increase water access and management during flooding and dry periods
2.2. Increase resilience of natural ecosystems	Wetland restoration and recovery of water causeways that has been negatively affected by the change of	2.2.1. Establish an integrated wetland	Landscape analysis, and community consultation for restoration of wetlands and wetland channels. A system for

<p>and ecosystems-based livelihoods</p>	<p>natural dynamics in La Mojana. Local communities, especially women, will be involved in the restoration activities supported by cash for work programmes. Options for alternative livelihoods will be identified for those whose livelihoods will be permanently affected by the restoration works.</p>	<p>restoration plan and monitoring system</p> <p>2.2.2. Implementing community restoration plans for integrated wetland restoration plan</p> <p>2.2.3. Create ecosystem compatible livelihoods</p> <p>2.2.4. Enhance women leadership in ecosystem restoration</p> <p>2.2.5. Develop code of practice for cattle livestock along the wetlands</p>	<p>wetland monitoring will also be established to measure its capacity for water management including flooding mitigation.</p> <p>Implementation of community restoration plans by the communities themselves using a landscape productive approach. An estimated 100 integrated wetland restoration plans will be implemented to cover the entire restoration area.</p> <p>Identification of options for livelihoods compatible to wetland management through a participatory process with local communities combined with market analysis.</p> <p>Empowerment of and support to women-led and related associations to lead the restoration process to ensure sustainability of the restoration process.</p>
<p>3.1. Strengthen monitoring and early warning systems</p>	<p>Enhance existing EWS to be regionally-specific and link existing monitoring systems to the national system. An integrated EWS to be established that includes flood and prolonged dry period and the specific impacts on agriculture and public health.</p>	<p>3.1.1. Consolidation of the available climate and risk data for the region</p> <p>3.1.2. Integration of hydrological and regional models</p> <p>3.1.3. Provide hydromet equipment and forecasting and</p>	<p>Consolidation of hazard and risk maps, and consolidation of all available data for La Mojana from national and regional sources in GDB format to ensure that data is consolidated and in a format for integration to national network</p> <p>Construction of meteorological models to improve forecasts as well as capacity building on modeling to local experts and integrating real time data into FEWS system.</p> <p>Purchase of hydromet and forecasting hard and software to ensure coverage of the 11 municipalities in La Mojana as well as to provide the system</p>

		<p>data processing software</p> <p>3.1.4. Capacity building to generate alert products based on continuous monitoring of all regional stations</p> <p>3.1.5. Enhance capacity to reach communities with early alert messaging and ensure actionable results</p>	<p>requirements to enhance forecasting and real time data monitoring.</p> <p>Capacity building will be focused on identifying the specific alerts and messaging that is required to address climate and weather information user needs.</p> <p>Capacity building on EWS protocols and mobilization strategies, the design of emergency evacuation plans at a community level as well as the provision of communication equipment (radio) to the RMLC (11 total) to ensure a direct communication line to community leaders in the case of emergencies.</p>
4.1. Conduct Agroecosystems livelihood diversification research	<p>Reduced access to sustainable water sources has created a negative impact in the agro productive capacity of La Mojana. Currently there is limited information on productive alternatives to improve water use and compensate for the lack of productivity. Research will be conducted on adapted agroecosystems through a local university who will work jointly with the productive associations to research water efficient best practices for adapted agriculture, crop rotation and livestock production adapted to the region, and their market impact. Investigation will be made to identify more resilient local seed varieties that can provide alternative productive livelihoods for the region. Information derived from this activity will be packaged in technological packages to be used for climate resilient agriculture extension service in Activity 4.2.</p>	4.1.1. Conduct agroecosystems livelihood diversification research	<p>A local university will as a service provider to conduct and house research on water efficient best practices for the main productive activities in the region (livestock, agriculture, rice) and identify market impact of native seed varieties and crops that would enable crop rotation. The service provider will package the information to be shared at a community level through productive associations and the rural extension programme</p>
4.2. Improve water resource management in household-level food production	<p>Establish agro-diverse home-gardens at household level for those households negatively affected by floods and prolonged dry periods. New and existing home-gardens will be upgraded to use climate resilient water and soil management practices. Enhancing resilience of the home-gardens includes research on existing crop varieties used to determine climate-resilient crops as an adaptive measure.</p>	<p>4.2.1. Improving irrigation for water conservation</p> <p>4.2.2. Enable crop diversification for climate change</p>	<p>Provide home garden good practice construction kits to build the home-garden, including grey water re-use through homemade filters, crop shading, irrigation pipework and other organic agricultural inputs.</p> <p>Establish nurseries for crop research, knowledge exchange and promote use of adapted crops across households</p>

<p>4.3. Enhance climate resilient agro-extension programmes</p>	<p>An integrated technical assistance programmes for local farmers to implement climate resilient water management practices.</p>	<p>4.3.1. Design a technical assistance programme</p> <p>4.3.2. Capacity building of local farmers through training programmes developed using research conducted to develop the technical assistance programme.</p>	<p>Technical assistance programme will be developed with support from universities and agricultural sector associations, communities and especially women's group. This includes water supply practices, wetland restoration, agro-ecosystems and early warning systems.</p>
<p>5.1 Programme Management</p>	<p>Staffing of project management team including project manager, regional coordinators and administrative support to guide the implementation and monitoring of the project.</p>	<p>5.1.1 Hiring of project management team</p>	<p>Hiring of project manager, administrative support team and four regional coordinators</p>

## H.2. Arrangements for Monitoring, Reporting and Evaluation

310. Project-level monitoring and evaluation will be undertaken in compliance with the UNDP POPP and the UNDP Evaluation Policy.
311. The primary responsibility for day-to-day project monitoring and implementation rests with the Project Manager. The Project Manager will develop annual work plans to ensure the efficient implementation of the project. The Project Manager will inform the Project Board and the UNDP Country Office of any delays or difficulties during implementation, including the implementation of the M&E plan, so that the appropriate support and corrective measures can be adopted. The Project Manager will also ensure that all project staff maintain a high level of transparency, responsibility and accountability in monitoring and reporting project results.
312. The UNDP Country Office will support the Project Manager as needed, including through annual supervision missions. The UNDP Country Office is responsible for complying with UNDP project-level M&E requirements as outlined in the UNDP POPP. Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP Regional Technical Advisor as needed. The project target groups and stakeholders including the NDA Focal Point will be involved as much as possible in project-level M&E.
313. A project inception workshop will be held after the UNDP project document has been signed by all relevant parties to: a) re-orient project stakeholders to the project strategy and discuss any changes in the overall context that influence project implementation; b) discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms; c) review the results framework and discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E plan; d) review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; e) plan and schedule Project Board meetings and finalize the first year annual work plan. The Project Manager will prepare the inception report no later than one month after the inception workshop.

The final inception report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board.

314. A project implementation report will be prepared for each year of project implementation. The Project Manager, the UNDP Country Office, and the UNDP Regional Technical Advisor will provide objective input to the annual PIR. The Project Manager will ensure that the indicators included in the project results framework are monitored annually well in advance of the PIR submission deadline and will objectively report progress in the Development Objective tab of the PIR. The annual PIR will be shared with the Project Board and other stakeholders. The UNDP Country Office will coordinate the input of the NDA Focal Point and other stakeholders to the PIR. The quality rating of the previous year's PIR will be used to inform the preparation of the next PIR. The final project PIR, along with the terminal evaluation report and corresponding management response, will serve as the final project report package.
315. An independent mid-term review process will be undertaken and the findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the final half of the project's duration. The terms of reference, the review process and the final MTR report will follow the standard templates and guidance available on the [UNDP Evaluation Resource Center](#). The final MTR report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board. The final MTR report will be available in English.
316. An independent terminal evaluation (TE) will take place no later than three months prior to operational closure of the project. The terms of reference, the review process and the final TE report will follow the standard templates and guidance available on the [UNDP Evaluation Resource Center](#). The final TE report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board. The TE report will be available in English. The UNDP Country Office will include the planned project terminal evaluation in the UNDP Country Office evaluation plan, and will upload the final terminal evaluation report in English and the management response to the public UNDP Evaluation Resource Centre (ERC) ([www.erc.undp.org](http://www.erc.undp.org)).
317. The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure in order to support ex-post evaluations.
318. A detailed M&E budget, monitoring plan and evaluation plan will be included in the UNDP project document.
319. UNDP will perform monitoring and reporting throughout the Reporting Period in accordance with the AMA. UNDP has country presence and capacity to perform such functions. In the event of any additional post-implementation obligations over and above the AMA, UNDP will discuss and agree these with the GCF Secretariat in the final year of the Reporting Period and will prepare a post Reporting Period plan and budget for approval by the GCF Board as necessary.

## I. SUPPORTING DOCUMENTS FOR FUNDING PROPOSAL

- NDA No-objection Letter
- Feasibility Study
- Integrated Financial Model that provides sensitivity analysis of critical elements (xls format, if applicable)
- Confirmation letter or letter of commitment for co-financing commitment (If applicable)
- Project/Programme Confirmation/Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – see *the Accreditation Master Agreement, Annex I*
- Environmental and Social Impact Assessment (ESIA) or Environmental and Social Management Plan (If applicable)
- Appraisal Report or Due Diligence Report with recommendations (If applicable)
- Evaluation Report of the baseline project (If applicable)
- Map indicating the location of the project/programme
- Timetable of project/programme implementation

\* Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.