



# ESTIMATED INVESTMENT NEEDED TO ADDRESS CLIMATE CHANGE IN COLOMBIA



<http://www.undpcc.org/en/colombia>

Colombia's villagers struggle with water shortages, which threaten to jeopardize the livelihood of nearly 3.5 million Colombians who depend on the agriculture sector, as well as the 10% of the GDP that are based on agriculture. Photo: United Nations

→ Climate change induced by anthropogenic activities is a barely doubted reality, and the agriculture sector, which is highly dependent on climate conditions, is a critical sector within the changing face of the earth-atmosphere system. This is even more true and worrisome for developing countries which depend heavily on the agricultural sector as Colombia and which are known to suffer stronger climatic irritations, with developing countries having limited resources, technology and preparation to cope with climate change and Colombia is no exception. The main measures to tackle climate change in the agricultural sector in Colombia require US\$ 2.81 billion, of which US\$ 2.08 billion are required for mitigation activities and US\$ 0.73 billion for adaptation.

In this context, it is of vital importance to Colombia to define national priorities to tackle climate change in the agricultural sector, as well as investment and financial flows (I&FF) required to implement them. So the assessment of I&FF was focused on the agricultural sector, to support efficient planning of mitigation and adaptation measures required to address climate change.

The assessment of investment and financial flows (I&FF) is one component of the global UNDP project "Capacity

Development for Policy Makers to Address Climate Change." Colombia is one of the 20 countries participating in the project worldwide. The project is funded by the governments of Norway, Switzerland, Spain, Finland, UNDP and United Nations Foundation.

## Selection of key sectors

The **agriculture** sector contributed 9.1% to the GDP during the period between 2000 and 2009, and many economically important crops (banana, coffee, sugarcane, beans, cassava, potato, rice and corn) are exposed to severe impacts of climate change. There is also a large potential for mitigating climate change in the sector, as according to the national inventory of greenhouse gas (GHG) (IDEAM, 2010) the agricultural sector contributed significantly (38.1%) to national GHG emissions. Since the sector has importance for climate change adaptation to as well as mitigation of climate change in Colombia, was analyzed from both perspectives.

Within the agriculture sector, the focus was laid on rice and livestock production.

## Institutional arrangements

An Ad-hoc Steering Committee for the project was established comprising representatives of the Ministry of Environment, Housing and Territorial Development, the Ministry of Agriculture and Rural Development, the National Planning Department and the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) that reviewed the assessments and provided recommendations.

The information used in the assessment was provided by the following organizations: National Department of Planning, National Bureau of Statistics, Ministry of

Agriculture and Rural Development, Institute of Hydrology, Meteorology and Environmental Studies of Colombia, and the Geographical Institute Agustín Codazzi.

The underlying economic, environmental and social assumptions that define the various scenarios were also agreed through inter-ministerial dialogues. Under his leadership, both UNDP and the Instituto Torcuato di Tella provided backstopping to the national teams based on their international experience.

In Latin America, the global project has been reinforced through the UNDP regional initiative “Climate Policy 2012,” which provided additional technical and financial support to amplify the impact of this process in the region.

## ASSESSMENT OF INVESTMENT AND FINANCIAL FLOWS

### Objectives of the Investment and Financial Flows Assessment

The overall objective of the I&FF assessment is to determine the extent and sources of funds needed to address climate change at the national level, and builds directly on national government strategies, plans and programmes from Colombia. In essence, the assessment seeks to answer the question: *“From a development perspective, what can my country do to address climate change in selected key sectors, and what level of financial contributions will be needed to achieve these objectives?”* In this context, the national I&FF team considered the following questions:

- What are the main adaptation / mitigation measures for the selected sectors in the next 25 years?
- Who is investing in the sector / Who are the main stakeholders and sources?
- What changes / increases in I&FF will be needed in the sectors?
- What additional I&FF are needed to address climate change?

For the agricultural sector first a baseline scenario was developed and then a mitigation scenario and an adaptation scenario to determine the investment flows (IF) and financial flows (FF) necessary to implement the measures between 2005-2030. The values are given in constant 2005 US\$. The investment entities analyzed are: households (private investments), companies (private and NGOs) and government (public funds).

Many of the measures analyzed are relevant for both mitigation and on adaptation. Nevertheless, in order to

present the I&FF needed separately for mitigation and adaptation, the I&FF of each measure were assigned according to its primary reason. For example, the primary reason for reducing the amount of water consumption for rice production is to reduce CH<sub>4</sub> emissions, but it also helps producers to adapting to the decreased availability of water and to reduce their dependence on it, in that case the I&FF of this measure was charged to the mitigation measures and not to adaptation.

### For the agriculture sector (mitigation of greenhouse gas emissions)

- Infrastructure and Equipment: Public investment - Construction, improvement and maintenance of infrastructure of the sector. Acquisition and production of equipment, materials and supplies. Private investment - Agricultural or forestry machinery (US\$ 311.8 million);
- Technical Cooperation and Social Protection: Rice - Reducing water consumption and fertilizer use. Better management of crop residues in the field. Livestock - intensification and diversification of production systems (US\$ 52.7 million);
- Research and Information Management: Rice - Better handling of crop residues after harvest. Using nitrogen-fixing fungi. Biological nitrification of soil. Livestock - Use of alternative sources of fertilization. Using grasses to for soil nitrification (US\$ 4.9 million);
- Development: Livestock - Intensification and diversification of production systems (US\$ 36.2 million); and
- Crops: Rice - Reducing water consumption (US\$ 1.68 billion).

### For the agriculture sector (adaptation to impacts of climate change)

- Infrastructure and Equipment: Rice – Adequate zoning of existing irrigation areas. Increasing irrigated area. Livestock - Management and conservation of water through water storage or increased irrigation systems (US\$ 186.7 million);
- Research and Information Management: Rice - Development of new resistant varieties. Livestock - Improvement of animal’s adaptability to heat. Making animal species more efficient in converting feed into meat or milk (US\$ 9.5 million);
- Support: Rice – Developing crop insurance. Livestock – Recovering pastures (US\$ 70.8 million); and
- Cultivation: Rice - improved growing systems to reduce the seasonality of production. Livestock - Recovery of degraded pastures (US\$ 463.6 million).

## EVALUATION OF POLICY IMPLICATIONS FROM THE I&FF ASSESSMENT

*For the agriculture sector (mitigation of greenhouse gas emissions and adaptation to the impacts of climate change)*

- Income redistribution policies with environmental standards and social programs: Establish instruments to internalize environmental costs generated by intensive agricultural production and other large-scale agriculture activities to put the costs on those that degrade the environmental quality of ecosystems.
- Water resources management policies: Preservation of watersheds and integration of hydrological information in the management of the agriculture sector, and establish monitoring systems. Control of water use at different scales.
- Land policy: Securitization and formalization of land tenure as a key incentive for inhabitants to implement mitigation and adaptation measures. Advocating the promotion of agro-silvopastoral systems.
- Policies for the promotion of research: Promote interagency partnerships among key stakeholders to promote the research on genetic resources to identify, conserve and present promising varieties and rescued native materials.
- Policy recommendations for mitigation: Prioritize measures such as water management (in Cucuta and Jamundí) and crop residue management (the Espinal).

*Case Study on 'Panela': Colombia's I&FF team completed the project with a detailed study of mitigation opportunities in the production of brown sugar from sugar cane (known as 'panela'), conducted by the organization 'Fedepanela'. The technologies of steam and heat recirculation in traditional stoves were analyzed as mitigation mechanisms in the industrial production of panela within various areas of the country. These systems can save up to 50% of heat loss in the production system and thus reduce fuel consumption and GHG emissions. According to the I&FF methodology, the investment and financial flows associated with these mitigation alternatives have been estimated. The conversion to this improved approach would involve a significant investment for producers, but could be initiated through state subsidies or foreign funds, and could be promoted through the certification of the project emission reductions under the Clean Development Mechanism. This would be the recommendation of the study, resulting from the field results as well as the socio-economic, institutional and financial analysis.*

## SUMMARY TABLES OF INCREMENTAL INVESTMENT COSTS

Table 1: Cumulative undiscounted I&FF for all investments in each sector, by investment entity and funding source. Incremental cumulative (2005-2030) sectoral investments (million 2005 US\$)

Investment entity	Funding source	Agriculture (Mitigation)				Agriculture (Adaptation)			
		ΔIF	ΔFF	ΔO&M	ΔTotal	ΔIF	ΔFF	ΔO&M	ΔTotal
Households	Total household funds	414.7	2.2	585.3	1,002.3	220.3	-	104.3	324.6
Corporations	Corporations	-	-	-	-	-	-	-	-
	National	-	-	-	-	-	-	-	-
	Foreign	426.0	2.4	601.2	1,029.6	226.3	-	107.1	333.4
Government	Internal	-	-	-	-	-	-	-	-
	External	-	-	-	-	-	-	-	-
	Total government funds	40.1	3.1	-	43.2	16.7	29.2	-	46.0
<b>Total</b>		<b>880.8</b>	<b>7.7</b>	<b>1,186.6</b>	<b>2,075.1</b>	<b>463.3</b>	<b>29.2</b>	<b>211.4</b>	<b>703.9</b>

IF = Investment Flows, FF = Financial Flows, O&M = Operation and Maintenance Costs  
 ΔI&FF = Incremental changes of Investment and Financial Flows, ΔO&M = Incremental changes of Operation and Maintenance Costs  
 Source: National I&FF assessment

Regarding adaptation: Recommended measures include crop insurance (rice) and the recovery of degraded pasture (livestock).

- Policies for social risk management and food security: Build contingency plans and implement adaptation measures that increase the adaptability of crops and land. Also prioritize the implementation of measures to the poorest and most vulnerable parts of the population.
- Corporate Strategy for the articulation of policies and actions on mitigation and adaptation: Under the programme Conpes 3700: Working with the Executive Committee of Climate Change and with Regional

Climate Change Nodes to coordinate the actions recommended in the assessment with the National Adaptation Plan Climate Change and Development Strategy Colombian Low Carbon (currently in development).

- Articulate the recommended measures in the assessment with the National Climate Change Adaptation Strategy Colombian Low Carbon Development (under development). Working with the Executive Committee of Climate Change and Regional Climate Change Nodes for territorial management and effective decentralization of policy and strategies of climate change.

**Table 2: Annual I&FF and O&M for all investments in each sector.**  
Incremental annual sectoral investments (million 2005 US\$)

Year	Agriculture (Mitigation)				Agriculture (Adaptation)			
	ΔIF	ΔFF	ΔO&M	ΔTotal	ΔIF	ΔFF	ΔO&M	ΔTotal
2005	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-
2015	58.1	0.3	5.4	63.8	32.9	0.7	1.5	35.1
2016	61.6	0.5	12.3	74.3	31.2	0.7	3.0	34.9
2017	65.2	0.6	22.9	88.7	32.8	0.7	4.5	38.0
2018	65.2	0.6	33.6	99.4	32.8	0.8	6.0	39.5
2019	65.3	0.6	44.3	110.2	32.7	0.8	7.5	41.0
2020	68.9	0.9	55.9	125.6	32.7	0.9	9.0	42.6
2021	69.0	0.9	67.5	137.4	32.6	1.0	10.5	44.1
2022	54.6	0.4	75.5	130.5	32.6	1.2	12.1	45.8
2023	54.6	0.4	83.5	138.4	26.6	1.4	13.7	41.6
2024	54.6	0.4	91.4	146.4	26.5	1.6	15.3	43.5
2025	55.6	0.4	99.2	155.2	25.1	2.0	17.0	44.1
2026	59.2	0.4	107.0	166.5	25.0	2.4	18.7	46.1
2027	62.7	0.4	114.8	177.9	25.0	2.8	20.4	48.2
2028	27.5	0.4	119.6	147.5	25.0	3.3	22.2	50.5
2029	27.6	0.4	124.4	152.4	24.9	4.0	24.1	53.0
2030	31.2	0.4	129.2	160.8	24.9	4.8	26.1	55.8
<b>TOTAL</b>	<b>880.8</b>	<b>7.7</b>	<b>1,186.6</b>	<b>2,075.1</b>	<b>463.3</b>	<b>29.2</b>	<b>211.4</b>	<b>703.9</b>

IF = Investment Flows, FF = Financial Flows, O&M = Operation and Maintenance Costs  
ΔI&FF = incremental changes of Investment and Financial Flows, ΔO&M = incremental changes of Operation and Maintenance Costs  
Source: National I&FF assessment



#### Knowledge platform

The project website [www.undpcc.org](http://www.undpcc.org) contains information on activities in Colombia, the I&FF methodology, and many other resources in English, French, Spanish and Russian.

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#### More information on activities in Colombia

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