



December, 2009



[www.worldbank.org/lacagcnotes](http://www.worldbank.org/lacagcnotes)

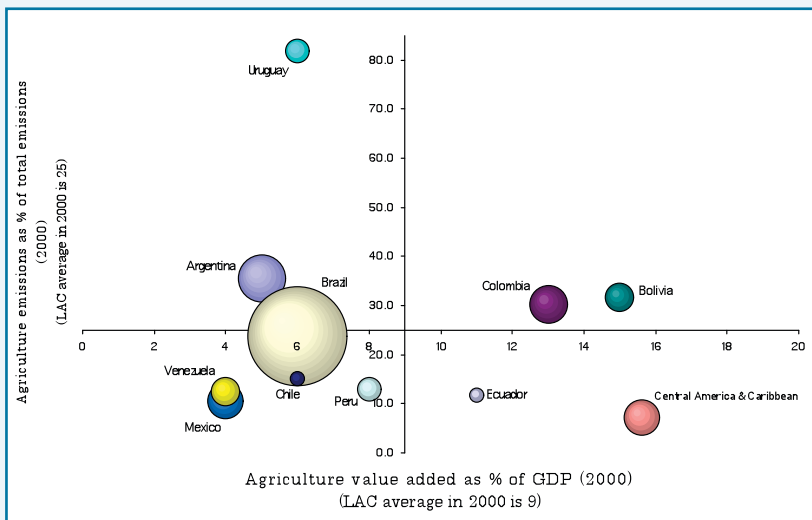


# GUATEMALA

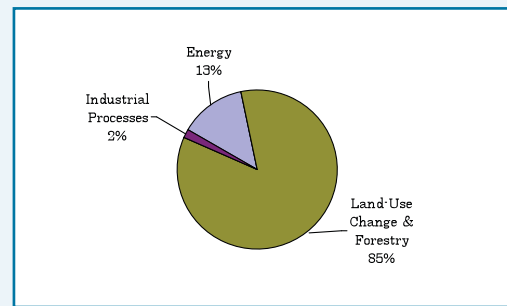
## Country Note on Climate Change Aspects in Agriculture

**This Country Note briefly summarizes information relevant to both climate change and agriculture in Guatemala, with focus on policy developments (including action plans and programs) and institutional make-up.**

**Contribution of agriculture (without LUCF) to the economy and to emissions in LAC countries**  
(size of bubble in MTCO<sub>2</sub> of LUCF emissions; axes cross at LAC average)

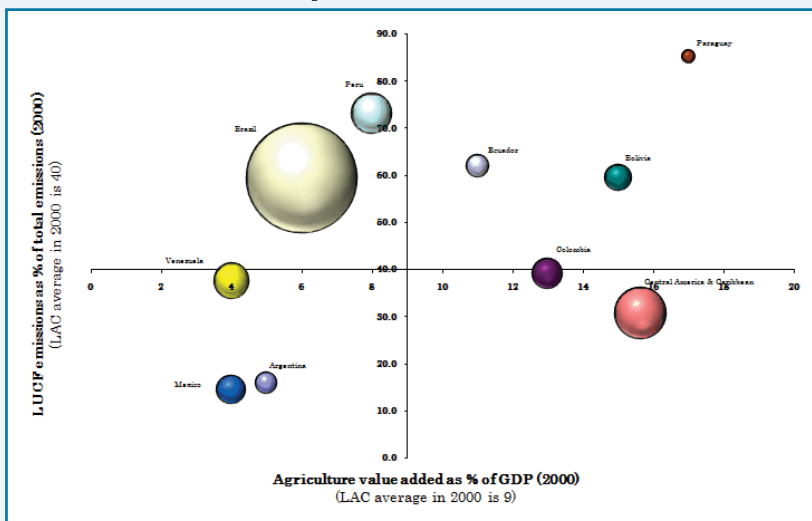


**Percent of GHG emissions in CO<sub>2</sub> equivalent, by sector (2000)**

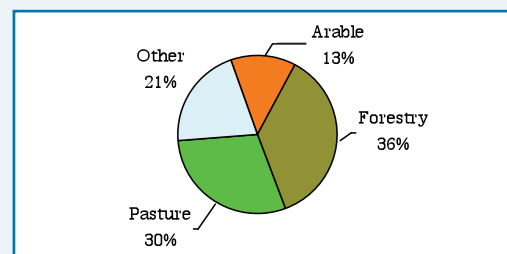


Source: World Resources Institute <http://cait.wri.org>

**Contribution of agriculture to the economy and of LUCF to emissions in LAC countries**  
(size of bubble in MTCO<sub>2</sub> of LUCF emissions; axes cross at LAC average)

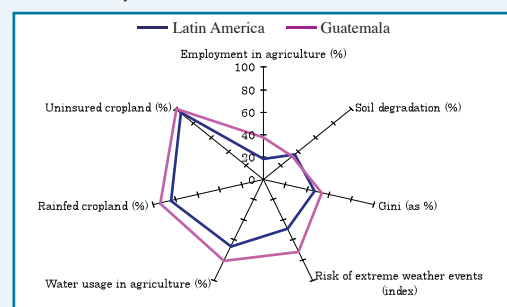


**Land use (2005)**



Source: World Development Indicators

**Vulnerability Indicators**



**Note:** Employment in agriculture (% of total employment)\*; Rainfed cropland (% of total cropland)\*; Gini\*; Water usage in agriculture (% of total annual fresh water withdrawals)\*; Uninsured cropland (% of total cultivated land area)\*\*; Soil degradation (% of total land)\*\*\*; Risk of extreme weather events (index; annual average 1997-2006)\*\*\*\*

**Sources:** \*World Development Indicators 2007, 2000-2007 average; \*\*IADB, IICA, 2002/2003 figures; \*\*\*FAO AGL 2005<sup>1</sup>; \*\*\*\*Germanwatch

**Note:** In the first bubble graph, the total emissions for Uruguay do not account for the positive effects of LUCF (i.e. afforestation efforts). If they are considered, agriculture represents 22% of total emissions. Because of afforestation efforts in Uruguay and Chile, land use change and forestry (LUCF) is not a net contributor to emissions; hence the countries do not appear in the second bubble graph, but are considered in the calculation of the average in the vertical axis.

<sup>1</sup> <http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp?country=GTM&search=Display+map+%21>

## Table of Contents

### Summary

<b>1. The Climate Context</b> .....	1
1.1. Country Projections .....	1
1.2. Agriculture-Related Impacts .....	2
<b>2. The Policy Context</b> .....	2
2.1. National Climate Change Plans, Strategies and Programs .....	2
2.2. Regional Initiatives .....	2
2.3. Agricultural Sector Initiatives .....	4
<b>3. The Institutional Context</b> .....	4
3.1. Inter-Sectoral Coordination .....	4
3.2. Agricultural Sector Institutions .....	4
3.3. Fostering Capacity to Deal with Climate Change .....	5
<b>4. The Impact of Agriculture on Climate Change - Mitigation Measures</b> .....	5
4.1. Action Frameworks .....	5
4.1.1. Forestry and Land Use Change .....	5
4.1.2. Livestock .....	6
4.2. Carbon Trading and Agriculture .....	6
<b>5. Impact of Climate Change on Agriculture - Adaptation Measures</b> .....	7
5.1. Action Frameworks .....	7
5.1.1. Land Management .....	7
5.1.2. Water Use .....	7
5.2. Social Aspects and Interventions .....	7
5.3. Insurance Instruments .....	8

## Summary

Like most countries in Latin America, Guatemala has submitted one national communication to the United Nations Framework Convention on Climate Change (UNFCCC). Land use change and forestry are by far the largest contributors to GHG emissions in the country. The emission reduction potential of the sector is large, but not sufficiently explored. Guatemala counts with 8 CDM projects, one of which is in the agricultural sector. It is estimated that Central America produces less than 0.5% of global carbon emissions, but it is one of the most vulnerable regions to climate change related impacts on the planet<sup>2</sup>. Agriculture is highly vulnerable to climate variability and weather extremes, this coupled with problems of land degradation in the country. A greater emphasis on reducing soil degradation, reforestation and developing and applying adequate insurance mechanisms can be placed for better management of public resources in light of natural disasters in the agriculture sector.

## Working definitions

**Agriculture** is defined as a managed system of crops, livestock, soil management, forest resources (productive use, goods & services) and water resources (irrigation), including land use and land use change. **Climate change** encompasses both **mitigation** and adaptation activities within the agricultural sector. On the mitigation side, the focus is on the potential to reduce green house gas emissions by the different sub-sectors. On the **adaptation** side, the focus is on the potential to build resilience to climate and to increase the adaptive capacity through sustainable management of agriculture and other complementary factors (e.g. financial instruments). There is no specific **time frame** used in the country notes. An effort was made to collect the most recent available information on country indicators and policy matters.

### Acknowledgments:

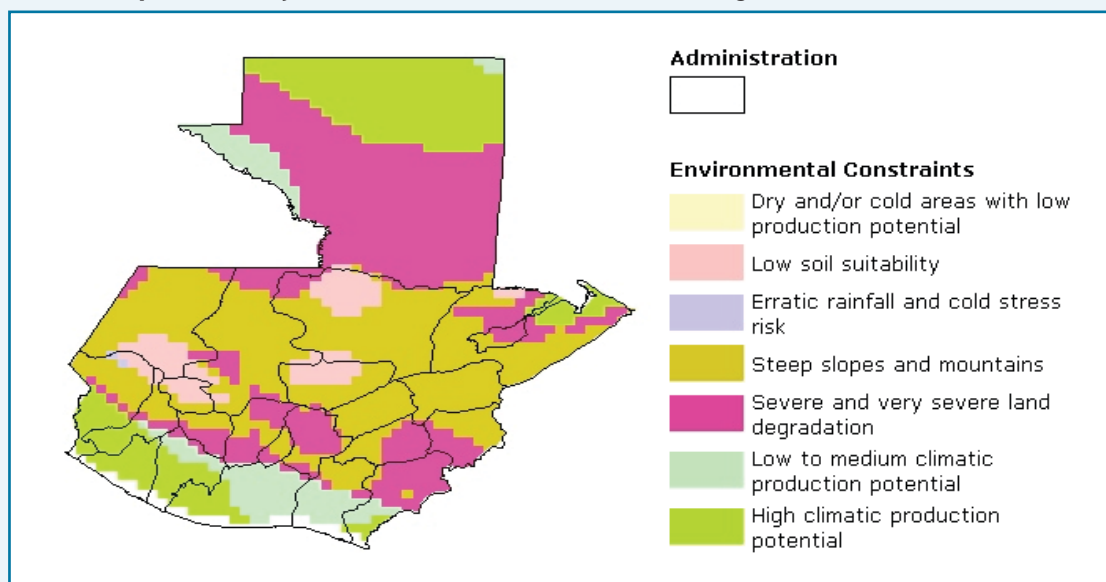
This *Country Note* was produced by a World Bank team of specialists (in agriculture, forestry, social development, risk and knowledge management) from the Latin America and the Caribbean region and other units of the World Bank. The team is very grateful for all the comments and suggestions received from the focal points on climate change and agriculture in many of the countries.

<sup>2</sup> <http://www2.ohchr.org/english/issues/climatechange/docs/submissions/Guatemala.pdf>, pg.6

## 1. The Climate Context

The baseline map provides a visual characterization of Guatemala's agricultural potential given current environmental constraints and their regional distribution. Around 43% of Guatemala's land is used for agriculture (30% for pasture and 13% for cultivation), with forestry occupying 36% of the land in the country (WDI, 2005).

### Baseline map: Current Major Environmental Constraints related to Agricultural Potential



Source: FAO Note: For more maps on Guatemala and agricultural resources, go to <http://www.fao.org/countryprofiles/Maps/GTM/04/ec/index.html>

### 1.1. Country Projections

Based on climate scenarios developed for the First National Communication for the year 2050, the following climatic changes with relevance to the agricultural sector are to be expected in Guatemala:

- a) **temperature increases** – it is probably that the temperature will increase by the year 2050 between 1.5°C (optimistic scenario) and 4.5°C (pessimistic scenario) with the month of May being the hottest one with temperatures exceeding 28°C; an expansion of the areas with higher temperatures is to be expected at the expense of the one where currently there are lower temperatures such as the mountainous areas.
- b) **precipitation reduction** – all three scenarios (optimistic, moderate, pessimistic) point to an average reduction in precipitations by the year 2050 for the trimester July-September with the month of August presenting the most severe reduction; this will lead to an intensification of the heat wave period with serious implications for agriculture.
- c) **expansion of semi-arid areas** – it is expected that evapo-transpiration will increase due to temperature increases and precipitation reduction, resulting in the expansion of semi-arid areas under all three scenarios analyzed, including under the scenario predicting precipitation increases (UKHI scenario).

- d) **increase in sea level** – it is probable that the sea level will increase anywhere between 6.05-7.4cm by the year 2030, between 9.71-13.37cm by the year 2050 and between 17.71-33.25cm by the year 2100.

In recent years (between 2001 and 2007) storms and droughts have had the highest human and economic impact in Guatemala, with losses for the period 1997-2006 averaging 0.51% of GDP – 485,662 people (around 5% of the country's population) have been affected by storms (3 events) with the cost of the damages reaching US\$1 billion and 113,596 people (around 1% of the country's population) have been affected by droughts (1 event) with the cost of damages reaching US\$14 million<sup>3</sup>. The damage inflicted by Hurricane Stan alone amounted to economic losses totaling 3.1% of GDP in 2004. Guatemala's catastrophe classified the country as second in the list of ten countries most affected by natural disasters in 2005 in terms of number killed/100,000 inhabitants<sup>4</sup>.

In terms of vulnerability, 1.53% of the total land area of the country is under extremely high threat of drought, 3.53% is under very high threat and 5.99% under high threat, according to the Ministry of Agriculture, Livestock and Food Supplies (MAGA).

## 1.2. Agriculture-Related Impacts

According to the Guatemalan Ministry of Agriculture, Hurricane Stan, which hit the country in 2005, damaged an agricultural area of 720,000 hectares. The estimated crop losses were estimated to be 50% in the case of yellow maize, 80% for black beans, 30% for white maize, 90% for banana, sorghum and sesame and 5% for sugar cane. It is also estimated that in some areas of the western departments, 100% of the small livestock died as a consequence of the disaster<sup>5</sup>. In terms of maize and bean production, the drought of 2009 resulted in 15,735 ha affected in the department of Chiquimula, 14,501 ha in the department of Jutiapa and 10,521 ha in the department of Zacapa.

## 2. The Policy Context

Like most countries in the region, Guatemala has submitted only one **National Communication**<sup>6</sup> to the **United Nations Framework Convention on Climate Change (UNFCCC)**<sup>7</sup> in December 2001, laying out the analytical basis for its policy response to climate change and its commitment to take future actions within an official international framework. It established the First National GHG Inventory with 1990 as its base year, it included the results of vulnerability studies to climate change for forestry and water resources and it established options for reducing GHG emissions for the forestry sector.

### 2.1. National Climate Change Plans, Strategies and Programs

The **National Climate Change Program**<sup>8</sup>, in the **Ministry of Environment and Natural Resources**, is in charge of analytical work related to climate change and global warming in general, studies of carbon sequestration under the clean development mechanism and for technical and scientific support to institutions affected by climate change (forests, water resources, basic grains, etc.).

### 2.2. Regional initiatives

#### Institutions:

The **Central American Commission on Environment and Development**<sup>9</sup> (CCAD, Spanish acronym) is a regional institution in charge of the environmental agenda of the region. It

<sup>3</sup> [http://www.emdat.be/Database/CountryProfile/countryprofile2.php?disgroup=natural&country=gtm&period=1999\\$2008](http://www.emdat.be/Database/CountryProfile/countryprofile2.php?disgroup=natural&country=gtm&period=1999$2008)

<sup>4</sup> <http://www.reliefweb.int/rw/RWB.NSF/db900SID/EGUA-72ZP3S?OpenDocument>

<sup>5</sup> <http://www.reliefweb.int/rw/RWB.NSF/db900SID/EGUA-72ZP3S?OpenDocument>

<sup>6</sup> <http://unfccc.int/resource/docs/natc/guanc1.pdf>

<sup>7</sup> [www.unfccc.int](http://www.unfccc.int)

<sup>8</sup> [http://www.marn.gob.gt/Portal\\_cambio\\_climatico/index.html](http://www.marn.gob.gt/Portal_cambio_climatico/index.html)

<sup>9</sup> [www.ccad.ws](http://www.ccad.ws)

counts with an information portal -Ecoportal<sup>10</sup>- which includes information on various environmental issues from the region, including information on climate change issues (programs, plans, initiatives) in all the Central American countries.

The **Regional Technical Assistance Unit**<sup>11</sup> (**RUTA**, Spanish acronym) is a common initiative of the governments of the seven Central American countries and seven international development agencies aimed at fostering the sustainable development and reduction of poverty in rural areas of Central America. Amongst its working areas are the environment and natural resources and the Central American agricultural policy.

### Projects:

The **Project Forests and Climate Change in Latin America**<sup>12</sup> (**PBCC**, Spanish acronym) financed by the Food and Agriculture Organization (FAO) and the government of the Netherlands with the headquarters in Honduras and realized in coordination with the **Central American Commission on Environment and Development**<sup>13</sup> (**CCAD**, Spanish acronym) was developed with the purpose of helping Central American countries develop the mitigation potential of forests to climate change and to take advantage of the opportunities offered by the Clean Development Mechanism. As part of this, it launched a **Central American Series on Forests and Climate Change**<sup>14</sup> for Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama and a regional one. These eight publications describe the mitigation potential of forests and the legal and institutional framework for each Central American country and for the region. It also includes a regional document presenting the overall situation of the region in the Clean Development Mechanism.

The Project on **Capacity building for Stage II adaptation to climate change (Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama)** is funded through the GEF Trust Fund and is implemented by UNDP. Central America, Mexico and Cuba serve as the pilot region for elaborating and applying an Adaptation Policy Framework for preparing adaptation strategies, policies and measures. The application of this framework will demonstrate how policy for adaptation can be integrated into national sustainable development for at least three human systems: water resources, agriculture and human health. This demonstration project builds upon the Stage I vulnerability and adaptation assessments of the Initial National Communications of the eight participating countries of the region and will prepare them to move onto Stage III Adaptation. The outputs of the project, Stage II adaptation strategies may be used for preparing second National Communications<sup>15</sup>.

### Programs:

The **Regional Strategic Program for Management of Forest Ecosystems**<sup>16</sup> (**PERFOR**, Spanish acronym) designed for the period 2008-2012 has as a main objective the improvement of forest management in Central America and the Dominican Republic. Among others, it aims to position the forest agenda in the inter-sectoral agenda of the **Regional Agro-environmental Strategy (ERA)**, Spanish acronym), thus contributing to poverty reduction, reduction of vulnerability to climate change events and to mitigation and adaptation to climate change.

A **Regional Climate Change Strategy**<sup>17</sup> for Central America is currently in preparation and will include five areas: i) vulnerability and adaptation; ii) mitigation; iii) institutional and

<sup>10</sup> <http://www.ccad.ws/ecoport/cambio/camnica.html>

<sup>11</sup> [www.ruta.org](http://www.ruta.org)

<sup>12</sup> <http://www.fao.org/regional/honduras/pbcc/Descripcion.htm>

<sup>13</sup> <http://www.ccad.ws/>

<sup>14</sup> [http://www.ccad.ws/forestal/pp\\_regional.htm](http://www.ccad.ws/forestal/pp_regional.htm)

<sup>15</sup> [http://unfccc.int/files/adaptation/adverse\\_effects\\_and\\_response\\_measures\\_art\\_48/application/pdf/200609\\_background\\_latin\\_american\\_wkshp.pdf](http://unfccc.int/files/adaptation/adverse_effects_and_response_measures_art_48/application/pdf/200609_background_latin_american_wkshp.pdf)

<sup>16</sup> <http://www.sica.int/ccad/program.aspx?IdEnt=2>

<sup>17</sup> <http://www.sica.int/ccad/temporal/LINEAMIENTOS.pdf>

capacity development; iv) education, public awareness and v) international management. The initial guidelines for this strategy have been approved in April 25, 2008, an action plan should be completed within six months from the approval of the guidelines and the strategy should be finished within one year. The strategy will represent a key instrument for future climate change adaptation and mitigation actions in the region.

The **Central American Forest Program**<sup>18</sup> (**PROCAFOR**, Spanish acronym), is a program financed by the Finnish Cooperation, aimed at improving the well-being of rural communities through sustainable forest management in the region.

### 2.3. Agricultural Sector Initiatives

## 3. The Institutional Context

The **Ministry of Environment and Natural Resources**<sup>19</sup> (**MARN**, Spanish acronym) is the national authority on environment in the country and is the designated national authority on climate change and in particular, on Clean Development Mechanism (CDM) in Guatemala. The Ministry counts with a **Climate Change Unit**<sup>20</sup> (**UCC**, Spanish acronym) created in September 2001 whose main activities are the analysis of climate change, carbon sequestration studies, to offer technical and scientific support to institutions in charge of areas affected by climate change (forests, water, basic grains) and participation in risk and early warning activities related to climate variability and global warming.

#### 3.1. Inter-Sectoral Coordination

The **National Council on Climate Change** (**CNCC**, Spanish acronym) was created in July 1997 and its purpose is to be a national consultation entity between the Ministry of Environment and Natural Resources and the rest of the Guatemalan society and sectors of the economy on all issues related to climate change. The Commission is formed of officials from the various Ministries, among these the **Ministry of Agriculture, Livestock and Food** (**MAGA**, Spanish acronym) and the **National Environmental Commission** (**CONAMA**, Spanish acronym).

The **National Commission on Joint Implementation**, also known as the **Guatemalan Office in Joint Implementation** (**OGIC**, Spanish acronym) was created in June 1997 and has as a main role the technical follow-up on projects of Joint Implementation as well as to create a multitude of actions designed to facilitate the development of projects within the framework of the United Nation Framework Convention on Climate Change.

#### 3.2. Agricultural Sector Institutions

The **Ministry of Agriculture, Livestock and Food**<sup>21</sup> (**MAGA**, Spanish acronym) is an institution whose objective is to promote the development of agriculture and livestock by formulating, monitoring and evaluating the policies, strategies and programs of the farming and livestock sector. The Technical Division of Irrigation and Drainage is in charge of regulating irrigation activities for the agricultural sector through the existing **Master Plan for Irrigation and Drainage** (**PLAMAR**, Spanish acronym).

The **National Forest Institute** (**INAB**, Spanish acronym) performs studies on improvement of seed banks, diagnostics on the current state of the Clean Development Mechanism in

<sup>18</sup> <http://www.elsalvadorforestal.com/nota.php?id=53>

<sup>19</sup> [www.marn.gob.gt](http://www.marn.gob.gt)

<sup>20</sup> [http://www.marn.gob.gt/Portal\\_cambio\\_climatico/index.html](http://www.marn.gob.gt/Portal_cambio_climatico/index.html)

<sup>21</sup> [www.maga.gob.gt](http://www.maga.gob.gt)

Guatemala, research on the effects of forest fires and it performs forest inventories in the various regions of the country.

### 3.3. Fostering Capacity to Deal with Climate Change

**Emissions inventories:** Guatemala counts with only one national GHG Inventory with 1990 as its base year. It includes information on agriculture, land use change and forestry, providing disaggregated information by type of emission and type of agricultural resource.

**Studies related to climate change and agriculture:** several vulnerability studies have been carried out for Guatemala in preparation for the First National Communication: vulnerability studies for basic grain production, water resources and for the forestry sector.

The World Bank published a flagship document for the entire region of Latin America and the Caribbean titled "Low carbon, High Growth: Latin American Responses to Climate Change"<sup>22</sup>, encompassing information on climate change impacts in the region, on the potential contribution to mitigation efforts as well as a listing of future low carbon-high growth policies.

## 4. The Impact of Agriculture on Climate Change - Mitigation Measures

According to the First National Communication, agriculture combined with land-use change and forestry account for 83% of total GHG emissions in the country in 1990, a large portion of these being the emissions of methane (CH<sub>4</sub>) from enteric fermentation from farm animals (96% of total CH<sub>4</sub> emissions). Rice cultivation accounted for 0.1% of total CH<sub>4</sub> emissions from the agricultural sector. Furthermore, agriculture is responsible for 95% of total nitrous oxide emissions (mostly from handling of manure from farm animals), 13% of total nitrogen oxides emissions (mostly from burning of agricultural waste). Guatemala's carbon dioxide emissions per capita in 2004 stand at 1tCO<sub>2</sub>/capita, compared to the Latin America region of 2.6tCO<sub>2</sub>/capita and the world at 4.5tCO<sub>2</sub>/capita<sup>23</sup>.

### 4.1. Action Frameworks

#### 4.1.1. Forestry and Land Use Change

According to the First National Communication, the land-use change and forestry sector accounted for 43% of total CO<sub>2</sub> emissions in 1990 (3,244.553 Gg CO<sub>2</sub>). However, the amount of CO<sub>2</sub> absorption in 1990 far exceeded the total emissions leading to a total balance of 39,659.174 Gg CO<sub>2</sub> captured by this sector. The CO<sub>2</sub> absorption was mostly due to changes in forests and abandoning of farmland followed by natural regeneration of forests. Over half of Guatemala's forest, as well as nearly two-thirds of its deforestation occur in the northern Petén region, which is subtropical moist forest. These forests also have high carbon stocks.

The average annual deforestation rate for 1990-2000 is 1.7%<sup>24</sup>. Migratory agriculture, through the practice of slash and burn, accounts for 78.5% of deforestation activities in the country, livestock accounts for 10% and commercial agricultural accounts for 0.5%. Farm activities along with cattle ranching account for 89% of land-use change in Guatemala<sup>25</sup>.

According to a series of studies on Central American Forests and Climate Change<sup>26</sup>, including Guatemala, 6.5% of the national territory (0.7 million hectares) qualify as areas that could

<sup>22</sup> [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/02/27/000334955\\_20090227082022/Rendered/PDF/476040PUB0Low0101Official0Use0Only1.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/02/27/000334955_20090227082022/Rendered/PDF/476040PUB0Low0101Official0Use0Only1.pdf)

<sup>23</sup> [http://hdrstats.undp.org/countries/country\\_fact\\_sheets/cty\\_fs\\_GTM.html](http://hdrstats.undp.org/countries/country_fact_sheets/cty_fs_GTM.html)

<sup>24</sup> World Development Indicators, 2005

<sup>25</sup> <http://unfccc.int/resource/docs/natc/guanc1.pdf>

<sup>26</sup> [http://www.ccad.ws/forestal/pp\\_regional.htm](http://www.ccad.ws/forestal/pp_regional.htm)

be used for Clean Development Mechanism (CDM) projects for the period 2003-2012. In terms of the actual carbon sequestration capacity of the country without CDM projects, an estimated sequestration of 14 million tons carbon could be achieved on 131,027 hectares for the period 1997-2000. By developing CDM projects, it is estimated that Guatemala could capture around 89 million tons of carbon by the year 2012, due to reforestation projects under the CDM and due to existing national reforestation projects under the **Program for Forest Incentives (PINFOR)**.

The First National Communication identifies the following actions needed to be taken to reduce GHG gases from this sector: forest conservation and soil improvement, increased efficiency in forest management, increase of forest cover through reforestation, afforestation activities and agro-forestation practices as well as promotion of environmental services.

The **Program for Forest Incentives**<sup>27</sup> (**PINFOR**, Spanish acronym) has been implemented by the **National Forest Institute (INAB**, Spanish acronym) to stimulate the sustainable forest management through investments in afforestation and reforestation activities and management of natural forests. The program consists of a cash payment from the government to forestland owners and will be active until 2017. In terms of achievements of this program for the period 1997-2007, 73,416.2 ha have been reforested, 137,063.1 ha of natural forest have passed under protection and production management and 162,000 jobs have been created in the rural area.

#### 4.1.2. Livestock

Livestock is responsible for 93.5% of methane (CH<sub>4</sub>) emissions in 1990, the majority being from enteric fermentation from farm animals (96%) and the rest from handling of farm manure (4%). The handling of farm manure also leads to the emission of 33% of the total nitrous oxide (N<sub>2</sub>O) emissions for 1990 (6.497 Gg N<sub>2</sub>O).

#### 4.2. Carbon Trading and Agriculture

Under the Clean Development Mechanism (CDM), developed (also referred to as Annex I) countries can implement project activities that reduce emissions in developing (non-Annex I) countries. Though the CDM is expected to generate investment in developing countries, especially from the private sector, and promote the transfer of environmentally-friendly technologies in that direction, the global share of agricultural sector projects (including afforestation and reforestation) is very small (5.71% of total registered projects globally as of December 2009)<sup>28</sup> and the potential is country-specific. Latin America, as a region, currently holds the largest share of registered agricultural projects globally, 61% (75 projects).

As of December 2009, there are 10 registered projects in Guatemala, representing a very small share of projects (1%) in LAC. Currently, there is 1 registered CDM project in agriculture in Guatemala and there are no projects registered under the "afforestation and reforestation" category<sup>29</sup>. This is a shortcoming given the impact of the sector on GHG emissions in the country.

The World Bank has mobilized a fund to demonstrate projects that sequester or conserve carbon in forest and agro-ecosystems. The BioCarbon Fund, a public/private initiative

<sup>27</sup> [http://www.ccad.ws/forestal/pp\\_nacional.htm](http://www.ccad.ws/forestal/pp_nacional.htm)

<sup>28</sup> <http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByScopePieChart.html>

<sup>29</sup> <http://cdm.unfccc.int/Projects/projsearch.html>



administered by the World Bank, aims to deliver cost-effective emission reductions, while promoting biodiversity conservation and poverty alleviation. In principle, the BioCarbon Fund can consider purchasing carbon from a variety of land use and forestry projects; its current portfolio includes Afforestation and Reforestation, Reducing Emissions from Deforestation and Degradation and the Fund is currently exploring innovative approaches to account for agricultural soil carbon.

## 5. Impact of Climate Change on Agriculture - Adaptation Measures

### 5.1. Action Frameworks

#### 5.1.1. Land Management

The main crops cultivated in Guatemala are corn, beans, rice, sorghum and wheat. According to climate change scenarios to analyze the vulnerability of basic grain production to climate change in Guatemala for the year 2030, increases in temperature of 1.7°C (optimistic scenario), 1.2°C (normal scenario) and 2.4°C (pessimistic scenario) along with variation in precipitation ranging from average 6% increases (optimistic scenario) to 18% decrease (pessimistic scenario) for corn, beans and rice will mainly lead to yield decreases as follows: i) yield increases for corn of up to 15% or yield decreases of up to 34% depending of the zone; ii) dramatic yield decreases of up to 66% for beans for zone 3 of the valley of Asuncion Mita Jutiapa and Monjas Jalapa or modest yield increases of up to 3% for the farmlands of Amatitlán, San José Pinula, Palencia and Villa Nueva and iii) yield decreases of up to 27% for the lower areas of the Polochic river basin.

Land degradation in Guatemala stands at 32.47%, very close to the Latin America average of 35%.

#### 5.1.2. Water Use

Agriculture accounts for 74% of total water usage in the country. It is estimated that 2.94 million hectares are suited for agricultural production, representing 27% of the total national territory. Of these, 2.6 million hectares are suited to be irrigated. The actual area under irrigation is 133,803 hectares (5% of total). Of these, 15% are made up of state irrigation districts and the rest of 85% belong to the private sector<sup>30</sup>. Irrigated is mainly concentrated on the Atlantic Coast, on the High Plains and in the lower coastal areas of the Pacific. The main crops irrigated are: sugar cane (51% of total), followed by basic grains and vegetable fields (27%), banana (14%) and fruit trees (8%)<sup>31</sup>.

According to the vulnerability study for water resources realized for the First National Communication, the moderate and pessimistic scenario show a future probable reduction in the superficial water flow of between 10% (under the moderate scenario) and up to 50% reduction (pessimistic scenario) for some departments. This reduction in the water flow, along with the predicted temperature increases and precipitation reduction will result in a lower water supply for irrigation in agriculture.

### 5.2. Social Aspects and Interventions

More than half of Guatemala's population (51.8%) lives in rural areas and about 70.5% of rural residents live in poverty<sup>32</sup>. A study of the National Statistics Institute (ENCOVI 2000)

<sup>30</sup> <http://www.aguayclima.com/pdf/capitalhidricososdelagua-guatemala.pdf>

<sup>31</sup> <http://www.fao.org/nr/water/aquastat/countries/guatemala/indexesp.stm>

<sup>32</sup> <http://www.ruralpovertyportal.org/english/regions/americas/index.htm>

showed that households producing non-traditional agricultural products (snow peas, sprouts, broccoli, etc. – see Reference for complete list) have better socioeconomic indicators than those producing traditional products (coffee, sugar, bananas, cardamom). In addition, landless households demonstrated better social and economic indicators. About half of rural households are landless and seeking salaried non-farm jobs (in construction, manufacturing, etc.) or abroad. The majority of landless households are non-indigenous. Employment in agriculture is 39% of total employment.

**ProVention Consortium, Community Risk Assessment and Action Planning Project<sup>33</sup>:** is a toolkit for disaster preparedness and risk prevention that uses participatory research methods (community interviews and workshops; assignment of community focal points, etc.). Once a community identifies key risks and vulnerabilities, it develops an action plan for prevention and/or mitigation of risks. Risks could be associated with natural disasters (hurricanes, earthquakes, floods, etc.) or other threats e.g., conflict, environmental health hazards and epidemics.

The **Communities of Nuestra Señora del Carmen zone 12 y Anexo Forestal zone 13<sup>34</sup>:** aimed at promoting mitigation actions and disaster prevention through the various services offered by the Guatemalan Red Cross.

**Guate Solidaria Rural<sup>35</sup>:** is a strategic poverty reduction policy aiming to reduce rural poverty by half by 2015. Consists of a combination of benefits to improve human capital in rural areas such as feeding programs in schools, school infrastructure improvements, awareness-raising on better nutrition within the community, improvement of health, water and sanitation infrastructure. It targets 41 rural municipalities.

**Central American Indigenous and Peasant Coordination Association<sup>36</sup> (ACICAFOC,** Spanish acronym): a community-based organization working with rural communities across Central America to exchange information and promote the sustainable use of natural and cultural resources. It works in the following areas: Community forest management; Community management of water and environmental services; Local eco-tourism and agro-ecotourism; Sustainable production and commercialization. Its **Sustainable Watch** project created a network of NGOs and CSOs in Asia, Africa to promote consistent qualitative monitoring of sustainable development within countries and raise emerging issues to national and international attention. Focal points for this project in Central America so far are Guatemala, Nicaragua and El Salvador.

### 5.3. Insurance Instruments

Agricultural insurance was first introduced in Guatemala in 1998 by a private company to protect corn against drought risk. After Hurricane Mitch (1998) agriculture insurance started to become an issue in the Government's agenda, which led to the project "Guateinvierte" which subsidizes up to 70% of agriculture insurance premiums of producers that have access to the credit guarantee scheme of the program. However, demand has not increased significantly, although there has been a steady increase in agricultural insurance coverage. All of the insurance being offered is MPCI.

<sup>33</sup> <http://www.proventionconsortium.org/?pageid=43>

<sup>34</sup> <http://www.proventionconsortium.org/themes/default/pdfs/CRA/Guatemala2.pdf>

<sup>35</sup> [http://www.segeplan.gob.gt/index.php?option=com\\_remository&Itemid=58&func=fileinfo&id=79](http://www.segeplan.gob.gt/index.php?option=com_remository&Itemid=58&func=fileinfo&id=79)

<sup>36</sup> <http://en.acicafoc.org/>

The Government of Guatemala has one instrument in place that supports the agriculture sector in managing climate risks, **GUATEINVIERTE**. This is a program (a fund) that guarantees lines of credit from private banks to the agriculture sector. As part of the guarantee scheme, the banks are required to request agricultural insurance coverage from borrowers. The program can subsidize up to 70% of insurance premiums according to the crop and location of the farmer. However, a farmer that does not intend to request credit from the Banks does not have access to the subsidy.

In terms of regional initiatives aimed to support the development of agricultural insurance in Central America, the **Inter American Federation of Insurance Companies**<sup>37</sup> (**FIDES**, Spanish acronym) groups the different agricultural insurance companies in Latin America. They currently provide technical assistance to the private insurance sector of Nicaragua, Guatemala and Honduras for developing agricultural insurance and are being financed by Grants from the World Bank, CABI and Inter American Development Bank.

The following is a list of government entities and donors involved in initiatives relating to climate risk management for agriculture in Guatemala:

**1. Public sector:**

- a) **MAGA:** The Ministry of Agriculture was the promoter and designer of Guateinvierte. They play a key role in establishing the public policy agenda for promoting agriculture insurance.

**2. Donors:**

- a) **WB:** The Bank is supporting La Ceiba (an insurance company) in developing agriculture (index-based) insurance contracts. The Bank has also undertaken a pre-feasibility for using weather-data grids to fill in the meteorological information gaps in areas where there are no meteorological stations.
- b) **IADB and CABI:** They are currently financing work through the association of insurance companies (AGIS) for strengthening the regulatory framework and information platform for the development of agriculture insurance.

<sup>37</sup> [www.fides.com](http://www.fides.com)



### **About *Country Notes on Climate Change Aspects in Agriculture...***

The **Country Notes** are a series of country briefs on climate change and agriculture for 19 countries in Latin America and the Caribbean region, with focus on policy developments (action plans and programs), institutional make-up, specific adaptation and mitigation strategies, as well as social aspects and insurance mechanisms to address risk in the sector. The **Country Notes** provide a snapshot of key vulnerability indicators and establish a baseline of knowledge on climate change and agriculture in each country. The **Country Notes** are the beginning of a process of information gathering on climate change and agriculture. The **Country Notes** are “live” documents and are periodically updated.



LATIN AMERICA AND THE  
CARIBBEAN REGION  
AGRICULTURE AND RURAL  
DEVELOPMENT TEAM

### **Feedback**

For comments and/or suggestions, please contact Svetlana Edmeades at [sedmeades@worldbank.org](mailto:sedmeades@worldbank.org)

