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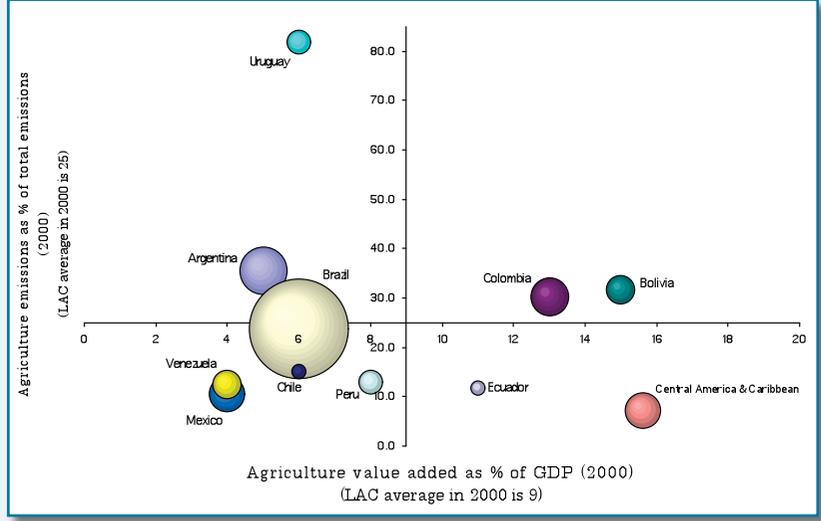
# COSTA RICA

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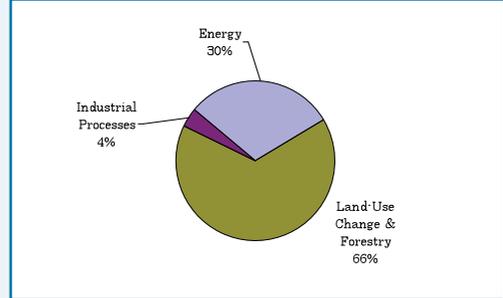
### Country Note on Climate Change Aspects in Agriculture

This Country Note briefly summarizes information relevant to both climate change and agriculture in Costa Rica, 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)

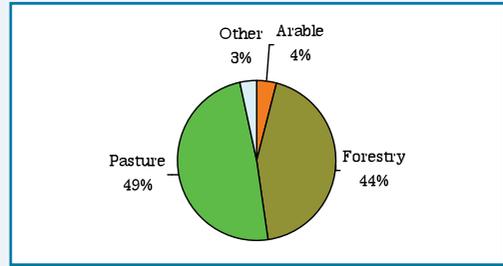


Percent of GHG emissions in CO<sub>2</sub> equivalent, by sector (2000)



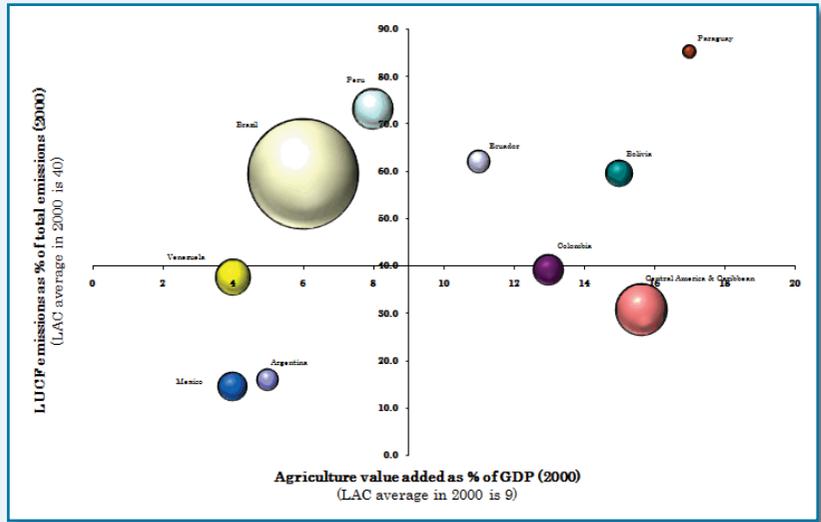
Source: World Resources Institute <http://cait.wri.org>

Land use (2005)

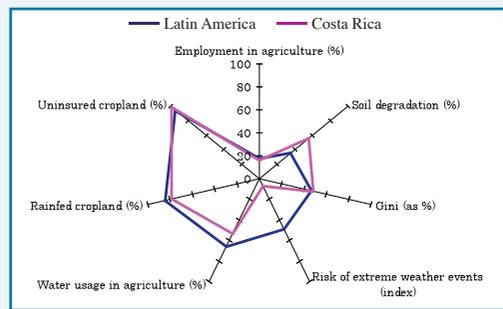


Source: World Development Indicators

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)



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=CRI&search=Display+map+21>

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## Summary

Like most countries in Latin America, Costa Rica has submitted one national communication to the United Nations Framework Convention on Climate Change (UNFCCC) with a second one under preparation. Land use change and forestry are the largest contributors to GHG emissions in the country. The emission reduction potential of the sector is large and several reforestation programs have been initiated. 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, this coupled with problems of land degradation in the country. A greater emphasis on reducing soil degradation 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:

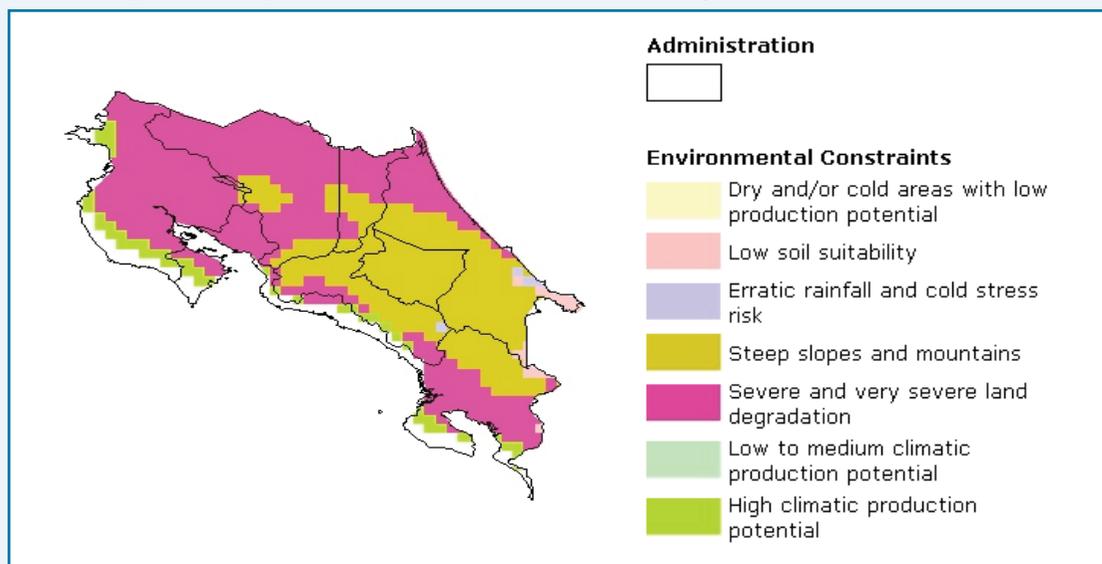
This *Country Note* was produced by a World Bank team of specialists (in agriculture, forestry, social development, risk and knowledge management) from the Latin America and the Caribbean region and other units of the World Bank. The team is very grateful for all the comments and suggestions received 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 Costa Rica's agricultural potential given current environmental constraints and their regional distribution. Around 53% of Costa Rica's land is used for agriculture (49% for pasture and 4% for cultivation), with forestry occupying 44% 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 Costa Rica and agricultural resources, go to <http://www.fao.org/countryprofiles/Maps/CRI/04/ec/index.html>

### 1.1. Country Projections

According to the First National Communication and to climatic models developed for this, the following is to be expected in Costa Rica by the year 2100:

- a) **increases in temperature** – it is probable that the highest temperature increases of 3.8°C will be registered in Region I (north-west of the country), followed by Region IV (south-east of the country) with 3.5°C and Region II (north-east of the country) with 3.2°C, all during the month of May and June.
- b) **decreases in precipitation** – the highest precipitation decreases with maximums registered during the month of March (-63%) are registered in region I (north-west of the country), followed by region II (north-east of the country) with up to 49% decreases during the month of April and region IV (south-east of the country) with 46% reduction during the month of March.
- c) **increases in sea level** – it is estimated that the sea levels will increase by up to 1m under a pessimistic scenario by 2100 leading to high tide flooding of the coastal line.

According to the Second National Communication and to the PRECIS model developed to project future climatic changes, the following regional changes in precipitation and temperature should be expected by 2100:

- a) increases in temperature in all regions ranging from 3-8°C rise in the maximum for the Pacific-North to 2-4°C for the Pacific South and Caribbean region

- b) changes in precipitation patterns – precipitation decreases in the Pacific North (13-24%), Central (16-23°C), the Eastern Central Valley of the Caribbean Region and the north of the Central Pacific region and increases in the Southern part of the Central Pacific region, Southern Pacific and the Caribbean coastal area.

In recent years (between 2001 and 2008), floods and storms have had the highest human and economic impact in Costa Rica – 106,000 people have been affected by floods (8 events) with the cost of damages reaching US\$ 106 million and 55,000 people have been affected by storms with the cost of damages reaching US\$21 million<sup>3</sup>.

## 1.2. Agriculture-Related Impacts

According to a climate change study in Costa Rica<sup>4</sup>, using general circulation models and assuming a temperature increase of between 1-2°C and a precipitation variation of between +/- 10-20%, the result has been a decrease yields in crops. Even if the positive effect of daily increase of precipitation on crop yields were to be isolated, when the effect of temperature increase is added (especially the maximum value of the temperature), a significant decrease in crop yields is observed.

Costa Rica has submitted two national communications to the **United Nations Framework Convention on Climate Change**<sup>5</sup> (UNFCCC), laying out the actions that the government has already taken and the analytical basis for its policy response to climate change and its commitments to take future actions within an official international framework. The **First National Communication**<sup>6</sup> established the First National GHG Inventory with 1990 as its base year and included an identification of adaptation and mitigation options to climate change for the water sector and coastal areas, as well as agriculture and forestry.

The **Second National Communication**<sup>7</sup> was submitted in October 2009 and has a revised National Greenhouse Gas Inventories for 2000 and 2005, policies and mitigation measures for greenhouse gas absorption, vulnerability studies and adaptation measures to climate change, a chapter on technology transfer, as well as other pertinent information related to the achievement of the Convention.

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

The **National Climate Change Plan**<sup>8</sup>, created within the **Ministry of Environment and Energy** and coordinated by the **National Meteorological Institute**<sup>9</sup> (IMN, Spanish acronym) and the Costa Rican **Office for Joint Implementation (OCIC, Spanish acronym)**, is in charge of conducting research related to the GHG inventory, vulnerability studies, analysis of mitigation and adaptation measures and of research studies in preparation for the National Communication.

The Costa Rican government marked the creation of the **National Strategy for Climate Change**<sup>10</sup> (ENCC, Spanish acronym) as a top priority for its 2006-2010 agenda. Through this national policy, it is required from all public institutions, local governments and autonomous institutions to produce and put into execution a short, medium and long term action plans containing clear goals around the six main pillars of the strategy: mitigation, vulnerability and adaptation, precise metric system, development of national capacity and technology transfer, education and public awareness and financing. The mitigation pillar has as its main goal to make the country carbon neutral by 2021.

## 2. The Policy Context

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

<sup>4</sup> [http://www.mag.go.cr/congreso\\_agronomico\\_XI/a50-6907-III\\_367.pdf](http://www.mag.go.cr/congreso_agronomico_XI/a50-6907-III_367.pdf)

<sup>5</sup> [www.unfccc.int](http://www.unfccc.int)

<sup>6</sup> <http://unfccc.int/resource/docs/natc/cornc1.pdf>

<sup>7</sup> <http://unfccc.int/resource/docs/natc/cornc2.pdf>

<sup>8</sup> <http://www.imn.ac.cr/publicaciones/Programa%20nacional.pdf>

<sup>9</sup> [www.imn.ac.cr](http://www.imn.ac.cr)

<sup>10</sup> [www.encc.go.cr](http://www.encc.go.cr)

At the sub-national level, Costa Rica counts with a Climate Change Strategy for the Region Huetar Norte<sup>11</sup>, consisting of five main pillars: a) mitigation of greenhouse gases, b) vulnerability and defining adaptation measures, c) greenhouse gas inventory, d) development of local capacities and e) public awareness and education. The objective is to make the Region of Huetar Norte the first carbon-neutral area of the country by 2021.

## 2.2. Regional initiatives

### Institutions:

The **Central American Commission on Environment and Development**<sup>12</sup> (**CCAD**, Spanish acronym) is a regional institution in charge of the environmental agenda of the region. It counts with an information portal- Ecoportal<sup>13</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>14</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>15</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>16</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>17</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>18</sup>.

### Programs:

The **Regional Strategic Program for Management of Forest Ecosystems**<sup>19</sup> (**PERFOR**, Spanish acronym) designed for the period 2008-2012 has as a main objective the improvement of forest

<sup>11</sup> <http://cglobal.imn.ac.cr/Pdf/estrategia/Estrategia%20de%20Cambio%20Climatico%20para%20la%20Region%20Huetar%20Norte.pdf>

<sup>12</sup> [www.ccad.ws](http://www.ccad.ws)

<sup>13</sup> <http://www.ccad.ws/ecoportal/cambio/camnica.html>

<sup>14</sup> [www.ruta.org](http://www.ruta.org)

<sup>15</sup> <http://www.fao.org/regional/honduras/pbcc/Descripcion.htm>

<sup>16</sup> <http://www.ccad.ws/>

<sup>17</sup> [http://www.ccad.ws/forestal/pp\\_regional.htm](http://www.ccad.ws/forestal/pp_regional.htm)

<sup>18</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>19</sup> <http://www.sica.int/ccad/program.aspx?IdEnt=2>

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>20</sup> for Central America** is currently in preparation and will include five areas: i) vulnerability and adaptation; ii) mitigation; iii) institutional and 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>21</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 Energy<sup>22</sup> (MINAE)**, Spanish acronym) is the country's environmental authority, it oversees Costa Rica's commitments to the UNFCCC and other climate change related actions and is the Designated National Authority on climate change and, in particular, on Clean Development Mechanism (CDM) in Costa Rica through the **Costa Rican Office for Joint Implementation (OCIC)**.

The **National Meteorological Institute<sup>23</sup> (IMN)**, Spanish acronym), linked to MINAE, acts as a focal point at the IPCC for Costa Rica and is currently improving an early alert system containing climatic forecasts related to *El Niño* and *La Niña* phenomenon and the extreme weather events accompanying them. This will be used for the design of more appropriate adaptation measures and policies, thus contributing to reducing the vulnerability of the country to climate change related events.

Another institution involved in the climate change debate in the country is the **Regional Committee of Water Resources<sup>24</sup> (CRRH)**, Spanish acronym).

### 3.1. Inter-Sectoral Coordination

The **Consultative Commission on Climate Change<sup>25</sup> (CCCC)**, Spanish acronym) was created in 1994 under the **National System for Sustainable Development<sup>26</sup> (SINADES)**, Spanish acronym) as a national entity for dialogue between all sectors of the Costa Rican society, about adaptation and mitigation policies and measures for climate change.

### 3.2. Agricultural Sector Institutions

The **Ministry of Agriculture and Livestock<sup>27</sup> (MAG)**, Spanish acronym) has as a main objective the development of the agricultural sector in the country and is responsible, among others, for the adoption of policies, plans and programs aimed at the preservation of natural resources and the general improvement of the environment in the country.

<sup>20</sup> <http://www.sica.int/ccad/temporal/LINEAMIENTOS.pdf>

<sup>21</sup> <http://www.odi.org.uk/resources/download/761.pdf>

<sup>22</sup> [www.minae.go.cr](http://www.minae.go.cr)

<sup>23</sup> <http://www.imn.ac.cr/>

<sup>24</sup> [www.aguayclima.com](http://www.aguayclima.com)

<sup>25</sup> [http://www.pgr.go.cr/scij/busqueda/normativa/Normas/nrm\\_articulo.asp?nValor1=1&nValor2=30397&nValor3=32098&nValor4=&nValor5=214660&nValor6=](http://www.pgr.go.cr/scij/busqueda/normativa/Normas/nrm_articulo.asp?nValor1=1&nValor2=30397&nValor3=32098&nValor4=&nValor5=214660&nValor6=)

<sup>26</sup> <http://www.mideplan.go.cr/sinades/>

<sup>27</sup> [www.mag.go.cr](http://www.mag.go.cr)

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

**Emission inventory:** To date, Costa Rica counts with three National GHG Inventories with 1990, 2000 and 2005 respectively as base years. They include data on agriculture and land-use change and forestry, providing disaggregated data by type of emissions and type of agricultural resources. The last two inventories (for 2000 and 2005) were developed as part of the Second National Communication.

**Studies related to climate change and agriculture:** In preparation for the First National Communication, four different vulnerability studies were realized for the coastal area, water resources, agriculture (for rice, beans, potato and coffee) and forestry. A GEF-funded **AIACC**<sup>28</sup> project in Central America (Costa Rica, El Salvador and Nicaragua): "Assessment of impacts and adaptation measures for the water resources sector due to extreme events under climate change conditions in Central America"<sup>29</sup>.

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>30</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.

According to the Second National Communication, agriculture accounts for 90% of methane emissions, mainly from enteric fermentation of farm animals, and 96% of nitrous oxide emissions.

#### 4.1. Action Frameworks

##### 4.1.1. Forestry and Land Use Change

The forestry and land-use change sector is responsible for a net CO<sub>2</sub> absorption of 3667.7Gg in 2005. This is a result of change in forest biomass (absorption of 1606.9 GgCO<sub>2</sub>), and abandonment of cropland followed by regeneration of vegetation (absorption of 3732.3 GgCO<sub>2</sub>). Deforestation activities have decreased in Costa Rica due to a government policy of conservation and forest improvement adopted in the 1980s leading to an average annual deforestation rate for the period 1990-2005 of 0.4%.

As part of the mitigation potential of the forestry sector, the First National Communication identified the two forestry projects currently active in the country:

The **Protected Areas Project (PAP)**, Spanish acronym): consists of the international commercialization of emission reduction units resulting from diminishing of emissions from deforestation in territory considered national parks or biological reservations. The potential of net emission reduction units of this project by 2015 is 642,738 metric tons of carbon.

**Ecomarkets: The Private Forestry Project (PFP)**, Spanish acronym): takes place between the government and small owners of forests through payments for environmental services (PSA, Spanish acronym) established in 1996 under a national program fostering conservation and sustainable management of forests, thus avoiding land use change. By the year 2000, there are 230 million hectares contracted under PSA for a period of five years.

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

<sup>28</sup> <http://www.aiaccproject.org/>

<sup>29</sup> [http://www.aiaccproject.org/aiacc\\_studies/aiacc\\_studies.html](http://www.aiaccproject.org/aiacc_studies/aiacc_studies.html)

<sup>30</sup> [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/02/27/000334955\\_20090227082022/Rendered/PDF/476040PUB0Low0101OfficialUseOnly1.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/02/27/000334955_20090227082022/Rendered/PDF/476040PUB0Low0101OfficialUseOnly1.pdf)

In 2006, the **Costa Rica Mainstreaming Market-based Instruments for Environmental Management Projects** was started. The Project Development Objective is to enhance the provision of environmental services of a national and global significance and secure their long-term sustainability through a scaled-up payment for environmental services system in Costa Rica. By the end of the project, at least 288,000 hectares of land with environmental service contracts generating environmental services of local, national and/or global importance and 50% increase from 1,900 (2005) to 2,850 (2011) of the number of small- and medium-sized landholders (less than 100-hectare farms) participating in the PSA Program and 3.5% from fuel-tax revenues and 25% water-resource-usage tariffs to finance PSA. This project is under implementation.

Costa Rica is a participant in the World Bank's Forest Carbon Partnership Facility, to prepare itself to reduce emissions from deforestation and forest degradation (REDD).

#### 4.1.2. Livestock

In 2005, livestock was responsible for 89% of all methane emissions from the agricultural sector: 98% of these are from enteric fermentation from farm animals and the rest of 2% from handling of farm manure. The rate of emission of methane depends on the animal diet and the physical and chemical characteristic of the food.

One of the mitigation measures for this sector identified in the First National Communication is to introduce a change in the animal diet and to change the frequency of animal grazing in order to reduce methane emissions. These measures were based on a simulation study on two different animal herds (one for meat production and the other for milk production) of 100,000 animals each, whereby two types of animal forages were used and two different frequencies of grazing, along with supplementing the diet with green banana and concentrated food. This resulted in a significant reduction of methane emissions of 168,560 metric tons/year of CO<sub>2</sub> equivalent. It was also concluded that by supplementing the diet with legumes, the quantity of methane emissions is reduced and, in the case of the meat producing livestock, the number of days necessary to achieve the market weight is also reduced, thus achieving increased productivity.

#### 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>31</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 6 registered projects in Costa Rica, representing a very small share of projects (1%) in LAC. Currently, there are no registered CDM projects in agriculture in Costa Rica, nor there are projects registered under the "afforestation and reforestation" category<sup>32</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 administered by

<sup>31</sup> <http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByScopePieChart.html>

<sup>32</sup> <http://cdm.unfccc.int/Projects/projsearch.html>

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 intensity of fertilizer use per hectare of cropland is five times higher in Costa Rica, with 342 kg fertilizer/hectare of cropland, than the Central America and the Caribbean average of 65 kg fertilizer/hectare<sup>33</sup>. According to the First National Communication, Costa Rica has the highest consumption of chemicals in agriculture per cultivated cropland in Central America and one of the highest in developing countries with repercussions on the environment, soil and water. Some of the measures identified to mitigate the effects of climate change in this sector are: i) implementation of no-tillage practices and ii) a better use of fertilizers through improved nitrogen application technologies. According to the Second National Communication, rice crops account for 11% of total CH<sub>4</sub> emissions from the agricultural sector, while as cropland are responsible for 98% of total N<sub>2</sub>O emissions from the year 2005.

The Second National Communication proposes the following adaptation measures: introduction of perennial crops, suspension of sowing in critical areas, monitoring of plagues and crop diseases, combination of forestry and livestock grazing activities, organic crops.

#### 5.1.2. Water Use

In 1999, Costa Rica's arable land was 9.9% of the total territory and 21.4% of this was irrigated, which is much higher than the Central America and the Caribbean average of 19.1%<sup>34</sup>.

According to a vulnerability study of the water sector realized in the three most important river basins of the country (Reventazon river, Grande de Terraba river and Grande de Tarcoles river) and using climate scenarios whereby the temperatures are estimated to increase by 1-2°C and the changes in the precipitation regimes are estimated at +/-15% on the Pacific side and +/-10% on the Atlantic side, it is expected that important variations in water flow will be noticed in these areas with impact on agriculture, especially during the transition between summer and winter. It is also expected to have an increase in floods with direct impact on irrigation systems and leading to more soil erosion, but also increase in droughts in some parts of the country, leading to reduced water supply for irrigation.

According to an analysis of the vulnerability of water resources to climate change, the areas most vulnerable in the country are those with most land area dedicated to agriculture or areas which conflict over land use.

The Second National Communication formulates the following adaptation measures for the water sector: i) water storage facilities, protection of aquifers, monitoring of water resources, water rationing, irrigation projects along with projects aimed at increasing water efficiency | irrigation, among others.

<sup>33</sup> [http://earthtrends.wri.org/pdf\\_library/country\\_profiles/agr\\_cou\\_188.pdf](http://earthtrends.wri.org/pdf_library/country_profiles/agr_cou_188.pdf)

<sup>34</sup> [http://earthtrends.wri.org/pdf\\_library/country\\_profiles/agr\\_cou\\_188.pdf](http://earthtrends.wri.org/pdf_library/country_profiles/agr_cou_188.pdf)

**Costa Rica Red Cross Flood Preparedness Program**<sup>35</sup>: is a community training program in disaster preparedness and prevention, community first aid and psychological support, initiated in 2002 following the flooding of August 2002. In coordination with local institutions: community emergency committees (established as part of the program), the community development association, Catholic church, Costa Rican institute of electricity, chamber of tourism, public and private schools. The effectiveness of the program was tested in a landslide in May 2003 – communities were able to respond more quickly as all relevant actors were already in communication with one another.

## 5.2. Social Aspects and Interventions

With a Human Development Index value of 0.846 (2005), Costa Rica is the highest performing country in Central America in terms of human development. Poverty rates, including rural poverty, are also lower in Costa Rica: 3.3% of the population lives on less than 1\$/day, 9.8% on less than 2\$/day and 22% live below the national poverty line. Inequality is also lower compared to the average for Central America with a Gini coefficient of 49.8. Even though the country has a sizeable rural population (48.3%), rural poverty is the lowest in the region – 23%<sup>36</sup> Employment in agriculture currently comprises only 15% of total employment. Rural communities, including low income families, have also organized themselves in order to provide tourist services (in what became known as Rural Community Tourism in Costa Rica)<sup>37</sup>. This can potentially be a good adaptation strategy for rural residents to changing climate; however, it does not mitigate the risk to natural disasters.

**ProVention Consortium, Community Risk Assessment and Action Planning Project**<sup>38</sup>: 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. Costa Rica participated in this with the project *Vulnerability and Capacity Assessment in Linda Vista (La Unión) and El Meco (Ciudad Quesada)*<sup>39</sup> whose objective is to facilitate the design of a detailed action plan for the community to address the vulnerability of the region to climate change. The project consisted of a series of surveys in the region aimed at a better understanding of the community's ways of life, their costumes and ways of doing things, as well as an identification of natural threats, risks and vulnerabilities in order to identify adaptation measures to address these.

The program **Superémonos**, part of the **National Development Plan of Costa Rica for 2006-2010**, under the **Ministry of Planning**, provides cash transfers to families with school-age children on the condition that children attend school. The coverage of the program however is limited, with only 1.1% of the population being covered in 2006. In addition it prioritizes families with children between fifth and sixth grade and in the first years of secondary school, where drop-out rates are the highest. Hence it does not reach all poor and extremely poor households.

**Instituto Mixto de Bienestar Social**<sup>40</sup> (**IMAS**, Spanish acronym) provides social welfare programs in the country. The beneficiaries of all social welfare programs in rural areas are approximately 219,713, compared to 336,652 in urban areas<sup>41</sup>.

<sup>35</sup>[http://siteresources.worldbank.org/EXTSOCIALDEVELOPMENT/Resources/244362-1170428243464/3408356-1170428261889/3408359-1170428299570/3408360-1196192306988/CS7-Costa\\_Rica\\_Flood\\_Preparedness.pdf](http://siteresources.worldbank.org/EXTSOCIALDEVELOPMENT/Resources/244362-1170428243464/3408356-1170428261889/3408359-1170428299570/3408360-1196192306988/CS7-Costa_Rica_Flood_Preparedness.pdf)

<sup>36</sup> <http://www.ruralpovertyportal.org/web/guest/region/home/tags/americas>

<sup>37</sup> See <http://www.changemakers.net/node/8016> and [http://www.transitionsabroad.com/publications/magazine/0411/costa\\_rica\\_rural\\_community\\_tourism.shtml](http://www.transitionsabroad.com/publications/magazine/0411/costa_rica_rural_community_tourism.shtml)

<sup>38</sup> <http://www.proventionconsortium.org/?pageid=43>

<sup>39</sup> [http://www.proventionconsortium.org/themes/default/pdfs/CRA/Costa\\_Rica.pdf](http://www.proventionconsortium.org/themes/default/pdfs/CRA/Costa_Rica.pdf)

<sup>40</sup> [www.imas.go.cr](http://www.imas.go.cr)

<sup>41</sup> [http://www.imas.go.cr/perfil/sist\\_info/sipo/estadisticas\\_sipo.html](http://www.imas.go.cr/perfil/sist_info/sipo/estadisticas_sipo.html)

**Central American Indigenous and Peasant Coordination Association<sup>42</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 Costa Rica in 1928. There is a large menu of options for coverage (crops and risks). Agriculture insurance is mandatory by law in Costa Rica; however this measure is impossible to implement and has not been enforced. The Costa Rican insurance industry is a monopoly controlled by the Public Company INS (Instituto Nacional de Seguros). In 2008 (with the entering into effect of the DRCAFTA agreement) the monopoly ends and private sector will be able to participate. Around 12,000 ha are insured which represents 2.2% of total cropland.

The Government of Costa Rica has one instrument in place that support the agriculture sector in managing climate risks. The **National institute of Insurance (INS**, Spanish acronym) is a public company that offers all the agriculture insurance policies. However the development of the agriculture insurance market has been declining in recent years and the INS hasn't been proactive in developing the market as it has produced large losses for the company. Unfortunately, data is not available on the loss ratios of INS, but the private sector, with the opening of the market, is expected to slowly expand coverage, beginning with some of the most profitable clients.

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<sup>42</sup> <http://en.acicafoc.org/>



### **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.



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### **Feedback**

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