

## CONTEXT ANALYSIS REPORT GUATEMALA

### Programme: Climate-Proof Disaster Risk Reduction

#### Involvement of Southern partners

*The Southern partners of Partners for Resilience in Guatemala have been actively involved in the context analysis, as well as the programme design. In October 2009 they gathered together with key partners and actors of their DRR, CCA and ecosystems network in a workshop to get familiar with the MFS II programme, map their current actions in disaster risk reduction (DRR), climate change adaptation (CCA) and ecosystem-based approaches (EBA), and identify the main problems and stakeholders. During the first four months of 2010 the Southern partners have actively collected additional inputs. During the workshop, this information was discussed criteria were set for the selection of programme locations. The CARE regional coordinator introduced the "Pressure and Release" (PAR) model to identify the problems at different levels. Subsequently, the partners applied it to selected programme locations. In April key stakeholders at national level, such as the national system for disaster prevention and the Ministries that are responsible for disaster risk reduction, eco-system based approaches and climate change issues were invited to a one-day workshop. Ideas on the thematic and geographical areas were freely discussed implying a mutual learning on how to adapt the general programme ideas to the local context building on the existing knowledge and experiences, and creating an environment for learning by doing. Furthermore, the stakeholders participated in a civil society and the programme SWOT exercise. The participatory process during the meetings built confidence and capacity of all partners. It increased their commitment and was an important step towards a more conducive environment.*

### I. INTRODUCTION

Guatemala, a country with a population of 14.3 million, has the strongest economy in Central America but at the same time its income distribution is the most unequal. Fifty-one percent of the population has an income of less than US\$ 2 per day. Around 2 million persons live under conditions of extreme poverty and do not have a daily proper meal.<sup>i</sup> In areas where the majority of the population is indigenous this can rise to 80 per cent. Nine-two per cent of small producers cultivate 21.86% of the land area, while 1.86% of commercial producers occupy 56.59% of the land. There is a tendency towards development of economic activities with significant environmental and social impacts (e.g. mining, palm oil, sugar cane, melon, oil) related to the signing of the DR-CAFTA (2004).

On the Human development Index it is in the 118<sup>th</sup> position – just ahead of Haiti (UNDP, 2008). Guatemala is ethnically very diverse and counts 24 different ethnic groups representing 65% of the population. The Act on the Identity and the Rights of the Indigenous Population, signed in 1995, recognises four groups: Ladina, Maya, Xinca and Garífuna.<sup>ii</sup> The Decree 19-2003 (Law of National Languages) declares 22 indigenous languages official.<sup>iii</sup> Inequality between the different groups is persistent.

Fourteen years after the guerrilla war ended and the peace treaty was signed, Guatemala is still facing multiple challenges in the functioning of its democratic institutions. Common and organized crime have risen to high levels and the authorities are unable to respond. Money laundering involving high political personalities associated to the drugs trafficking and a lack of transparency in management of public funding are not contributing to social stability. The United Nations Office for Human Rights in Guatemala classifies Guatemala "among the most violent countries in Latin America".<sup>iv</sup> The International Commission Against Impunity (CICIG-UN) has recommended to reform the judicial system. Infant mortality is still 41.2 per 1,000 live births. Twenty-six per cent of the population between 7 and 14 years of age do not attend primary school. Guatemala invests only 2.4% of its GDP in education - well below the 4.4% which is the average in Latin America.

The Central America region is multi-hazard prone area (hurricanes, earthquakes, floods, droughts, volcanic eruptions) and is part of the so called Pacific Rim's "ring of fire". The northern part of Guatemala has a tropical climate with maximum rainfall from May to September. The west and south of the country is very mountainous with moderate rainfall and a distinct dry season from November to April. Rainfall is heavier along the Pacific coast.<sup>v</sup> In El Niño years dry conditions in parts of Guatemala during July-December<sup>vi</sup>, and cool and wet conditions from July-August in La Niña years.<sup>vii</sup> The Pacific coast is vulnerable to seasonal flooding. Guatemala is located in an area of high volcanic and seismic activity. The combination of these various hazards causes landslides. The situation is influenced by climate change resulting in food insecurity, desertification, drought, forest fires and health problems. Over the last 20 years the most frequent disaster have been floods (23) and storms (13) (e.g. Hurricane Mitch in 1998 and Tropical storm Stan in 2005). The increase in the number of events to 32 in 2009, compared to a normal yearly average of 2-3. The quality of seasonal forecasts for Guatemala is decent, with good forecast lead times for August-December.<sup>viii</sup>

#### *Climate Change Projections*

Climate models project a median average temperature increase of 3.2°C in Central America by 2080-2099.<sup>ix</sup> The median decrease in annual rainfall is projected at 9%, ranging from a 48% decrease to 9% increase.<sup>x</sup> The sea level rise is projected to rise 0.18 metre to 0.59 metre by 2100. Some sources project a sea level rise of one metre by 2100.<sup>xi</sup> Intensity of tropical cyclones is expected to increase.<sup>xii</sup>

After flood events, diarrhoeal diseases and vector-borne diseases are more common due to mixing of human waste and drinking water.<sup>xiii</sup> Stagnant pools of water provide extra breeding grounds for disease carrying

mosquitoes. In times of drought, water quality can decrease, causing diarrhoea. Inadequate access to adequate amounts of water for personal hygiene can cause diarrhoeal disease, intestinal worms and trachoma.<sup>xiv</sup> Yields of staple crops including maize, beans, rice, sorghum and wheat are projected to decline.<sup>xv</sup> A number of impoverished areas vulnerable to droughts and floods have been identified as vulnerable to food insecurity.<sup>xvi</sup> Water supply and hydroelectric generation could be seriously impacted in the Pacific slopes.<sup>xvii</sup> Increases in runoff could degrade soil, and have negative consequences for a number of crops. Reduced river flows, increased sedimentation, and threats to the water supply with consequences for human health are possible as well.<sup>xviii</sup> The damage caused by natural hazards (forest fires, hurricanes, droughts, floods will increase<sup>xix</sup> and threaten coastal communities, livelihoods and infrastructure. By 2020 large areas of different Central American ecosystems will be affected by climate change. About 25% of broadleaf forests and mangroves, 20% of coniferous forests, 15% of savannas and wetlands, and 10% of mixed forests in Central America will show elevated climate change severity indices, and even 25-30% of agricultural lands will be affected. The Mesoamerican Reef is experiencing the looming threat of bleaching and mass mortality of corals. Once sea temperatures pass the threshold for thermal tolerance, corals will be gone, the ecosystem will collapse, and this will have impacts on local fisheries and tourism, and an increased vulnerability.<sup>xx</sup> DRR has not been mainstreamed into public policies or public investment, neither at the national nor at the district level. A National Disaster Risk Policy and a National Policy on Climate Change were recently formulated.

## II. TARGET GROUP ANALYSIS

The target group is the most vulnerable population in the drought zone in the river basin of the Motagua river and other rivers with a special attention to indigenous people, youth, women and the elderly:



**Izabal:** situated in the northeast region of the country and has an estimated total population of 403,256.

**Zacapa:** situated in the northeast region of the country and has an estimated total population of 218,510.

**Chiquimula:** situated in the southeast region of the country and has an estimated total population of 362,826.

**Jalapa:** situated in the southeast region of the country and has an estimated total population of 309,908.

**Solola:** situated in the central west region of the country and has an estimated total population of 424,068.

**Quiché:** situated in the north central region of the country and has an estimated total population of 921,390.

In comparison, the total population of the Republic of Guatemala in 2010 is estimated at 14,362,666 persons.<sup>xxi</sup>

Cultivation of staple crops is the main economic activity in these areas. In some departments livestock, dairy products and fishing are important sources of income. There are mining activities in all departments, except for Solola. The craft industry is most important in Solola and Quiché. Most of the departments are located in the so-called "dry corridor" the threat of food insecurity is permanent. The latest emergency caused by the eruption of the Pacaya volcano and the tropical storm Agatha in the last weekend of May 2010 affected almost all selected departments. The landslide in San Antonio Palopo, Solola, caused many deaths and great damage to houses, electricity lines and roads.<sup>xxii</sup>

**Izabal<sup>xxiii</sup>** surrounds Lake Izabal, Guatemala's largest lake that is about 48 km long and 24 km wide, with an area of about 590 km<sup>2</sup>. Main focus will be on the district of El Estor with Q'eqchi people.

**Zacapa<sup>xxiv</sup>:** The principle water resource of the department Zacapa is the riverbasin of Río Grande or Motagua. There are two protected areas: 1) La Sierra de Las Minas, also known as Reserva de Biósfera and administrated by "Defensores de la Naturaleza", and 2) The mountain of "Granadillas" that is situated partly in Zacapa and partly in Chiquimula.

**Chiquimula<sup>xxv</sup>** also known as the *Pearl of the East*, has the following protected areas: 1) Vulcane Quezaltepeque, 2) Vulcane and lake Ipala (2.010 Ha.), and 3) Biosphere reserve Trifinio (8.000 Ha.). These areas are administrated by the national committee of protected areas (CONAP). The language chortí is still spoken in some of the districts of Chiquimula.

**Jalapa<sup>xxvi</sup>** is irrigated by several rivers. It has the following protected areas: 1) Vulcane Alzatate, 2) Vulcane Jumay, and 3) Vulcane Monterrico.

**Sololá<sup>xxvii</sup>** is situated on lake Atitlán. The protected areas are: 1) The river basin of lake Atitlán (62.500 ha), 2) Vulcane Atitlán, 3) Vulcane San Pedro, and 4) Vulcane Tolimán. All these areas are administrated by CONAP. The Maya languages K'iché, Tz'utujil and Cakch'iquel are spoken.

**Quiché<sup>xxviii</sup>** counts many rivers, of which the most important are the Chixoy or Negro and the river Grande or Motagua. Quiché is the most populous department and languages spoken are Uspanteco, Ixil, Sacapulteco, Q'eqchi and Quiché.

The Southern partners selected there areas on the basis of agreed upon criteria<sup>xxix</sup>. For validation external reports and information<sup>xxx</sup> were used. Although the initial the validation indicated some other regions as well, the southern

partners decided to focus on the drought zone of the Motagua River Basin which includes “forgotten” zones like Quiche. It is important that the application of DRR/CCA/EBA does full justice to the way of life of the indigenous groups (Ladina, Maya, Garifuna and Xinka). Historically, women, particularly those from indigenous and ladino background in rural areas, have been excluded from development. They lag men in education, health, employment and political participation. Rates of maternal mortality and malnutrition are high. Children and youth require special attention and training to ensure know how to address DRR, CCA and Ecosystems. The best local practices should be complemented with younger generations’ vision of human development. Elderly people are economically, politically and socially invisible. In their own indigenous society they are highly respected for their knowledge and wisdom, which can be of great value for the design of interventions in DRR/CCA/EBA. Furthermore, it will help improving the economic status of the elderly.

*Civil society organisations, local and regional government are also target groups; they are described below under “Contextual analysis” and “Multi-actor analysis”.*

### III. PROBLEM ANALYSIS

#### Micro

Communities are facing food insecurity and, more generally, their livelihoods are fragile. This especially impacts the indigenous, most vulnerable households practicing subsistence farming. Their livelihoods are especially dependent on ecosystems, which are constantly exposed to climatic threats. This reduces the food security of the majority of the population and their ability to escape poverty. The globalized economy favours the expansion of monocultures for agro export, and prevents indigenous cultural autonomy in planning agricultural production and the control over water sources and other basic resources. The traditional products of peasants and indigenous people are not marketed nationally or internationally. Domestic trade is a “paperless” and without formal contracts. The majority of the population has very few opportunities for generating an economic surplus to be reinvested in their own human and social development. The basic conditions for sustainable human development and poverty alleviation are lacking, in particular water and sanitation services. In urban areas, 61.6% of the population and in rural areas only 38.4% of the population has access to safe drinking water. The corresponding percentages for access to sanitary service are 55.6% and 44.4%. The contamination of water is a general problem. Cholera is reappearing, especially in the poorest zones of the country. Communities are becoming more vulnerable to environmental hazards and, thus, their disaster risk is increasing. Ecosystems providing essential services to communities are under pressure or being destroyed. Conflicts arise between communities and resource users who are able to reap the economic benefits of ecosystem services thanks to the inequality in the access to natural resource. In process, ecosystems are depleted and biodiversity is under threat.

Solutions to the above problems are complicated by high levels of illiteracy among indigenous groups, low of access to health services, imbalance in gender relations, and a dysfunctional legal system that is unable to protect the cultural, economical and social rights of indigenous groups.

#### Meso

The District Planning Offices lack capacity, expertise and authority. There is an absence of legal and technical instruments for local sustainable development planning. National policies are tailored to the needs of the urban populations and the administrative borders, but fail to take into account the environmental and territorial concerns typical for the river basin. As a result, available resources are not being used effectively. There is no funding available at district and community level. The basic DRR programmes need strengthening. Communities, districts and government institutions are disorganised. Local development committees do not always work or have the technical or economic resources to develop planning tools to address climate risks and environmental degradation. Civil society organisations can play an indispensable role in addressing the situation, but need to strengthen their capacity and develop partnerships.

#### Macro

Governance at national, local and community levels is deficient and there are no programmes for DRR and conservation of biodiversity in agro-forestry systems, forests and wetlands. Government policies encourage the production of commercial crops, and do not favour the production of staples. The government institutions responsible for livelihood development, disaster risk reduction and ecosystem management do not have the technical, financial and human capacity to implement government policies. Coordination between these institutions is quasi-absent.

### IV. CONTEXTUAL ANALYSIS

Inequality - especially regarding women and indigenous groups – leads to discrimination of large parts of the population as a consequence of which their development is compromised. The income distribution is extremely skewed and leads to exclusion from development initiatives. Politically, the challenge is to establish a democratic environment that can counter the complex dynamics of interests that obstruct the Government’s ability to promote and conduct public policy. Public policy is not based on local needs and common interests, but is guided by hidden political agendas. Civil society in Guatemala is defined as all persons and entities that are not governmental and that advocate for individual and collective rights of peoples from the 4 groups<sup>xxxi</sup> that Guatemala is made up of. The district decides if an organisation or a person is able to represent a group of people and this is an obstacle to the development of civil society. Civil society is diverse and internally divided.

There is a competition for external funding. The following civil society organisations have been selected as local partners:

The Guatemalan Red Cross Society (GRC)<sup>xxxii</sup> is officially recognised as a national, autonomous, voluntary help association and counts with 19 departmental branches and 4 help posts. The effectiveness of their advocacy for DRR and CCA is widely recognised.

Caritas Guatemala is recognised for its strong presence at the community level.

Agricultural Cooperatives are the main structure through which farmers have organised themselves and are, therefore, vital for the success of the programme.

Defensoras de Naturaleza, Torrego Foundation, FUNDAECO, and Ak Tenamit are environmental NGOs operating in Izabal. Their experiences and work is much appreciated by the local population and authorities.

Asorech is a local NGO that is defending the rights of the Chorti population in Chiquimula and Zacapa.

del Valle University, Landivar University, and San Carlos University are universities with which the Partners for Resilience have ongoing relations.

Local reduction disaster committee (COLRED) are part of the decentralised organisational structure coordinated by SE-CONRED at the national level.

Local development committees (COCODES) are part of the decentralised organisational structure coordinated by SEGEPLAN at the national level.

At a later stage, cooperation with civil society organisations will probably be expanded to other CSOs that are working in the same thematical and geographical area.

On the basis of the SWOT analysis of Guatemalan civil society, the following strategies for strengthening civil society were formulated for inclusion in the country programme:

|               | Strengths   | Weaknesses   |
|---------------|---|--|
| Opportunities | <p><i>Establish more partnerships with other civil society organisations to strengthen its approach towards DRR/CCA</i></p> <p><i>Investigate/Integrate local/indigenous knowledge into its existing knowledgebase and processes.</i></p> <p><i>Facilitate dialogues between indigenous groups and other civil society organisations.</i></p> <p><i>Facilitate linkages between civil society &amp; government to collaborate on DRR/CCA/EBA issues</i></p> | <p><i>Work only with organizations which have adopted criteria and quality standards (accountability, management, transparency) to strengthen its administrative and financial organization</i></p> <p><i>Understanding the communication between groups and establishing conditions to facilitate the communication and the linkage between diverse groups through workshops, forums and trainings.</i></p> <p><i>Create an opening for dialogue between all the groups instead of with a specific group using a common focus and the creation of working groups.</i></p> |
| Threats       | <p><i>Be careful/strategic regarding to what an ally is doing - establish criterias based on a study for the selection of sustainable allies and partners.</i></p> <p><i>Civil society organisations will keep 'neutrality' in selection partner organisations and will work on a non-political.basis with them</i></p>   | <p><i>Patience/understanding to facilitate the "organization" and "strengthening process of" civil society.</i></p> <p><i>Transcend the historical fear to facilitate the process of civil society organization.</i></p> <p><i>Security and Preparedness Plan for the area of intervention.</i></p> <p><i>Investigate and be informed about organized crime in the area of intervention. Not having relations with companies that belong to them. Language education in general and focus on what we are specialized in.</i></p>   |

## V. MULTI-ACTOR ANALYSIS

As the Partners for Resilience come from different backgrounds and work with their own networks, it has extensive relations with most of the key actors in DRR, CCA and EBA in Central America.

### Government

**SE-CONRED**<sup>xxxiii</sup> is the national institute responsible for the management of DRR. An MoU will be signed to the effect that SE-CONRED will facilitate and coordinate planning and implementation of the programme. The Partners for Resilience will be member of the National Platform for the Hyogo Framework for Action and the National Platform for Disaster Risk Management. This will allow the Partners for Resilience providing institutional strengthening at local and district level with a special focus on the Local Disaster Risk Committees (COLRED).

**Ministry of Environment and Natural Resources** (MARN)<sup>xxxiv</sup> is responsible for environmental policy and natural resources, and climate change. The Partners of Resilience are discussing an MoU with the Ministry so that they can facilitate institutional development and give support district-level implementation of the new national policy on climate change. Currently, these two government bodies are hardly cooperating and this stands in the way of an integrated approach to DRR/CCA/EBA. Through the MoUs the Partners for Resilience hope to change this. The **Presidential Secretary for planning and programming** (SEGEPLAN)<sup>xxxv</sup> has a special department for DRR and it can facilitate alignment with other initiatives. An MoU is expected to be signed. The **Ministry of Health and Social Assistance** (MSPAS)<sup>xxxvi</sup> has a special unit in charge of recovering indigenous knowledge. It will facilitate the mapping of indigenous health institutions. Furthermore, MSPAS can provide assistance in the cooperation with it's the programme plans to strengthen the Ministry's local health centres. An MoU is under consideration. The **National Institute of Seismology, Volcanology, Meteorology and Hydrology** (INSIVUMEH)<sup>xxxvii</sup> will provide scientific data essential to the programme. The Partners for Resilience will assist



with local and district level monitoring. An MoU is planned. The **Coordination Center for the Prevention of Natural Desasters for Central America (CEPRENAC)**<sup>xxxviii</sup> has offered to assist in the replication of methodologies and innovative practices in other countries. An MoU is under discussion.

#### Donors

As stated in **Netherlands Embassy's** strategic plan for the period 2008 – 2011 recognises Guatemala's biodiversity and natural resources, but also its vulnerability to natural disasters and other effects related to climate change.<sup>xxxix</sup> The Partners for Resilience's focus on DRR/CCA/EBA complements the Embassy's development strategy. The Embassy wishes to be kept up to date on the progress made by the Partners for Resilience's programme. The **Office of U.S. Foreign Disaster Assistance (OFDA)**<sup>xl</sup> funds CARE Guatemala for the implementation of a disaster management project in Baja Verapaz, Chimaltenango and Solola, to which the Partners for Resilience's programme will be aligned. They will also align themselves with the **European Commission's DIPECHO**<sup>xli</sup> programme which funds simple and inexpensive community-based preparedness measures.

#### International NGOs

The **International Union for Conservation of Nature (IUCN)**<sup>xlii</sup> has cooperate with the Partners for Resilience on lessons learnt from its experience in the management of micro riverbasins and DRR.

#### Knowledge institutes

As expressed above in the description of the civil society in Guatemala, the alliance will strengthen its cooperation relationship with the **del Valle University**<sup>xliii</sup>, the **Landiver University**<sup>xliv</sup>, and the **San Carlos University (USAC)**<sup>xlv</sup>.

The added value of the programme in relation to the interventions of others is that it brings together a number of well established, experienced and respected organisations, both governmental and non-governmental, in an effort to reduce the impact of natural disasters on vulnerable communities. The broad base of the partnership augurs well for adoption of the integrated approach to DRR/CCA/EBA. The relations with the target groups are close, so that change from within possible is likely within reach. The programme approaches communities' livelihoods in a comprehensive sustainable manner, which is different from other programmes which usually focus on a specific line of work.

### **VI. TAILOR-MADE PROGRAMME**

The programme aims to reduce the impact of droughts, flooding, landslides and hurricanes on vulnerable communities. The key issues identified in the context analysis are: 1) Guatemala is a multi-threat area regularly affected by floods and hurricanes; 2) Chronic food insecurity undermines people's livelihoods; 3) Access to drinking water is not a common good in Guatemala; 4) The intensity and frequency of climatic events is affecting ecosystems and, thus, livelihood; 5) Development policies are not addressing inequality and do not foster resilience and sustainability; 6) Public spending does not adequately respond to the needs of local communities; 7) Civil society is fragmented but has good potential to help communities reducing disaster risk and strengthening livelihoods by means of an ecosystem-based approach; and 8) DRR has not been mainstreamed into public policies, neither at the national nor at the district level, although a National Disaster Risk Policy and a National Policy on Climate Change have been formulated recently.

The programme will address the situation through three clusters of activities:

- Community resilience will be strengthened by introducing an integrated approach to DRR/CCA/EBA; community based disaster risk assessments will be undertaken and disaster risk reduction plans prepared accordingly; agricultural practices will be improved and ecosystems restored; improved health services and availability of and water will further improve livelihoods;
- Capacity of CSOs will be strengthened, particularly in the area of an integrated approach to DRR/CCA/EBA and related policy dialogue;
- Support to policy dialogue and knowledge management. Working wit universities, regional and global institutes, best practices will be documented and shared with policy makers. The programme will engage with authorities to discuss the need for additional policy specifically in support of DRR/CCA/EBA; and to advocate for an increase in resource allocations for that purpose.

These activities will benefit from the global support component which provides best practice on DRR/CCA/EB to the community resilience activities, specifically including best practices from other countries in Central America; links to global networks of civil society organizations and knowledge centres that will provide tools and partnerships to the Southern partners; and global policy inputs that will support their engagement with national policy makers, planners and implementing agencies. This specifically includes the UNFCCC process, World Bank including GFDRR, which is supporting in the region the development of scientific information to assist district planning to reduce disaster, ISDR which is fostering regional capacity building through its Panama office, UNDP and others.

In each intervention area we will actively involve members of the vulnerable groups in Guatemala to build on the particular context and to identify the most relevant needs per region. Involvement will be open, inclusive and

participative. When effective participation opportunities open up, the target groups become high potential sectors for contribution and commitment to their own development processes (auto-development). Furthermore, NGOs will accompany them as facilitators (not main players/heros).

The opportunities identified in the SWOT analysis of the programme are:

- The programme is complementary to the work of other organisations working in development and conservation in the target areas;
- The electoral process can be used to highlight the need for the new government to address DRR/CCA;
- The programme will further investigate and integrate local/indigenous knowledge into its existing knowledgebase and processes;
- The programme can take advantage of what its different partners have already successfully engaged in so far and synergize their efforts into one integrated programme.

<sup>i</sup> European Commission Humanitarian Aid, 2010. *DIPECHO Country Document*. p. 5.

<sup>ii</sup> Programa Estado de la Nación. Resumen del capítulo 8: *El desafío de la multiculturalidad del Segundo informe sobre desarrollo humano en Centroamérica y Panamá*, 2003. [online] Available at: <http://www.estadonacion.or.cr>. [Accessed in May 2010].

<sup>iii</sup> Alertnet. *Ley de idiomas indígenas*. [online] Available at: <http://alertanet.org/quate-idiomias.htm>. [Accessed in April 2010].

<sup>iv</sup> Vision of Humanity. *Global Peace Index*. [online] Available at: <http://www.visionofhumanity.org/gpi-data/#/2010/scor>. [Accessed in May 2010].

<sup>v</sup> BBC. *Weather: Country Guide, Guatemala*. [internet] Available at: [http://www.bbc.co.uk/weather/world/country\\_guides/results.shtml?tt=TT001860](http://www.bbc.co.uk/weather/world/country_guides/results.shtml?tt=TT001860). [Accessed in April 2010].

<sup>vi</sup> International Research Institute for Climate and Society. Earth Institute, Columbia University. *El Niño Teleconnections in Africa, Latin America and Caribbean, and Asia Pacific: Overview of Current Socio-Economics and of Enhanced Odds of Anomalous Seasonal Precipitation*, 2009. [online] Available at: [http://portal.iri.columbia.edu/portal/server.pt/gateway/PTARGS\\_0\\_2\\_5783\\_0\\_0\\_18/eINiñoTelecnx\\_final.pdf](http://portal.iri.columbia.edu/portal/server.pt/gateway/PTARGS_0_2_5783_0_0_18/eINiñoTelecnx_final.pdf). [Accessed in May 2010].

<sup>vii</sup> International Research Institute for Climate and Society. *Typical influence of La Niña events*. [internet] Available at: [http://iri.columbia.edu/climate/ENSO/globalimpact/temp\\_precip/region\\_lanina.html](http://iri.columbia.edu/climate/ENSO/globalimpact/temp_precip/region_lanina.html). [Accessed in May 2010].

<sup>viii</sup> Conversation with Tony Barnston, Lead Forecaster at the International Research Institute for Climate and Society. March 29, 2010.

<sup>ix</sup> Christensen, J.H., B. Hewitson, A. Busuioic, A. Chen, X. Gao, I. Held, R. Jones, R.K. Kolli, W.-T. Kwon, R. Laprise, V. Magaña Rueda, L. Mearns, C.G. Menéndez, J. Räisänen, A. Rinke, A. Sarr and P. Whetton, 2007: Regional Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

<sup>x</sup> *ibid*

<sup>xi</sup> Kleiner, Kurt, 2010. 'Climate Science in 2009'. *Nature*. Vol. 4.

<sup>xii</sup> Christensen, J.H., B. Hewitson, A. Busuioic, A. Chen, X. Gao, I. Held, R. Jones, R.K. Kolli, W.-T. Kwon, R. Laprise, V. Magaña Rueda, L. Mearns, C.G. Menéndez, J. Räisänen, A. Rinke, A. Sarr and P. Whetton, 2007: Regional Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

<sup>xiii</sup> Ahern M, Kovats RS, Wilkinson P, Few R, Matthies F, 2005. 'Global health impacts of floods: epidemiologic evidence.' *Epidemiol Rev*. No 27: p.36-46.

<sup>xiv</sup> Confalonieri, U., B. Menne, R. Akhtar, K.L. Ebi, M. Hauengue, R.S. Kovats, B. Revich and A. Woodward, 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., *Human health*. Cambridge University Press, Cambridge, UK, p.391-431

<sup>xv</sup> Ministerio de Ambiente y Recursos Naturales, Guatemala, 2001. *First National Communication to the United Framework Convention on Climate Change* (UNFCCC). [online] Available at: <http://unfccc.int/resource/docs/natc/quanc1.pdf>. [Accessed in April 2010].

<sup>xvi</sup> Castellanos E. and A. Guerra, 2008. *El Cambio Climático y sus Efectos sobre el Desarrollo Humano en Guatemala* (PNUD).

<sup>xvii</sup> Magrin, G., C. Gay García, D. Cruz Choque, J.C. Giménez, A.R. Moreno, G.J. Nagy, C. Nobre and A. Villamizar, 2007. *Latin America. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson. Cambridge, UK, Cambridge University Press, p. 581-615.

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<sup>xix</sup> Castellanos E. and A. Guerra, 2008. *El Cambio Climático y sus Efectos sobre el Desarrollo Humano en Guatemala* (PNUD).

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