

Climate Change issues at the US-Mexico border region

Gabriela Munoz-Melendez, PhD & DIC

El Colegio de la Frontera Norte

Introduction

Climate change is a frequent and hotly debated topic that is argued from a wide range of perspectives, in extremes cases one has on the one hand those saying the phenomena is inexistent and was created to slow down economies (Coulter, 2004) and on the other hand those stating that climate change may cause a catastrophe similar to the one that saw the mass extinction of dinosaurs (PNUMA, 1999).

It is a fact; however, that scientific evidence showing a correlation between alteration in the energy balance of the climate system and atmospheric abundance of greenhouse gases grew during the 1980's (WMO, 1979; UNEP/WMO/ICSU, 1985; WHO, 1987).

“Greenhouse gases (GHG) are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and ozone (O₃) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely humanmade greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances” (IPCC, 2007).

Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years (IPCC, 2007). Those human activities include fossil fuel burning, fertilisers use, deforestation, landfilling, building heating and cooling, industrial processes, etc; or in simple words activities related to our daily life and how we conceive progress, economic development, and comfort.

The possibility of a global climate change puzzled the scientific community around the world and attracted the attention of international organisms such as the United Nations. This new found awareness initiated a serie of events worldwide that defined the current direction in the understanding of and actions on how to deal with climate change issues, of these two are highly significant:

1. The creation of the Intergovernmental Panel on Climate Change (IPCC). In 1988, the World Meteorological Organization and the United Nations Environment Programme created this panel, that has an objective to evaluate in a comprehensive, objective, open and transparent way scientific, technical and socio-economic information relevant to climate change; in order to understand the scientific basis, risk and magnitude of the impact that climate change may have, and to formulate realistic strategies (WMO & UNEP, 2004).
2. The adoption of the United Nations Framework Convention on Climate Change (UNFCCC). In 1992, such convention was adopted in New York and signed at the Earth Summit in Rio de Janeiro by more than 150 countries and the European Community; its ultimate objective was the *'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'*. It contains commitments for all Parties; those included in Annex I (all OEC countries and countries with economies in transition) aim to return greenhouse gas emissions not controlled by the Montreal Protocol to 1990 levels by the year 2000. The convention entered in force in March 1994.

Despite the convention ratification, the GHG emissions continued to increase worldwide; thus a new measure containing legally binding commitments was developed: the Kyoto Protocol; this was adopted in Japan on 11 December 1997; the detailed rules for the implementation of the Protocol were accepted at the Conference of the Parties (COP) 7 in Marrakesh in 2001; and finally entered into force on 16 February 2005.

Countries included in Annex I of the Protocol agreed to reduce their anthropogenic GHG emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012. 184 Parties of the Convention have ratified its Protocol to date.

Parties to the Convention must submit national reports on implementation of the Convention to the COP. The contents and timetables for the submission of such communications are different for Annex I and non-Annex I Parties, in accordance with the principle of "common but differentiated responsibilities" contained in the Convention.

Regarding submission timetables, Annex I Parties are required to submit information on their national inventories annually, and to submit national communications periodically on a COP predefined date. This is not the case for the submission of national communications of non-Annex I Parties, although these documents should be submitted within four years of the initial allocation of financial resources to assist them in preparing their national communications.

In terms of contents, the core elements of the national communications for both Annex I and non-Annex I Parties are information on emissions and removals of GHG emissions and details of the activities a Party has undertaken to implement the Convention. National communications usually contain information on national circumstances, vulnerability assessment, financial resources and transfer of technology, and education, training and public awareness; but the ones from Annex I Parties additionally contain information on policies and measures.

The Kyoto mechanisms (UNFCCC, 2009)

As seen before, Parties must meet their targets primarily through national measures; however, the Kyoto Protocol offers them additional means of meeting such targets through three market-based mechanisms:

Emissions trading – known as “the carbon market”

Clean development mechanism (CDM)

Joint implementation (JI)

The JI mechanism is open only to Annex I countries, this is, industrialized countries; in such way that they are allowed to develop joint implementation projects with other developed countries.

By the other hand, the CDM involves investment in sustainable development projects that reduce emissions in developing countries.

Climate change at the border region Mexico-USA: challenges, needs and problems

Climate change is a global phenomenon; however, this does not mean that is uniform. Regions play an important role, as they display a wide and diverse variation in both, contributions to GHG emissions and vulnerability of different populations and environmental system. This results from differences in local environmental conditions; economic, social, and political conditions; and degrees of dependence on climate-sensitive resources, among other factors.

The border region between Mexico and USA is not an exception, a diverse area itself, encompassing deserts, mountain ranges, wetlands, estuaries and aquifers along 3,141 kilometers from the Gulf of Mexico to the Pacific Ocean, is home to more than 12 million people - by 2020, the binational population along the border is expected to double to more than 24 million people (EPA, 2009a).

The environmental challenges of this rapid population growth include unplanned development; greater demand for land and energy; increased traffic congestion, air pollution and waste generation; overburdened or unavailable wastewater treatment; and increased frequency of chemical emergencies; as seen activities all that generate GHG emissions.

The main objective of the border to be selective to the transit of people does not apply to GHG emissions; these move freely due to similar physical conditions shared by border communities, such as topography, geomorphology and weather; in other words border communities share air basins which are characterised by changing wind patterns depending on the season. Winds are the mean of transport of all atmospheric pollutants including GHG emissions, thus any human activity that generates pollutants in a given side of the border will have an impact on the other side. This sharing of biophysical aspects is not recognised as it is not the need to collaborate on a regional level at both sides of the border. However, both countries have worked separately on actions regarding climate.

Mexico, a country non-included in the annex I, signed and ratified the Framework Convention in 1992. Furthermore, it signed in 1998 and ratified in 2000 the Kyoto Protocol, this entered in force in 2005. Currently, the Mexican climate actions are framed in the National Strategy on Climate Change (Estrategia Nacional de Cambio Climático) published in 2007, this set guidelines for mitigation strategies that may reduce 106.8 millions of metric tones (mmt) of carbon dioxide equivalent (CO₂eq.) annually until 2014.

Mexico published its most recent GHG emissions inventory in 2006, for the period 1990 to 2002. This inventory, following the COP methodology, was prepared by Instituto Nacional de Ecología as part of Mexico legal obligation to the Kyoto protocol. The Mexican GHG emissions sources are as follows: 61 % arises from the energy sector (24% due to electricity generation, 13% from other fixed and mobile sources, 18% due to transport and 6% due to fugitive emissions of methane). 14 % comes from land use and changes in land use, 10 % comes from waste, 8 % comes from industrial processes, and 7 % is emitted from

agriculture. It was estimated that 6 % of the national contributions comes from the Northern Border States.

USA signed the Kyoto protocol in 1998 but did not ratify it. And although is has tried to establish a national strategy against climate change that did not cristalised (the America's Climate Security Act of 2007), USA main efforts resides in regional and state actions, such as Asia Pacific Partnership on Clean Development and Climate, Regional Greenhouse Gas Initiative, the Western Climate Initiative and the State Climate Acts.

USA published its most recent GHG emissions inventory in 2008, covering the period 1990 to 2006. This inventory was prepared by the Environmental Protection Agency as part of America responsibilities to the UNFCCC. The methodology used to calculate emission was the one given in the guidelines of the IPCC for the year 2006. Inventory results showed that the main source of GHG emissions is the energy sector with 86 % of the total, following by transport, industry, agriculture, commercial and residential uses with 28, 19, 7, 6 and 5 %, respectively. In this inventory was estimated that Sourthern Border states contributed 13 % to the national GHG emissions.

The regional efforts on climate change issues developed at the Border States

If the border region were a country on its own will be of the size of Pakistan and will occupy the 33 rd position as GHG emissions responsible in the world, with a contribution of around 129 mmt CO₂ eq (EPA, 2009b). Such responsibility has been somehow understood, and caused numerous efforts to be developed in the region.

Since 2005, the American southern border states of California, Nuevo México, and Arizona, and the Mexican northern states of Baja California and Sonora have accomplished their GHG emissions inventories. Texas finished a gross inventory covering the period 1990-1999 in 2002. Chihuahua, Coahuila, Nuevo Leon are currently developing their own GHG emissions inventories. Table 1 summarises the gross and net GHG emissions in CO₂ eq. from the existing five inventories in the border region.

Table 1. Summary of GHG emissions at the border estates (EPA, 2009b)

Border state	Year on which inventory was finished	Period covered	Annual emissions (mmt)	Population (Millions)	Emissions per capita (mmt CO ₂ eq)
California	2007	1990-2004 (Projections until 2020)	484.4 mmt CO ₂ eq. (2004)--gross 479.7 mmt CO ₂ eq. (2004)--net	36.6 (2007)	13.2-- gross 13.1--net
Arizona	2005	1990-2003 (Projections until 2020)	89 mmt CO ₂ eq. (2000)-- gross 82.3 mmt CO ₂ eq. (2000)--net	6.3 (2007)	14.1-- gross 13.1--net
Nuevo México	2006	1990-2003 (Projections until 2020)	82.9 mmt CO ₂ eq. (2000)— gross 62 mmt CO ₂ eq. (2000)—neto (aproximate) <i>Note :this approximation is base don the New Mexico production</i>	2.0 (2007)	41.5-- gross 31--net
Baja California	2007	2005	17.7 mmt CO ₂ e (2005)— gross	2.8 (2005)	6.3-- gross
Sonora	2008	1990-2005 (Projections until 2020)	19.9 mmt CO ₂ e (2005)— gross 11.5 mmt CO ₂ e (2005)—net (aproximado)	2.4 (2005)	8.3— gross 4.8--net

The sources of GHG emissions in the border region are as follows: use of energy as electricity generation and fossil fuel burning for building cooling and warming with 40 – 50 %; the burning of fossil fuel –gas and diesel – in transport with 25 – 40 %; industrial processes with 2 – 9 %; agriculture contributions, particularly livestock methane emissions, nitrous oxides from fertilizers and carbon emissions from crops with 5 – 17 %; waste as methane emissions from landfills and oxidation ponds in wastewater treatment plants with 1 – 13 %; and finally land use and land use change with less than 1 %.

California, Arizona and New Mexico have State Climate Change Action Plans, and all six Mexican northern states are either developing or about to start to develop their own plans.

Efforts in the border region have gone beyond state inventories and action plans, thus there are several border initiatives to coordinate, to report and to trade GHG emissions at the border region, such as:

- The Climate change initiative Arizona-Sonora in 2005
- Border 2012
- Local Governments for sustainability
- The U.S. Mayors Climate Protection Agreement
- The conference of border governors
- The Chicago Climate Exchange

- The PG&E-California agreement
- The SEMARNAT-California agreement

Climate change at the border region Mexico-USA and the need of crossborder collaboration

As seen in the previous paragraphs, efforts to act on climate change issues are various on both sides of the border; however, it is also noticed that these are separated; thus in order to minimise the risk of missing opportunities three issues should be addressed: 1) collaboration on harmonisation of calculation procedures to estimate GHG emissions inventories on both sides of the border, 2) collaboration to elaborate and implement mitigation and adaptation projects; and most importantly 3) development of a rigorous benchmarking of current carbon trading schemes, on regional needs incorporating social and economic aspects.

These issues should first be addressed to a regional and manageable level, for example as a harmonisation exercise between sister cities such as San Diego and Tijuana, this exercise could comprise three stages; 1) start with a detailed review of calculation methods to figure out if the carbon language is similar, 2) continue with a identification of main sources of emissions in the border region taking into account the role of air basins; and 3) end with a list of realistic and achievable climate actions that includes a tailor-made cap and trade scheme.

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