

CLIMATE CHANGE AND THE PROTECTION OF GUATEMALAN MARINE-COASTAL ECOSYSTEMS

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ABSTRACT

Guatemala is prone to natural disasters such as tropical storms, hurricanes and earthquakes. This is borne out by the 2009 Global Assessment Report on Disaster Risk Reduction which classifies Guatemala as one of the world's top ten countries that is vulnerable to natural disasters. This is why the adoption of climate change mitigation and adaptation strategies are vital for the future economic prosperity of the country.

This research paper provides background information on the Climate Change National Policy, the National Policy for the Integrated Management of Marine Coastal Zones and the Law Initiative No. 4139: Framework Law to Regulate the Reduction of Vulnerability, Obligatory Adaptation, Facing Climate Change and the Mitigation of Green House Gases Effects in Guatemala, and how this is influenced to a greater or lesser degree by maritime matters.

The paper also makes a number of research recommendations for further action and capacity building. They aim to improve adaptive capacity at a national level and include a strategy for mitigation and disaster risk reduction.

Particular emphasis is placed on reducing the risks to vulnerable communities along the coastline who bear the brunt of climate impacts such as frequent floods, droughts and heat waves, and whose severity are foreseen by scientists to increase over the coming decades.

The paper concludes that the protection of marine coastal ecosystems and the sustainable use of their goods and services is vitally important and will in the longer term contribute to the economic well-being and prosperity of Guatemala.

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ACRONYMS

AWG-LCA	Ad Hoc Working Group on Long term Cooperative Action under the UNFCCC
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism – Kyoto Protocol
CER	Certified Emissions Reduction – Kyoto Protocol
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CONAP	<i>Consejo Nacional de Áreas Protegidas /</i> Guatemalan National Council of Protected Areas
COP	Conference of the Parties to the UNFCCC
CO₂	Carbon Dioxide
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
INAB	<i>Instituto Nacional de Bosques /</i> Guatemalan National Forest Institution
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
JI	Joint Implementation – Kyoto Protocol
MAGA	<i>Ministerio de Agricultura, Ganadería y Alimentación /</i> Guatemalan Ministry of Farming, Livestock, and Food
MARN	<i>Ministerio de Ambiente y Recursos Naturales /</i> Guatemalan Ministry of Environment and Natural Resources

OAS	Organization of American States
OCRET	<i>Oficina de Control de Áreas de Reservas Territoriales del Estado</i> / Guatemalan National Bureau of Land Reserves
OECD	Organization for Economic Co-operation and Development
RFMO	Regional Fisheries Management Organization
SIGAP	<i>Sistema Guatemalteco de Áreas Protegidas</i> / Guatemalan System of Protected Areas
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WSSD	World Summit on Sustainable Development

UNITS USED IN THE RESEARCH

ft	foot
ha	hectare
in	inch
nm	nautical mile
m	metre
m³	cubic meter
mm	millimetre
km	kilometre
sq km	square kilometre
T	ton

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INTRODUCTION

Guatemala is a country with a very distinctive geography, climate, history and people. Currently, the future of the country is closely linked with its ability to deal with a number of pressing matters including the establishment of a robust economy which can withstand global recessions; the long-term stability of its political structures; and the adoption of appropriate measures to deal with the effects of natural disasters and climate change.¹

Guatemala is prone to natural disasters and this is a matter which has to be taken into consideration when adopting climate change mitigation and adaptation strategies-- as will be seen in later chapters. This is mainly attributable to the geographic location of the country – Guatemala lies between the Caribbean Sea and Pacific Ocean which ensures frequent tropical storms and hurricanes.

A case in point is Hurricane Mitch and Tropical Storm Agatha which left the country in a devastated state in 1998 and 2010 respectively.² Hurricane Mitch (1998) resulted in \$748 million USD in economic losses, 77% of which affected production sectors. Tropical Storm Stan (2005) caused \$989 million USD in economic losses, over 1,400 deaths, and over ½ million victims, 70% of whom were indigenous peoples.³

The 2010 rainy season was one of the worst in history. In that year, tropical storms Alex, Agatha, Frank, and Matthew affected 723,000 people, killed 262, injured 778, required the evacuation of 243,000, and left 44,500 homes at risk and 76,000 homes damaged.⁴ Agatha's estimated economic damage was \$1 billion USD.⁵

¹ For background information about Guatemala, refer to Appendix I

² For more information about Hurricane Mitch and Tropical Storm Agatha, refer to: Inter-American Development Bank website, at:

http://www.iadb.org/regions/re2/consultative_group/background5.htm; and BBC website, at: <http://www.bbc.co.uk/news/10200440>

³ Data from SEGEPLAN - Guatemalan Presidential Secretariat for Planning and Programming, 2006

⁴ Data from SE-CONRED. *Informative Bulletin No. 1382*, 2010

⁵ Data from EM-DAT - The OFDA/CRED International Disaster Database, 2011

The 2011 rainy season is already making ravages and the country is expecting more damages and devastation. Also, by the end of September 2011 the country suffered four consecutive earthquakes in less than two hours, causing panic among the people.

Recent scientific evidence from the 2009 Global Assessment Report on Disaster Risk Reduction indicates that Guatemala has been classified as one of the world's top ten countries most vulnerable to disasters.⁶

There are other geographical factors that need to be taken into account when dealing with climate change. In particular, the geographical location of the highlands, which lie along the Motagua Fault which has been associated with several major earthquakes and earth tremors in recent years. This is compounded by the location of the Middle America Trench, a major subduction zone which lies off the Pacific Coast where the Cocos Plate is sinking beneath the Caribbean Plate, producing volcanic activity inland of the coast. In total, there are 37 volcanoes, 4 of which are active: Pacaya, Santiaguito, Fuego and Tacaná. This has made life unpredictable and results in periodical unexpected environmental affects. For instance, in 2010 there was an eruption from the Pacaya Volcano which resulted in volcanic sand and debris in Guatemala City and brought economic life to a standstill for a number of days.⁷

⁶ UNISDR. The 2009 Global Assessment Report was coordinated by the United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat, in collaboration with the United Nations Development Programme (UNDP), the World Bank, the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the ProVention Consortium, the Norwegian Geotechnical Institute and a wide range of other International Strategy for Disaster Reduction (ISDR) partners, 2009 This analysis was conducted to include not only climate change risks, but also risks associated with seismic and volcanic activity

For the complete text of the Report, refer to:

<http://www.preventionweb.net/english/hyogo/gar/report/index.php?id=1130&pid:34&pih:2>

⁷ For more information about the eruption and the volcanic sand, refer to: Prensa Libre, at:

http://www.prensalibre.com.gt/noticias/Quedan-suspendidas-vuelos-ceniza-Pacaya_0_269373340.html; and Sky News, at:

<http://news.sky.com/skynews/Home/World-News/Guatemala-Erupting-Pacaya-Volcano-Kills-Journalist-And-Shuts-La-Aurora-International-Airport/Article/201005415639807>

The effects of climate change are very visible in Guatemala.⁸ In the year of 2009 the drought in the Dry Corridor (East Central Pacific departments: Quiche, Baja Verapaz, El Progreso, Zacapa, Chiquimula, Jalapa, Jutiapa) represented almost \$31.97 million USD in economic losses.⁹ The food crisis increased that year to more than 110%.¹⁰

The effects of climate change are compounded by both El Niño and La Niña phenomenon. In 2010, for example, La Niña phenomenon with the incessant rains, landslides and the worst flooding in years stroke in a very severe way the country affecting roads, bridges, crops; and, also caused more than 150 deaths.¹¹

The agricultural sector in Guatemala is one of those most affected by climate change. This is documented in the Guatemalan First National Communication on Climate Change¹² and is highlighted by the recent food crisis in Guatemala (September 2009), due to prolonged drought in the eastern and north-western parts of the country, which caused losses of 72,798 ha. of crops (worth about \$32 million USD). In 2010, after Tropical Storm Agatha, a government proposal was made to invest about \$203 million USD to ensure food security in the country.¹³

Most climate change models predict that damages will be most sorely felt by small farmers, particularly rain-fed farmers.¹⁴ Current temperatures are near or above optimal values for agricultural production, so it is expected that the

⁸ To see a Map of Drought Treat in Guatemala, refer to Appendix II Table 1

⁹ For more information about the economic losses, refer to: Prensa Libre, at: http://www.prensalibre.com/noticias/Perdidas-agricultura-ascienden-Q266-millones_0_200379996.html

¹⁰ For more information about the Guatemalan 2009 food crisis, refer to: Prensa Libre, at: http://www.prensalibre.com/noticias/Crisis-alimentaria-crece-ciento-agosto_0_99590116.html

¹¹ For more information about the phenomena, refer to the Central American Politics website, at: <http://centralamericanpolitics.blogspot.com/2010/09/flooding-in-guatemala.html>

¹² MARN. *First National Communication on Climate Change*, 2001

For the complete text of the Communication, refer to:

http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/pcn.pdf

¹³ MAGA Internal document, 2010

¹⁴ Altieri and Koohafkan. *Enduring Farms: Climate Change, Smallholders and Traditional Farming Communities*, 2008

warming projected for the rest of the century, along with an increase in variability of rainfall, will affect the productivity of the agricultural sector.

Taking all these factors into consideration with the reality of Guatemala and the vivid consequences of climate change, the Ministry of Environment and Natural Resources (hereinafter: MARN) drafted the Climate Change National Policy which was approved by the President Álvaro Colom in December 2009. Also, part of the MARN mandate is to generate all the public policies related to the basin hydrographic, coastal zones, oceans and marine resources, therefore in 2008 the Ministry also elaborated the National Policy for the Integrated Management of Marine Coastal Zones which was approved by the President Álvaro Colom in December 2009. Both policies are examined separately in Chapter 5.

The consequences of climate change also impacts the Guatemalan marine coastal ecosystems.

Guatemala possesses a great natural richness resulting from its exceptional geographic location in Central America, with coasts on both the Pacific Ocean and the Caribbean Sea. The Guatemalan coast spans 402 km (254 km of Pacific coastline and 148 km of Caribbean coastline), and its marine extension is estimated to be more than 116,000 km².

Approximately 1,012 species of fauna in the Pacific Coast of Guatemala are estimated to exist. More than 70% of the species are present in three classes: fish (31.57%), birds (26.17%) and bivalves (15.78%). Among the most emblematic and globally important ecosystems present in this region are mangroves, which currently cover an area of 261.7 km².¹⁵

In addition, there are sandy and muddy beaches, which serve as important feeding grounds for coastal bird species (four species from the *Charadriidae* family and 29 species from the *Scolopacidae* family); and, nesting areas for

¹⁵ MARN. Internal document, 2011

sea turtle species such as the Olive Ridley (*Lepidochelys olivacea*) and the leatherback (*Dermochelys coriacea*).¹⁶

Other ecosystems include estuaries and coastal lagoons, as well as herbaceous wetlands, which serve as areas for feeding, refuge and reproduction for many marine species; and, as resting areas for migratory birds, including the American White Pelican (*Pelecanus erythrorhynchos*) and the Wood Stork (*Mycteria americana*). The ocean waters serve as foraging/breeding areas for the green sea turtle (*Chelonya mydas agassizii*) and the hawksbill turtle (*Eretmochelys imbricata*), and for reproduction of the humpback whale (*Megaptera novaeangliae*). The Pink Footed Shearwater (*Puffinus creatopus*) a pelagic bird classified as “vulnerable” on the International Union for Conservation of Nature (hereinafter: IUCN) Red List¹⁷ is also present, as well as permanently submerged coral formations made up of colonies of hermatypic coral.¹⁸

The marine coastal area of the Guatemalan Caribbean forms part of the Mesoamerican Barrier Reef Ecoregion; and, in addition to coral reefs, it contains mangroves, coastal estuaries and lagoons and sandy beaches that originate from coral. Among the most globally important species present in the marine coastal region of the Guatemalan Caribbean are the manatee (*Trichechus manatus*), sea turtles (the hawksbill turtle, the green sea turtle and the loggerhead sea turtle *Caretta caretta*), the spiny lobster (*Panulirus argus*), the pink conch (*Strombus gigas*) and the White-tailed Tropicbird (*Phaethon lepturus*).¹⁹

The population in the coastal region of Guatemala consists of approximately 300,000 people living in 17 Municipalities. Guatemala’s Exclusive Economic Zone (hereinafter: EEZ) and Territorial Sea Zone has an area over 116,000 km², in which diverse economic activities occur.

¹⁶ MARN. Internal document, 2011

¹⁷ For more information about the IUCN Red List, refer to: <http://www.iucnredlist.org/>

¹⁸ MARN. Internal document, 2011

¹⁹ *Ibid*

Given this context, this research aims to recommend strategies for climate change adaptation and mitigation in Guatemala's marine coastal ecosystems, including the marine coastal zone for the conservation and sustainable use of its biological richness is a matter of great national importance because of the goods and services that they offer and provide.

This research is structured into six major chapters. Chapter 1 provides information about the science of climate change. Chapter 2 focuses on the international law on combating climate change, which includes the United Nations Framework Convention on Climate Change – UNFCCC, the Kyoto Protocol to the UNFCCC (referred as the Kyoto Protocol) and the Conference of the Parties (COP) to the UNFCCC. Chapter 3 relates climate change and Oceans Law highlighting the impacts of climate change in the oceans, the United Nations Convention on the Law of the Sea – UNCLOS and climate change under UNCLOS. Chapter 4 addresses the strategies for climate change adaptation and mitigation. Chapter 5 concentrates on the response in Guatemala with remarks on the First National Communication on Climate Change, the Climate Change National Policy and the National Policy for the Integrated Management of Marine Coastal Zones. Finally, Chapter 6 concentrates on the recommendations for further action and capacity building with the expected results.

CHAPTER 1 – THE SCIENCE OF CLIMATE CHANGE

SECTION 1. CLIMATE CHANGE, GLOBAL WARMING AND THE GREENHOUSE EFFECT

First of all, it is important to define important terms and concepts such as climate change, global warming and the greenhouse effect in order to better understand what the impacts of these phenomena are to give context to the discussion in subsequent chapters.

Climate Change is a periodic modification of Earth's weather conditions brought about as a result of changes in the atmosphere as well as interactions between the atmosphere and various other geologic, chemical, biological and geographic factors within the Earth system.²⁰

The United Nations Framework Convention on Climate Change (hereinafter: UNFCCC) defines climate change as a change of climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere; and, which is in addition to natural climate variability observed over comparable time periods.²¹

Climate change is thought to be linked largely to the emission of six greenhouse gases (hereinafter: GHG): nitrous oxides (N₂O), carbon dioxide (hereinafter: CO₂), perfluorocarbons (PFCs), methane (CH₄), chlorofluorocarbons (CFCs), chlorofluorocarbons (CFCs) and ground-level ozone.

These gases trap the infrared radiation emitted by the Earth's surface acting like a greenhouse; and, raising the air temperature to create a stable environment.

²⁰ Britannica, Academic Edition: *Climate change*, at: <http://www.britannica.com/EBchecked/topic/121632/climate-change>

²¹ The definition of climate change in the UNFCCC can be found in the Article 1.2. For the complete text of the UNFCCC, refer to: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

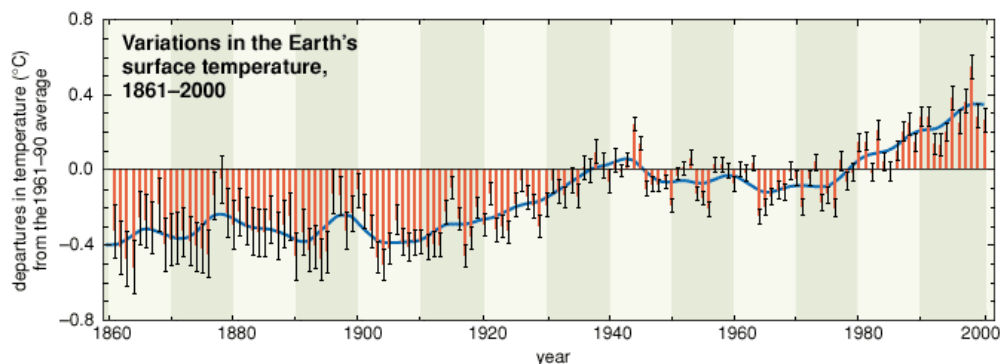
An increase in that air temperature is mostly liked to have very serious consequences such as flooding or low-lying land as the polar ice caps melt, extreme weather events, changes in seasons, etc.²²

In order to understand this definition it may be appropriate to refer to the work of the Intergovernmental Panel on Climate Change (hereinafter: IPCC),²³ which estimates that during the twentieth century the earth's surface warmed by about 0.74°C.

There has been a lot of discussion among the scientific community to determine the causes for this change. Some of them say that the change is due to the Earth's natural evolution, but there is some consensus among the scientific community that the Earth's warming is caused by human activity since the industrial period.²⁴

This can be clearly seen in the data presented in Table 1 below which shows the dramatic variation in the Earth's surface temperature between the years 1860 and 2000.

Table 1. Variations in the Earth's Surface Temperature (1861-2000)²⁵



Source: Intergovernmental Panel on Climate Change; World Meteorological Organization; United Nations Environment Programme
© 2006 Encyclopædia Britannica, Inc.

²² For more information about greenhouse gases, refer to: Britannica, Academic Edition: *Greenhouse Gas*, at: <http://www.britannica.com/EBchecked/topic/683450/greenhouse-gas>

²³ For more information about the IPCC, refer to IPCC official website, at: <http://www.ipcc.ch>

²⁴ For more information about the industrial period, refer to: Britannica, Academic Edition: *Industrial Period*, at: <http://www.britannica.com/EBchecked/topic/197976/exercise/25981/Industrial-period>

²⁵ Britannica, Academic Edition: *Climate change*, at: <http://www.britannica.com/EBchecked/topic/121632/climate-change>

Ominously, the IPCC 4th Assessment Report (AR4) in 2007 stated that warming of the climate system is “unequivocal” and that most of the observed increase in global average temperatures since the mid-twentieth century is “very likely” due to the rise in GHG generated by human activity.²⁶

GHG are gas molecules that have the property of absorbing infrared radiation (net heat energy) emitted from Earth’s surface and reradiating it back to Earth’s surface, thus contributing to the phenomenon known as the greenhouse effect.

CO₂, methane and water vapor are the most important GHG; and, they have a profound effect on the energy budget of the Earth system despite making up only a fraction of all atmospheric gases.²⁷

This is evident in the UNFCCC which defines GHG as those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.²⁸

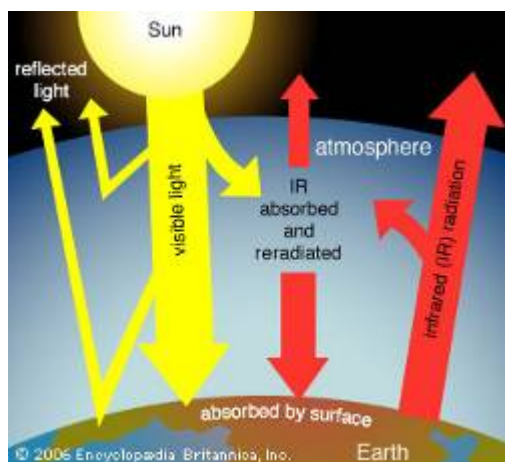
This effect is illustrated in the next Figure 1 which shows how the process works.

²⁶ For the complete text of the AR4 Report, refer to:
http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

²⁷ Britannica, Academic Edition: *Greenhouse Gases*, at:
<http://www.britannica.com/EBchecked/topic/121632/climate-change/275772/Greenhouse-gases>

²⁸ The definition of GHG in the UNFCCC can be found in the Article 1.5., at:
<http://unfccc.int/resource/docs/convkp/conveng.pdf>

Figure 1. The Greenhouse Effect²⁹



More recently, the data demonstrates that this process is beginning to accelerate. For example, the IPCC 4th Assessment Report (AR4) acknowledged that between the years of 1970 and 2004, GHG emissions increased approximately by 70%, and CO₂, by far the largest source with 77% of total emissions, grew by an astounding 80%. Atmospheric concentrations of CO₂, methane (CH₄) and nitrous oxide (N₂O), have all risen noticeably since 1750 due to human activity, and today, far surpass pre-industrial values. This allows specialist scientists to project that if emissions are allowed to rise at their current pace and double from pre-industrial levels, the world will likely face a 2°C - 4.5°C temperature rise by 2100, with a 3°C increase most likely.

However, considerable care has to be taken with these projections. Nonetheless, if we accept the IPCC most rigorous emissions reduction scenario, we still have a 50% chance of limiting further temperature increases to 2°C.

In reality, accomplishing that would require a comprehensive global mitigation effort, including an additional tightening of actual climate policies in developed countries and concurrent emissions reductions in developing nations.

²⁹ Britannica, Academic Edition: *Climate change*, at: <http://www.britannica.com/EBchecked/topic/121632/climate-change>

Climate scientists estimate that we need to see an emissions peak before 2020 and a 50% reduction below 1990 levels by 2050.³⁰ For industrialized nations, that translates to a reduction of 25% - 40% emissions below 1990 levels by 2020. Essentially, these are the targets which have informed the climate change policy debate at an international level.

Improving adaptive capacity at national, regional and global levels is vital to achieving these goals. This includes mitigation and disaster risk reduction efforts, insurance and other risk transfer mechanisms. Their broad use is needed to reduce the vulnerability of high-risk communities to inevitable climate impacts such as frequent floods, droughts and heat waves whose severity are foreseen to increase over the coming decades. That is why a risk reduction approach is fundamental; if not, economic growth and survival of the world's most vulnerable populations could be threatened.

Developing countries such as Guatemala will be most affected, and it is now evident that a pragmatic response by the international community is urgently required.

Essentially, the response has come in the form of the UNFCCC and its associated Protocol (commonly referred to as the Kyoto Protocol). Both of which will be thoroughly examined in the next chapter.

If we take into consideration that nothing is absolutely certain in science, since the physical sciences commonly say that something is “true”, “certain” or “well-established” if the evidence suggest that there is less than a 5% chance (1 in 20) of it being wrong, it is important to say that in any estimates of future climate change there is a number of sources of uncertainty. Some of these arise from science itself, and some from the uncertainty of future human behaviour, especially future emissions of future emissions of GHG.

³⁰ Gateway to the UN System's Work on Climate Change webpage, at: <http://www.un.org/wcm/content/site/climatechange/gateway>

In relation to future climate impacts, there are a number of different assumptions and a number of models of different parts of the climate system. These range from models of human society leading to future GHG emissions (socio-economic models), through models of how much of the emitted GHG stay in the atmosphere (carbon cycle models) to their effects on global climate (climate models), local or regional climatic changes (downscaling models), and eventually to the effects of climate change on biological and human systems (sectorial impact models). Sectorial impact models must also consider the adaptive capacity of society, which will change with time and also lead to uncertainty.³¹

Uncertainty in regards to the rate and magnitude of climate change and in relation to its effects, operates in both directions. It can mean that effects may be less than the current best estimates, or more. This poses the problem, common to most human endeavours, of how to make decisions in the face of uncertainty.

In regards to climate change, the problem is even more delicate because the decisions we make today may affect us many decades into the future. Uncertainty is inevitable, but risk is certain.

The Precautionary Principle, as incorporated in the Rio Declaration at the Earth Summit in June 1992,³² states that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.³³

The UNFCCC included this Principle in its Article 3.1, where it is expressed as: The Parties should take precautionary measures to anticipate, prevent or

³¹ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

³² For more information about the Earth Summit, refer to: Britannica, Academic Edition. United Nations Conference on Environment and Development, at: <http://www.britannica.com/EBchecked/topic/616390/United-Nations-Conference-on-Environment-and-Development-UNCED?anchor=ref289723>

³³ Principle 15 of the Rio Declaration, at: <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163>

minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.³⁴

In conclusion, uncertainty should be seen not as a reason for inaction on climate change, but as a reason for proceeding cautiously with a readiness to adapt policies to changing insights and circumstances.

Accordingly to the Stern Review,³⁵ future climate change and projected impacts due to higher levels of CO₂ and increases in temperatures could result in sea level rise and extensive damage to coral reefs that will result in a rising number of species that face extinction.³⁶ These could be case of the fragile marine coastal ecosystems in Guatemala; therefore, integrated management plans are important to work towards an effective environmental sustainability.

Climate change affects everyone and every country in the world, in one way or another; hence, the importance of the UNFCCC, a framework for international action in tackling the prospect of global warming associated with emission of GHG.

The regulations and negotiations of the UNFCCC, the Kyoto Protocol and the Conference of the Parties to the UNFCCC, are nowadays important in the

³⁴ Article 3.1 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

³⁵ For more information and the complete text of the Review, refer to: http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/sternreview_index.htm

³⁶ To see the Stern Review figure about the Projected Impacts of Climate Change, refer to Appendix II, Figure 1

international scheme and what happens in these forums affects the countries, especially those developing ones such as Guatemala, that did very little about the greenhouse gasses and are one of the most affected by the climate change impacts.

These international agreements are examined in detail in the next chapter and will give us a better understanding of the agreements and compromises between countries.

CHAPTER 2 – INTERNATIONAL LAW ON COMBATING CLIMATE CHANGE

SECTION 1. UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE – UNFCCC

In response to the scientific data which showed that there was a global increase in average temperatures, most countries began to think about what could be done to reduce global warming and to cope with the temperature increase.

The IPCC, the leading international body for the assessment of climate change, was established in 1988 through collaboration between the United Nations Environmental Programme (hereinafter: UNEP) and the World Meteorological Organization (WMO).

In 1990, the IPCC 1st Assessment Report predicted that the average global temperature would rise by an average of 0.3°C per decade.³⁷ That was the turning point when the United Nations General Assembly commenced an intergovernmental negotiating process that ultimately led to agreement on the Framework Convention on Climate Change.³⁸ After two years of intense and difficult negotiations, the draft treaty was opened for signature at the United Nations Conference on Environment and Development (hereinafter: UNCED), commonly known as the Earth Summit held in Rio de Janeiro from June 3 to 14, 1992.

The first countries to sign the UNFCCC on 4 June 1992 were: Antigua and Barbuda, Australia, Belgium, Brazil, Finland, Iceland, Israel, Liechtenstein, Netherlands, New Zealand, Norway and Uruguay. Guatemala signed the

³⁷ For the complete text of the FAR Report, refer to:

http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

³⁸ For more information about the UNFCCC, refer to: United Nations Treaty Collection, Chapter XXVII: No 7. United Nations Framework Convention on Climate Change –UNFCCC, at:

http://treaties.un.org/pages/ViewDetailsIII.aspx?&src=UNTSOnline&mtdsg_no=XXVII~7&chapter=27&Temp=mtdsg3&lang=en

UNFCCC on 13 June 1992. The UNFCCC entered into force on 21 March 1994. Currently, there are 195 Parties (194 States and 1 regional economic integration organization) to the UNFCCC.³⁹

As with all framework conventions, the UNFCCC is a complex agreement which reflects the various interests of the Parties that took part in the negotiation process.

The objective of the treaty is to achieve, in accordance with the relevant provisions of the UNFCCC, the stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.⁴⁰

This task is made more difficult by the requirement that such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.⁴¹

At the outset, it is important to note that the UNFCCC sets down a broad range of principles and commitments for the Parties.⁴²

Specific principles acknowledged in the Article 3 of the UNFCCC are:⁴³

- The need to protect the climate system on the basis of equity and in accordance with (States) common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead;
- The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable;

³⁹ To see the complete list of UNFCCC members and the status of ratification refer to: http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php

⁴⁰ Article 1 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

⁴¹ Article 2 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

⁴² Importantly, it also establishes a set of unique institutions such as the UNFCCC Secretariat that supports the work of public and private bodies that are involved in the climate change process

⁴³ Article 3 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

- The need for precautionary measures in the absence of full scientific certainty, qualified by the need to be cost effective and comprehensive; and
- Parties have a right to and should promote sustainable development integrated with national development programmes, and they should cooperate to promote a supportive and open international economic system. Measures taken should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.

Also, the first paragraph of Article 4 of the UNFCCC commits all Parties to:⁴⁴

- Develop, periodically update, publish and make available to the Conference of the Parties to the UNFCCC, national inventories of GHG emission sources and sinks;
- Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change; and, measures to facilitate adequate adaptation to climate change;
- Promote and cooperate in the development, application and diffusion, including transfer of technologies, practices and processes;
- Cooperate in preparing for adaptation to the impacts of climate change, develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture; and, for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as flood;
- Various general aims including the promotion of sustainable management, and the promotion and cooperation in a wide range of other measures, including conservation and enhancement of sinks and reservoirs of GHG, scientific, technological, socio-economic, etc. research and the open; and, prompt exchanges of relevant information; education, training and public awareness; and

⁴⁴ Article 4 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

- Communicate to the Conference of Parties information related to implementation.

This applied to all Parties. The second paragraph of Article 4 (Article 4.2) commits developed country Parties and others included in Annex I to more specific measures, namely the adoption of policies and measures that will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention.⁴⁵

Of particular importance is the Conference of the Parties to the UNFCCC (hereinafter: COP), which meet every year to review advancement and to move the international process forward. There are also a number of subsidiary bodies and their Bureau.⁴⁶

One significant aspect worth mentioning is that the UNFCCC omits to set down specific legally binding commitments on the Parties, but emphasizes the importance of precaution and places a large burden of responsibility on industrialized states to address the problems of climate change.

A key requirement is set down by Article 4.1, which requires all Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, to provide inventories of emissions, implement mitigating programmes, promote technology transfer, manage sinks and reservoirs, plan adaptation to climate change, take climate change into account in domestic policy, gather scientific data, exchange information, promote awareness, and communicate with the COP.⁴⁷

⁴⁵ Article 4 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

⁴⁶ The COP is the supreme decision making body of the UNFCCC. All governments that are Party to the UNFCCC are represented at the COP where they review and promote the implementation of the Convention and any other legal instruments that the COP adopts, including institutional and administrative arrangements

⁴⁷ Article 4 of the UNFCCC, at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

Understanding the system of the UNFCCC is important and a central feature is the classification of contracting Parties. In the first instance, Parties to UNFCCC are classified as: Annex I Countries which are 40 industrialized countries and economies in transition, as well as the European Union. Secondly, there is a classification which is referred to as Annex II Countries which is made-up of 23 developed countries and the European Union which are required to contribute towards the costs of developing countries), as well as Developing Countries.⁴⁸

In accordance with the scheme for reduction set down by the UNFCCC and the Kyoto Protocol, which will be analysed in more detail in the next section, Annex I countries who have ratified the Kyoto Protocol, have committed to reduce their emission levels of GHG gasses to targets that are mainly set below their 1990 levels. They achieve this by allocating reduced annual allowances to the major operators within their borders. These operators can only exceed their allocations if they buy emission allowances, or offset their excesses through a mechanism that is agreed by all Parties to UNFCCC. This may be contrasted to the position of Annex II countries which are a sub-group of the Annex I countries. They comprise the Organization for Economic Co-operation and Development (hereinafter: OECD) members, excluding those whose economies were in transition back in 1992. Developing countries are not required to reduce emission levels unless developed countries supply enough funding and technology. This is the case for Guatemala.

⁴⁸ To see the complete countries classification, refer to Appendix II, Table 2

SECTION 2. THE KYOTO PROTOCOL

The Kyoto Protocol is an international agreement, a Protocol to the UNFCCC adopted in the city of Kyoto, Japan, on 11 December 1997.⁴⁹ In accordance with Article 24, it was open for signature from 16 March 1998 to 15 March 1999 at the United Nations Headquarters in New York City.⁵⁰ By that date, the Kyoto Protocol had received 84 signatures. The first countries to sign the Kyoto Protocol on 16 March 1998 were: Antigua and Barbuda, Argentina, Maldives, Saint Lucia, Samoa and Switzerland. Guatemala signed it on 10 July 1998.⁵¹

The Kyoto Protocol entered into force on 16 February 2005 in accordance with Article 23, that is the 9th day after the date on which not less than 55 Parties to the UNFCCC, incorporating Parties included in Annex I which accounted in total for at least 55% of the total carbon dioxide (CO₂) emissions for 1990 of the Parties included in Annex I, have deposited their instruments of ratification, acceptance, approval or accession.⁵²

Presently, there are 193 Parties (192 States and 1 regional economic integration organization) to the Kyoto Protocol. The total percentage of Annex I Parties emissions is 63.7%.⁵³

The detailed rules for the implementation of the Kyoto Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the “Marrakesh Accords.”

The Kyoto Protocol sets binding targets for 37 industrialized countries and the European Union for reducing GHG emissions. This amount has to be reduced to an average of 5% against 1990 levels over the five-year period of 2008-

⁴⁹ For more information about the Protocol, refer to: United Nations Treaty Collection, Chapter XXVII: No 7a. United Nations Framework Convention on Climate Change –UNFCCC, at: http://treaties.un.org/pages/ViewDetails.aspx?src=UNTSO&tabid=2&mtdsg_no=XXVII-7-a&chapter=27&lang=en#Participants

⁵⁰ Article 24 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

⁵¹ The Kyoto Protocol has 192 State Parties and 84 Signatories

⁵² Article 23 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

⁵³ For more information about the status of ratification of the Kyoto Protocol, refer to: http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php

2012.⁵⁴ The Kyoto Protocol commits industrialized countries to stabilize GHG emissions, while the UNFCCC encouraged them to do so.

One of the most controversial aspects of the regime is that the Kyoto Protocol places a heavier burden on developed nations under the principle of “common but differentiated responsibilities”.⁵⁵ Essentially, this recognizes that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity; and, therefore lessens the burden for developing States.

Under the UNFCCC, countries must meet their targets for emission reduction primarily through national measures and sets down targets that must be achieved in this regard by the year of 2012. However, the Kyoto Protocol offers them additional means of meeting their targets by way of three market-based mechanisms. These mechanisms help stimulate green investment and help Parties meet their emission targets in a cost-effective way.

The three mechanisms that place reliance are as follows:

Emissions Trading – known as “the carbon market”. This is restricted to Annex II Parties (industrialised countries) who have accepted binding emissions targets under Kyoto.⁵⁶

Clean Development Mechanism (known as CDM), which is a form of project-based emission reduction between developed and developing countries. A developed country can fund a project in a developing country which will reduce emissions in that specific country. The developed country can then claim certified emissions reductions (known as CER) in return. These can be used to offset GHG emissions in the developed country. This should create a flow of capital and technology transfer to the developing world.⁵⁷

⁵⁴ Article 3.1 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

⁵⁵ Article 10 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

⁵⁶ Article 17 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

⁵⁷ Article 12 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

Joint Implementation (known as JI), which allows developed countries to collaborate on projects that reduce overall emissions either by using cleaner technology or by creating new or better carbon sinks. The resulting emission reduction units (hereinafter: ERU), can be traded and used to offset carbon emissions in another location. The procedures for these joint projects are defined by the Conference of the Parties to the UNFCCC.⁵⁸

For the system to work correctly under the Kyoto Protocol, countries actual emissions have to be monitored and precise records have to be kept of the trades carried out.

In practice, registry systems track and record transactions by Parties under the Kyoto Protocol mechanisms.⁵⁹ Reporting is done by Parties by way of submitting annual emission inventories and national reports under the Kyoto Protocol at regular intervals. A compliance system ensures that Parties are meeting their commitments and helps them to meet their commitments if they have problems doing so.⁶⁰

The Kyoto Protocol, like the UNFCCC, is also designed to assist countries in adapting to the adverse effects of climate change. It facilitates the development and deployment of techniques that can help increase resilience to the impacts of climate change. With this in mind, the Adaptation Fund was established to finance adaptation projects and programmes in developing countries that are Parties to the Kyoto Protocol. The Fund is mainly financed by a share from the clean development mechanism project activities proceeds and other sources of funding.

Nevertheless, on the positive side, the Kyoto Protocol is seen as an important first step towards a truly global emission reduction system that will stabilize GHG emissions, and provides the essential structure for any future

⁵⁸ Article 6 of the Kyoto Protocol, at: <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

⁵⁹ For more information about the registry systems under the Kyoto Protocol refer to: http://unfccc.int/kyoto_protocol/registry_systems/items/2723.php

⁶⁰ For more information about the compliance system under the Kyoto Protocol, refer to: http://unfccc.int/kyoto_protocol/compliance/items/2875.php

international agreement on climate change. However, there are many more challenges. The most pressing is that by the end of the first commitment period of the Kyoto Protocol in 2012, a new international framework needs to be negotiated and ratified, one that can deliver the rigorous emission reductions that the IPCC has clearly indicated are needed.

In light of this, we should now turn to the work of the Conference of the Parties to the UNFCCC which plays an important role in moving the international process forward.

SECTION 3. CONFERENCE OF THE PARTIES TO THE UNFCCC

The Conference of the Parties to the UNFCCC (hereinafter: COP) is the supreme decision making body of the UNFCCC. All parties to the UNFCCC are represented at the COPs, where they review and promote the implementation of the UNFCCC and any other legal instruments that the COP adopts, including institutional and administrative arrangements.

The COP to the UNFCCC has convened annually since 1995. At the first COP meeting, an important milestone was reached when they reviewed the commitments made under the UNFCCC to see if they were adequate for achieving its objectives. As mentioned before, one of the conclusions was that there was a pressing need for an agreement to set down more binding legal obligations; this led to the subsequent negotiation of the Kyoto Protocol in 1997.

To date there have been 16 COPs and they have all contributed to some degree to the elaboration of the law and policy on climate change.⁶¹

⁶¹ Each of the COPs meetings has been examined in detail in Appendix III

Guatemala has been actively participating in the COPs and in the Meetings of the Parties to the Kyoto Protocol (known as CMP).⁶²

During the administration of the former Guatemalan Minister of Environment and Natural Resources, Luis Alberto Ferraté Felice, the Guatemalan position had an emphasis on environmental justice for the most vulnerable peoples, which in Guatemala are mostly the indigenous people. The climate change issue is vital to their survival. From these meetings and international commitments derive the Climate Change National Policy⁶³ and the National Policy for the Integrated Management of Marine Coastal Zones,⁶⁴ which has climate change as one of its strategic lines.

Climate change also affects the oceans in various ways. Having both oceans on the Guatemalan east and southwest shores, this issue is very important and it will be looked at in more detail in the next chapter.

⁶² The COP serves as the Meeting of the Parties to the Kyoto Protocol (CMP). All governments that are party to the Kyoto Protocol are represented, while governments that are not party are observers. The CMP reviews the implementation of the Kyoto Protocol and takes decision to promote its effective implementation

⁶³ To see the complete text of the Climate Change National Policy and the Government Agreement, refer to: http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/politica_cc.pdf

⁶⁴ To see the complete text of the National Policy for the Integrated Management of Marine Coastal Zones and Government Agreement, refer to: <http://www.marn.gob.gt/documentos/novedades/pmc.pdf>

CHAPTER 3 – CLIMATE CHANGE AND OCEANS LAW

SECTION 1. IMPACTS OF CLIMATE CHANGE IN THE OCEANS

It is a well-known fact that the management and sustainability of marine ecosystems around the world are vital since coastal ecosystems services provide important goods and services.

In this context, it is important to highlight the crucial role that the oceans play in the global climate system, since they generate oxygen and absorb CO₂ from the atmosphere, while at the same time provide essential goods and services for sustaining life on Earth.⁶⁵

At this point it may be appropriate to explain how the Carbon Cycle works in the World's Oceans.⁶⁶ The flow of CO₂ across the air-sea interface is a function of CO₂ solubility in sea water (solubility pump).

The amount of CO₂ dissolved in sea water is mainly influenced by physico-chemical conditions (sea water temperature, salinity, total alkalinity) and biological processes, e.g. primary production. The solubility pump and the biological pump enhance the uptake of CO₂ by the surface ocean influencing its values for dissolved CO₂ and transferring carbon to deep waters. As these mechanisms are strongly connected, they influence the ocean's capacity to sink carbon and that is why we refer to the process as a "carbon sink".

In scientific terms, the net effect of the biological pump in itself is to keep the atmosphere concentration of CO₂ at about 30% of what it would be in its absence.⁶⁷

⁶⁵ UNEP, FAO, and IOC/UNESCO. *Blue Carbon. The Role of Healthy Oceans in Binding Carbon*, UNEP/GRID-Arendal, 2009

⁶⁶ To see a figure of the carbon cycle in the world's oceans and how it operates, refer to Appendix II, Figure 2

⁶⁷ Siegenthaler and Sarmiento. *Atmospheric carbon dioxide and the ocean*, 1993

Climate change effects which result in increased levels of GHG in the atmosphere, will consequently lead to changes in the oceans.

These changes will be mostly seen in the form of ocean warming, sea level rise, ocean current change and ocean acidification.⁶⁸ In turn, these changes put marine ecosystems and coastal communities at risk, such as the ones that live close by the Guatemalan coastline. Also, these processes can impact biodiversity directly (for example where local temperatures exceed individual species physiological tolerances), or indirectly (for example, by altering habitat availability, species interactions or productivity.)

At this point, it is also pertinent to mention that there are many other potentially complex interactions between climate change and other phenomena such as coastline degradation, habitat destruction and invasive species, which must also be taken into consideration when adopting a climate change mitigation and adaptation strategy. Also, the adverse effects of climate change on food security and the sustainability of fisheries are of critical importance at a national and international level; therefore, have to be taken into consideration strategy-wise.

Similarly, climatic variability will, very likely, result in more frequent extreme events around the world. Although some cause and effects relationships are questioned by some members of the scientific community. Nonetheless, there appears to be an increase in the number of natural disasters and geo-hazards associated with climate change, as can be seen from the information shown on the next Table 2.

For vulnerable countries such as Guatemala, this will most likely represent an increase in the number of hurricanes and tropical storms; and this can have terrible consequences for both coastal communities --as previously mentioned.

⁶⁸ UNEP, FAO, and IOC/UNESCO. *Blue Carbon. The Role of Healthy Oceans in Binding Carbon*, UNEP/GRID-Arendal, 2009

Table 2. Number of Disasters per Year⁶⁹



Thus, the information shown in Table 2, which comes from the Centre for Research on the Epidemiology of Disasters - CRED Annual Disaster Statistical Review 2006 – 2007, shows that there is a clear and rather dramatic increase in the number of natural disasters per year.

One needs to exercise considerable caution with such reports, as much of the increase in the number of hazardous events reported is probably due to significant improvements in reporting and data-gathering techniques, as well as other anthropogenic impacts such as population growth. Nonetheless, the number of floods and cyclones reported is still rising compared to earthquakes. In this context, there appears to be a relatively strong scientific case, which now links global warming with the increased frequency of natural hazards.

The IPCC 4th Assessment Report (AR4) has emphasized that if the planet's surface temperature increases by 2°C above pre-industrial levels, then a

⁶⁹ UNEP, FAO, and IOC/UNESCO. *Blue Carbon. The Role of Healthy Oceans in Binding Carbon*, 2009, at: <http://maps.grida.no/go/graphic/number-of-disasters-per-year>

catastrophic collapse of ecosystems becomes possible with unforeseen, non-linear impacts on poverty and disaster risk.⁷⁰

The IPCC has also confirmed that the geographic distribution, frequency and intensity of these hazards are already being altered significantly by climate change.

The 2009 Global Assessment Report on Disaster Risk Reduction establishes that changes are occurring in the amount, intensity, frequency and type of precipitation.⁷¹ This is associated with increases in the extent of the areas affected by drought, in the numbers of heavy daily precipitation events that lead to flooding, and increases in the intensity and duration of certain kinds of tropical storms.

Climate change, therefore, is now a key global driver of disaster risk. Globally, disaster risk is increasing for weather-related hazards such as floods and tropical cyclones, even if hazard levels remain constant.

In this perspective, it is important to recall that the UNEP *Blue Carbon*⁷² assessment establishes that maintaining or improving the ability of oceans to absorb and bury CO₂ is a crucial aspect of climate change mitigation.

Out of all the biological carbon captured in the world, 55% is captured by marine living organisms.⁷³

At this juncture it may be appropriate to explain a little about the phenomena of Blue Carbon Sinks.⁷⁴ The carbon captured by living organisms in oceans is stored in the form of sediments from mangroves, salt marshes and sea

⁷⁰ For more information about the IPCC 4th Assessment Report, refer to: http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

⁷¹ For more information about the 2009 Global Assessment Report, refer to:

<http://www.preventionweb.net/english/hyogo/gar/report/index.php?id=1130&pid:34&pih:2>

⁷² For the complete Blue Carbon assessment, refer to: <http://www.grida.no/publications/rr/blue-carbon>

⁷³ UNEP, FAO, and IOC/UNESCO. *Blue Carbon. The Role of Healthy Oceans in Binding Carbon*, UNEP/GRID-Arendal, 2009

⁷⁴ To see a figure about the Blue Carbon Sinks, refer to Appendix II, Figure 3

grasses. Benefiting from the excellent conditions available to support plant growth, vegetated coastal habitats rank amongst the most productive habitats in the world, comparable in production to the most productive agricultural crops.

Blue carbon sinks are strongly autotrophic, which means that these ecosystems fix CO₂ as organic matter photosynthetically in excess of the CO₂ respired back by biota, thus removing CO₂ from the atmosphere. Some of this excess carbon is exported and subsidises adjacent ecosystems, including open ocean and beach ecosystems.⁷⁵

The remaining excess production of mangrove forests, salt-marshes and seagrass meadows is buried in the sediments, where it can remain stored over millenary time scales, thereby representing a strong natural carbon sink which combats climate change on an on-going basis.

Moreover, the increase of CO₂ and other GHG emissions are contributing to climate change. So, the oceans play a vital role in all of this, since they contribute to reducing atmospheric CO₂ levels through sequestration and reduction of the marine and coastal ecosystem degradation.

Today, it is generally accepted by the scientific community that the oceans are crucial in the global carbon cycle.⁷⁶ In particular, it is estimated that they represent the largest long-term sink for carbon since they store and redistribute CO₂. About 93% of the earth's CO₂ is stored and cycled through the oceans.⁷⁷ Indeed, one of the great strengths of the ocean is its resilience to absorb and mitigate pollution.⁷⁸

⁷⁵ UNEP, FAO, and IOC/UNESCO. *Blue Carbon. The Role of Healthy Oceans in Binding Carbon*, UNEP/GRID-Arendal, 2009

⁷⁶ *Ibid*

⁷⁷ *Ibid*

⁷⁸ To see a figure regarding the Carbon Cycle and Blue Carbon, refer to Appendix II, Figure 4

The IUCN 2009 *The Ocean and Climate Change* report,⁷⁹ states that the ocean plays a critical role in our climate system and is significantly impacted by climate change and ocean acidification which are already impacting the ocean and will continue to cause harm unless successful mitigation and adaptation strategies are implemented quickly.

To date, the ocean has played only a minor role in international climate change discussions. Due to its importance in the global carbon cycle, as well as its potential for climate change mitigation and adaptation, it is necessary to include the ocean more clearly and prominently in future negotiations.

As we already established in Chapter 2, the international community has been devoted to address the challenges raised by climate change in the context of the UNFCCC and the Kyoto Protocol.

In parallel with these initiatives, a considerable number of initiatives have been undertaken utilising the legal framework provided under the 1982 United Nations Convention on the Law of the Sea – UNCLOS; and it is to this important treaty that will be the subject of the next Section.

SECTION 2. THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA - UNCLOS

The United Nations Convention on Law of the Sea (hereinafter: UNCLOS) is a sophisticated body of treaty law that applies to the World's Oceans and seas.⁸⁰

⁷⁹ For more information about the IUCN 2009 *The Ocean and Climate Change* Report, refer to: http://cmsdata.iucn.org/downloads/the_ocean_and_climate_change.pdf

⁸⁰ For more information about the UNCLOS, refer to: United Nations Treaty Collection, Chapter XXI: No 6. United Nations Convention on the Law of the Sea –UNCLOS, at: http://treaties.un.org/Pages/ViewDetailsIII.aspx?&src=UNTSOnline&mtdsg_no=XXI-6&chapter=21&Temp=mtdsg3&lang=en

Before looking at its substantive provisions of the UNCLOS that apply to climate change, it is first necessary to mention a little bit about the history of modern Law of the Sea.

The scientist Arthur C. Clarke once said:

*“How inappropriate to call this planet earth when it is quite clearly ocean”.*⁸¹

This statement is very accurate since the ocean covers nearly 71% of the Earth’s surface and is divided into major oceans and smaller seas.

In the seventeenth century the Principle of the Freedom of the Seas doctrine was the established legal norm for the high seas.⁸² As a consequence, this meant that the national rights and jurisdiction over the oceans was limited to a narrow belt of sea surrounding a nation’s coastline.

All the rest of the seas were proclaimed to be free to all and belonging exclusively to no one. In the mid-twentieth century the phenomenon to extend national claims over offshore resources began.

Although four conventions on the law of the sea had been adopted in Geneva in 1958; and, the subsequent failure of the second United Nations Conference on the Law of the Sea to deliver an agreement on the breadth of the territorial sea and adjacent fisheries zone, raised many concerns for new and independent States, including the general concerns about the impact on coastal fish stocks from the activities of long distance fishing fleets, as well as the threat of pollution from shipping and oil tankers carrying noxious cargoes. This pollution hazard threatened coastal States and all forms of ocean life.⁸³

At the same time there was considerable pressure from the navies of the large maritime powers, which wished to maintain a presence across the world

⁸¹ Arthur C. Clark quotes at arthurclark.net, refer to: <http://www.arthurclark.net/?scifi=12>

⁸² Water Encyclopedia. Science and Issues, refer to: <http://www.waterencyclopedia.com/La-Mi/Law-of-the-Sea.html>

⁸³ Audiovisual Library of International Law, refer to: <http://untreaty.un.org/cod/avl/ha/gclos/gclos.html>

on the surface waters and under the sea. The Freedom of the Seas doctrine was threatened by the increased presence of maritime powers and the pressures of long distance navigation, transforming the oceans into another area for conflict and instability.

In the late 60's the oceans were generating multiple claims, counterclaims and sovereignty disputes between the countries.

The need for updating law of the sea was imperative because the technological changes that had altered man's relationship to the oceans had to be taken into account. This was process was helped along by a number of developments on the political front at an international level including a famous intervention.

On 1 November 1967, Malta's Ambassador to the United Nations, Arvid Pardo, made a call to the nations, in the United Nations General Assembly, for "an effective international regime over the seabed and the ocean floor beyond a clearly defined national jurisdiction".⁸⁴

Pardo's urging began a process that lasted 15 years, resulting ultimately in the adoption of the 1982 UNCLOS. This work entailed participation by more than 150 countries representing all regions of the world in an international diplomatic conference: UNCLOS III.⁸⁵

The UNCLOS was opened for signature on 10 December 1982 in Montego Bay, Jamaica. A very interesting fact is that the UNCLOS was signed by 119 countries on the very first day on which it was opened for signature, being this the first time of such involvement in an international law convention.⁸⁶

⁸⁴ For the complete speech of Ambassador Pardo, refer to:

http://www.un.org/Depts/los/convention_agreements/texts/pardo_ga1967.pdf

⁸⁵ UN-DOALOS, UNCLOS, *A historical perspective*, refer to:

http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm

⁸⁶ For the complete text of the UNCLOS, refer to:

http://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf

The UNCLOS was adopted as a "Package deal", to be accepted as a whole in all its parts without reservation on any aspect. It entered into force in accordance with its Article 308 on 16 November 1994, twelve months after the date of deposit of the sixtieth instrument of ratification or accession (Guyana was the 60th State to adhere to it). At the time of writing, the UNCLOS has 157 signatories and 161 Parties.⁸⁷

The UNCLOS establishes rules governing all uses of the oceans and their resources.

The preamble acknowledges the normative concept that "all problems of ocean space are closely interrelated and need to be addressed as a whole".⁸⁸ It sets up rules for the uses of the oceans and also introduces new legal concepts and regimes and addressed new concerns.

The UNCLOS also provides the framework for further development of specific areas of the law of the sea, and it is the globally recognized regime dealing with all matters relating to the law of the sea. It was referred as a "Constitution for the Oceans", by Tommy T.B. Koh of Singapore, President of the 3rd United Nations Conference on the Law of the Sea, at the time of its adoption in Montego Bay in 1982.⁸⁹

Among the important features of the treaty are: navigational rights, territorial sea limits, economic jurisdiction, legal status of resources on the seabed beyond the limits of national jurisdiction, passage of ships through narrow straits, conservation and management of living marine resources, protection of the marine environment, a marine research regime, and a binding procedure for settlement of disputes between States.⁹⁰

⁸⁷ To see the complete chronological lists of ratifications, accessions and successions to the UNCLOS and the related Agreements as at 15 November 2010, refer to:
http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm#The United Nations Convention on the Law of the Sea

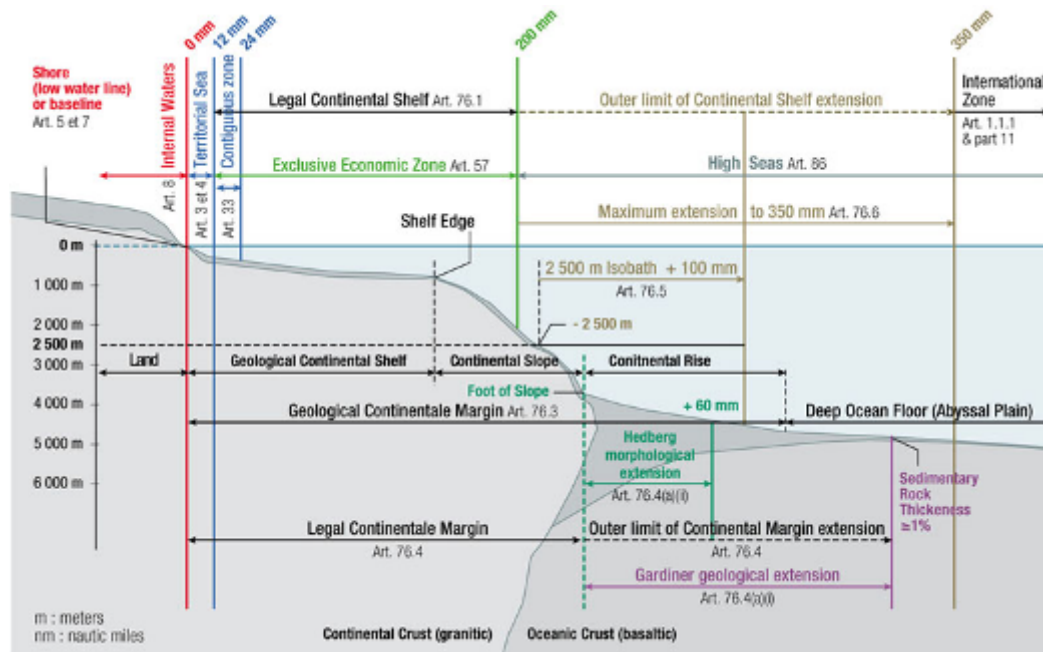
⁸⁸ UNCLOS - *United Nations Convention on the Law of the Sea*, III paragraph of the Preamble

⁸⁹ To see the complete text of Koh's remarks, refer to:
http://www.un.org/Depts/los/convention_agreements/texts/koh_english.pdf

⁹⁰ To see a figure with the limits of the UNCLOS Maritime Zones as codified by UNCLOS, refer to Appendix II, Figure 5

The limits of the UNCLOS Maritime Zones and the definition of maritime space as codified by UNCLOS are described in Figure 2 below.

Figure 2. Definition of Maritime Space According to UNCLOS⁹¹



Under the UNCLOS, navigation through the territorial sea and narrow straits is based on the legal Principles of Innocent Passage and Transit Passage. Coastal States harvested the benefits of provisions by the extensive economic rights over a 200 nm.-wide zone along their shores. The right of landlocked countries of access to and from the sea is guaranteed.

The right to conduct marine scientific research was based on accepted principles.

The International Seabed Authority was established, which organize and control activities in the deep seabed beyond national jurisdiction with a view to administering its resources, as well as the International Tribunal for the Law of

⁹¹ Martin Pratt. *The Arctic Ocean belongs to whom*, 2010, refer to: http://lecerclepolaire.com/En/articles_archives/Pratt_maritime_Arctic.html

the Sea, which has competence to settle ocean related disputes arising from the application or interpretation of the UNCLOS.⁹²

The UNCLOS also provides for the long-term conservation and sustainable use of marine living resources, and establishes the fundamental obligation of all States to protect and preserve the marine environment, including the obligation to prevent, reduce and control pollution of the marine environment from or through the atmosphere.

The Preamble of the UNCLOS declares that the States Parties recognize the desirability of establishing, with due regard for the sovereignty of all States, a legal order for the seas and oceans, which will facilitate international communication; and, will promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of their resources, the conservation of their living resources and the study, protection and preservation of the marine environment.⁹³

The State Parties to the UNCLOS bearded in mind that the achievement of the goals set in the UNCLOS will contribute to the realization of a just and equitable international economic order which takes into account the interests and needs of mankind as a whole and, in particular, the special interests and needs of developing countries, whether coastal or land-locked;⁹⁴ and believed that the codification and progressive development of the law of the sea achieved in the UNCLOS will contribute to the strengthening of peace, security, cooperation and friendly relations among all nations in conformity with the Principles of Justice and Equal Rights and will promote the economic and social advancement of all peoples of the world, in accordance with the purposes and principles of the United Nations.⁹⁵

⁹² UN-DOALOS, UNCLOS, Key provisions of the Convention, refer to:

http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm

⁹³ UNCLOS - *United Nations Convention on the Law of the Sea*, IV paragraph of the Preamble

⁹⁴ UNCLOS - *United Nations Convention on the Law of the Sea*, V paragraph of the Preamble

⁹⁵ UNCLOS - *United Nations Convention on the Law of the Sea*, VII paragraph of the Preamble

Some years later, Part XI of the UNCLOS, which deals with mining of minerals lying on the deep ocean floor outside of nationally regulated ocean areas, in what is the area codified by UNCLOS as the international seabed area, raised many concerns for industrialized States such as the United States.⁹⁶

The Secretary-General initiated a series of informal consultations among States that successfully achieved, in July 1998, an Agreement, which is part of the UNCLOS, related to the Implementation of Part XI of the UNCLOS.⁹⁷

At this point it is important to analyse how climate change relates to UNCLOS.

SECTION 3. CLIMATE CHANGE UNDER UNCLOS

Climate Change is not specifically regulated by UNCLOS, but being the protection and preservation of the marine environment⁹⁸ one of the main objectives of the UNCLOS, a link can be made with a holistic approach to ocean issues.

Article 1.4 of the UNCLOS states that pollution of the marine environment means the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance of marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.⁹⁹ By the plain wording of the definition, we can interpret and conclude that the meaning of pollution was to capture a full range of possible threats to the marine environment in any time frame.

⁹⁶ UN-DOALOS, UNCLOS, A historical perspective, refer to:

http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm

⁹⁷ For the complete text of the Agreement, refer to:

http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindxAgree.htm

⁹⁸ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 192, General Obligation

⁹⁹ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 1.4, Use of terms and scope

For international treaties it is very important to be interpreted in the light of changing circumstances to avoid being caught to the time when they were negotiated.

Even though climate change effects are not specifically stated in the UNCLOS, it is very possible that the potential impact of temperature changes to marine ecosystems was within the contemplation of negotiators.

Nevertheless, the threat of temperature change to the marine environment was clearly identified by the inclusion of the term energy in the definition of pollution.¹⁰⁰

Climate change science calculates an increase in energy within the atmosphere resulting from an increase of GHG. This will lead to a rise in energy in the oceans that will most likely bring changes in water temperature, sea level, ocean currents, etc. Such an approach can lead to the conclusion that GHG emissions will result in marine pollution as defined in Article 1.4 of UNCLOS.¹⁰¹

Part XII of UNCLOS entitled Protection and Preservation of the Marine Environment includes the different State obligations concerning the marine environment.

In Section I of Part XII, Articles 192 and 193 stipulate the general obligation of States to protect and preserve the marine environment¹⁰² and the sovereign right of States to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment.¹⁰³

¹⁰⁰ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 1.4, Use of terms and scope

¹⁰¹ *Ibid*

¹⁰² UNCLOS - *United Nations Convention on the Law of the Sea*, Article 192, General Obligation

¹⁰³ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 193, Sovereign right of States to exploit their natural resources

Article 194.1 is very clear, it establishes the obligation of the States to take all measures consistent with the UNCLOS necessary to prevent, reduce and control pollution of the marine environment from any source, using the best practical means.¹⁰⁴ Here is where the foundation for the States obligation to mitigate climate change effects to protect and preserve the marine environment can be found.

Article 195 stated that States must take measures to prevent, reduce and control pollution of the marine environment, to prevent the transfer of harm from one type or area to another.¹⁰⁵ Therefore, it can be concluded that mitigation measures by the States must be designed so as to not result in other environmental damage. With this article, the UNCLOS encourages the States to take a holistic approach to address environmental issues.

Another important Article is 212.1, which obligates States to adopt laws and regulations and take other necessary measures to prevent, reduce and control pollution of the marine environment from or through the atmosphere, obligating the States to prevent or control pollution from or through any air space over which a State has jurisdiction.¹⁰⁶

Likewise, Article 207 about pollution from land-based sources is broad enough to cover GHG emissions.¹⁰⁷

Article 213 establishes the obligation of the States to enforce domestic laws passed in accordance with Article 207 and any other international obligation to address land-based sources of marine pollution.¹⁰⁸

¹⁰⁴ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 194.1, Measures to prevent, reduce and control pollution of the marine environment

¹⁰⁵ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 195, Duty not to transfer damage or hazards or transform one type of pollution into another

¹⁰⁶ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 212.1, Pollution from or through the atmosphere

¹⁰⁷ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 207, Pollution from land-based sources

¹⁰⁸ UNCLOS - *United Nations Convention on the Law of the Sea*, Article 213, Enforcement with respect to pollution from land-based sources

These provisions are broad enough to allow for a State to claim that a failure by another State to mitigate climate change violates its obligations to preserve and protect the marine environment, and the compulsion to prevent pollution from spreading outside a State's jurisdiction results to be a vital provision.

Now, it is important to note that the substance of Part XII has not been interpreted by any international tribunal.

To give an example, in case of a claim and arguing that the obligation of States to protect and preserve the marine environment under UNCLOS extends to mitigating climate change, the claim must determine that a State in failing to mitigate the climate change effects violated its obligations under UNCLOS, and here is where the link can be made between the failure of a particular State to reduce GHG emissions and the impacts of climate change on the marine environment.

To see this more clearly, we must picture a hypothetical claim in which the existence of a small island State with minimum GHG emissions, is threatened by sea level rise. The treat of climate change effects is obvious. The claim, most likely, would be brought against an industrialized country with high levels of GHG emissions. In such a case, both countries, Parties to UNCLOS, could have access to the UNCLOS binding dispute settlement process to resolve disputes about the adequacy for the protection and preservation of the marine environment.

In this light, Guatemala could also have enough grounds for a claim, being one of the most vulnerable countries to be affected by the impacts of climate change.

During his administration, former Guatemalan Minister of Environment and Natural Resources, Luis Alberto Ferraté Felice, constantly emphasized that forced adaptation and obliged mitigation measures are vital for the welfare of country.¹⁰⁹

In the next chapter we will see the strategies for climate change adaptation and mitigation, some of which are already being implemented in Guatemala.

¹⁰⁹ MARN. *Guatemala en COP 15: Ministro de Ambiente llega a Copenhague*, 2009, refer to: <http://marnguatemala.blogspot.com/2009/12/intervencion-del-el-ministro-de.html>

CHAPTER 4 – STRATEGIES FOR CLIMATE CHANGE ADAPTATION AND MITIGATION

SECTION 1. THEORY ADDRESSING THE CLIMATE DIVIDE

A wide array of adaptation options are available, but more extensive adaptation than is currently occurring is required to reduce vulnerability to climate change. There are barriers, limits and costs, which are not fully understood.

Intergovernmental Panel on Climate Change, Synthesis Report, 2007¹¹⁰

Adapting to climate change impacts and the reduction of GHG emissions (mitigation), is the approach for societies to respond and reduce the rate and magnitude of the imminent changes.

The capacity of communities to adapt and mitigate is dependent on their socio-economic and environmental circumstances and the availability of information and technology.

There are two possible ways to cope with climate change effects: The first one is adaptation, an automatic or planned response to change that minimises the adverse effects and maximises any benefits. The second one is mitigation; that is, reducing the magnitude of climate change by reducing GHG emissions.

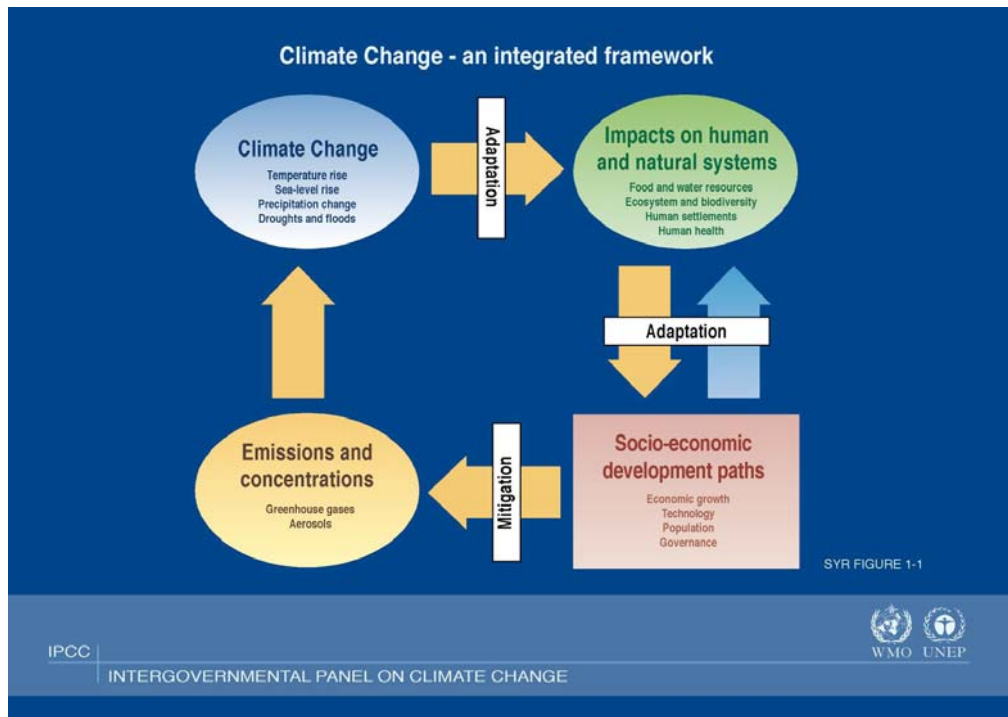
Adaptation is vital to cope with the already-happening climate change; while mitigation limits the extent of future climate change effects.

Adaptation is mostly a local challenge, while mitigation is a global process that will only be achieved by international cooperation and a common commitment.

¹¹⁰ IPCC. *Synthesis Report*, 2007, refer to: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

Figure 3 below illustrates that there is a clear relationship between adaptation and mitigation.

Figure 3. Climate Change: An Integrated Framework¹¹¹



SECTION 2. ADAPTATION = COPING WITH CLIMATE CHANGE

The IPCC has always discussed the idea of adaptation to climate change as a second or third best response, something to be done only after every possible effort has been made to reduce GHG emissions.¹¹² Our ability to adapt is what must determine the targets we set ourselves for reducing GHG emissions. Therefore, mitigation policies should seek avoiding situations where the limits of adaptability are exceeded.

¹¹¹ IPCC slides, at: http://www.grida.no/climate/ipcc_tar/slides/00.01.htm

¹¹² Kenneth P. Green. *Energy and the Environment*, AEI Online, 2009, refer to: <http://www.aei.org/article/energy-and-the-environment/climate-change-the-resilience-option/>

One of the best ways to ensure adaptability could be to increase resilience or the capacity to cope with natural, year-to-year, climate variability. In Guatemala, for instance, this could mean flood or drought cycles.

Additionally, an increasing resilience to cope with greater extremes would be uneconomic, or at least inefficient, unless guided by an understanding of the direction and magnitude of climate change, an understanding of what to expect by informed foresight.

A handbook on methods for climate change impacts assessment and adaptation strategies has been developed by the UNEP,¹¹³ which can be summarised in eight alternative but not exclusive strategies:

Bear losses	This is the baseline response of “doing nothing”. Bearing loss occurs when those affected have failed to act until it is too late, or have no capacity to respond in any other way (for example, in extremely poor communities), or where the cost of adaptation measures are considered to be high in relation to the risk or the expected damages. The big problem with this solution is that losses may become unbearable.
Share losses	This involves a wider community on sharing the losses. Sharing takes place in traditional societies and in the most complex, high-tech societies. In traditional societies, mechanisms include sharing losses with extended families, villages or similar small-scale communities. In societies organised on a larger-scale, losses are shared through emergency relief, rehabilitation, and reconstruction paid for by government funds or public appeals, or through private insurance. However, insurance usually applies only when the risk is considered random and uncertain for the individual insured, not when it is predictable. Even with shared losses, the accumulated loss to society may eventually

¹¹³ For the complete UNEP handbook refer to:
http://www.ivm.vu.nl/en/Images/UNEPHandbookEBA2ED27-994E-4538-B0F0C424C6F619FE_tcm53-102683.pdf

	become unacceptable, at which point other actions must be taken.
Modify the threat	For some risk, it is possible to exercise a degree of control over the specific environmental threat. For natural events such as a flood or drought, possible measures include flood control works (dams, dikes, levees) or water storages. For climate change, attempts to modify the threat through such measures may quickly become too expensive, and the more sensible modification to reduce the threat is to slow the rate of climate change by reducing global GHG emissions and eventually stabilising greenhouse concentrations in the atmosphere. It is important to say that in IPCC terminology, measures that reduce climate change are referred to as “mitigation” of climate change, in distinction to “adaptation”, which is reserved for an optimal response to a given climate change.
Prevent effects	A frequently used set of adaptation measures involves steps to prevent the effects of climate change and variability.
Change use	Where the threat or reality of climate change makes the continuation of an economic activity impossible or extremely risky, consideration can be given to changing the use.
Change location	A more extreme response is to change the location of economic activities. This may be possible in some countries, but not in others where migration to cities or other countries may be the only alternatives.
Research	Possibilities for adaptation can also be opened up by research into new technologies and methods of adaptation.
Educate, inform and encourage behavioural change	Dissemination of knowledge through education and public information campaigns can lead to adaptive behavioural change. Such activities have been little recognised and given little priority in the past, but are likely to assume increased importance as the need to involve more communities, sectors and regions in adaptation becomes apparent. Discouragement of maladaptive trends such as development in low-lying coastal areas is another useful strategy.

Adaptation to climate change will definitely cost money, time, and effort and will translate into changes as to “how” and “why” we do things. It will usually require planning and investment in new techniques, new infrastructure and/or new habits and lifestyles.

Adaptation can also be purely reactive, autonomous or automatic in response to some perceived change in the climate. In natural systems this is the only type of adaptation, although humans can intervene to facilitate adaptation, in which case the systems become managed.¹¹⁴

The best adaptation strategies will only be adopted if there is a degree of foresight as to what is likely to happen and how it will affect people. Confidence is needed that the projected climate changes will occur, with understanding of possibilities and alternatives.

Uncertainty can never be totally eliminated, so any strategy must have an element of hedging one’s bets, by doing something that will be beneficial even if climate change does not happen quite as expected.¹¹⁵ Diversification is such a strategy. An agreement will also be necessary on the cost/benefit ratio for action is favourable, and the necessary human, economic and technical capacity to act must exist. The first task in seeking optimal adaptation strategies is to become better informed.

Rapid climatic change allows less time to adapt than slow change of the same eventual magnitude, and may incur larger cost. Rates of change of climate after stabilisation of GHG concentrations will in general be much slower, and may therefore be easier to adapt to; although such a slowing is not expected to occur for sea level rise for centuries to come, so coastal adaptation will remain a serious on-going problem.

Adaptation raises serious questions about equity between countries and even within countries. This is mainly because adaptation is necessary for people

¹¹⁴ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹¹⁵ *Ibid*

and countries that are adversely affected by climate change, many of whom are not the countries that historically caused the problem such as Guatemala. This is a major source of conflict between some developed countries, whose historical emissions could be the main cause of climate change up to now, and the developing countries that will experience some major impacts in the near future.

Developed countries have more capacity to adapt because they can afford it. Developing countries agree in limiting GHG emissions, but their first priority is the welfare of their people in the face of increasing climatic disaster and the need for on-going economic development. In return for limiting their GHG emissions, developing countries are asking for help in disaster management and relief, development aid and assistance with adaptation to climate change and access to new less carbon-intensive technology.

There is no doubt that ability to adapt depends on the countries state of development. Under development limits adaptive capacity of the countries because of lack of resources to evade against extreme and expected events.¹¹⁶

Adaptive capacity needs to be a major consideration in development, both in the lesser developed countries and also in the developed countries, which are still subject to growth and change.

SECTION 3. MITIGATION = EMISSIONS REDUCTIONS

Projected impacts of climate change will mostly require costly adaptations, and in some cases, our capacity to adapt will not be enough to avoid serious damages to individuals and society. That is why it is necessary to reduce GHG emissions to the atmosphere. Basically this is what mitigation is all about.

¹¹⁶ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

Mitigation, in contrast to adaptation, needs more time to take effect due to the lags¹¹⁷ in the climate systems and the time necessary to reduce emissions sufficiently to stabilise climate.¹¹⁸ Therefore, mitigation actions taken now will probably have their most significant effects decades into the future.

The percentage reduction needed in GHG emissions to avoid dangerous changes is uncertain.

Stabilising the concentration of GHG in the atmosphere requires total emissions *per annum* at some time in the future to be less than or equal to the total removal of GHG *per annum* from the combined atmosphere-shallow oceans-land/soil biota system.

To stabilise GHG concentrations in the atmosphere the alternatives are either to reduce emissions by limiting the consumption of fossil fuels by such measures as energy efficiency or substitution of renewable energy, or to remove and sequester the CO₂ from the use of fossil fuels in additional biomass and soil storage (increased carbon sinks), in geological formations or into the deep ocean.

The longer emissions reductions are delayed the faster they will need to be reduced later to reach the same stabilised atmospheric concentration of GHG.¹¹⁹

Despite the uncertainty, there seems to be wide agreement that global average warming in excess of 2°C above pre-industrial may be considered “dangerous” in the terms of the UNFCCC. This is likely to lead, amongst other things, to mass coral bleaching and the death of many coral reefs, the flooding of many low lying islands and coasts, widespread crop failures at

¹¹⁷ Meaning of lag by the Oxford Dictionary of Environment and Conservation: “The period of time that elapses between the occurrence of an event and its resulting impact”

¹¹⁸ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹¹⁹ *Ibid*

least in developing countries, and to the non negligible chance of catastrophic changes.¹²⁰

We also have to consider the fact that there is a large uncertainty about climate sensitivity to GHG. Nevertheless, urgent emissions reductions with very stringent targets need to be made. The reason for this is that for GHG such as CO₂ (that have long effective residence times in the atmosphere), reducing emissions below present levels has only a very slow impact on future concentrations.¹²¹

The IPCC 2007 report¹²² stated that because of slow removal processes, atmospheric CO₂ will continue to increase in the long term if its emission is substantially reduced from present levels. About 20% of CO₂ emissions will remain in the atmosphere for “many millennia”. This is because stabilisation can only be achieved when continuing emissions are reduced to match the rate of natural (or artificially enhanced) removal of CO₂ from the combined atmosphere, active biosphere and upper ocean reservoirs into some reservoir, such as geological formations or deep ocean sediments, that cannot leak CO₂ back into the atmosphere. Shorter lived GHG will respond faster to reduced emissions, for example nitrous oxide, with a lifetime of about a century in the atmosphere needs only a 50% reduction in emissions to stabilise its concentration, while short lifetime gases such as methane (12 years) can stabilise concentrations at current emission levels.¹²³

A complication arises in that aerosol pollution, which presently masks some of the greenhouse warming, is likely to be reduced by efforts to reduce CO₂ emissions, and this will rapidly reduce aerosol concentrations, making the

¹²⁰ To see a figure with the world GHG emissions by sector for the year 2000, refer to Appendix II, Figure 6. Knowing this is essential for the mitigation measures that need to be put in place in the near future to avoid catastrophic consequences

¹²¹ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹²² For the complete IPCC 2007 Report, refer to:

http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

¹²³ Mason Inman. *Carbon is forever*, Nature Reports, 2008, refer to:

<http://www.nature.com/climate/2008/0812/full/climate.2008.122.html>

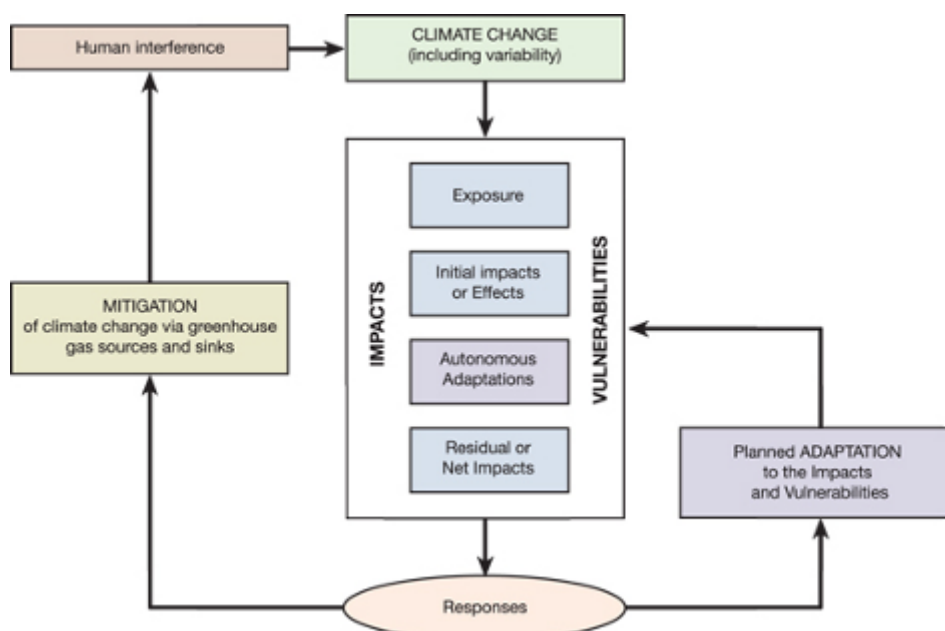
equivalent CO₂ concentrations somewhat larger.¹²⁴ Hence, a large emission reduction must be accomplished as quickly as possible. The longer the delay in reducing emissions, the more disastrous will be the potential outcome.

Actually, both adaptation and mitigation are needed, and both require a good measure of technological innovation and resourcefulness.

Having examined the adaptation and mitigation processes, the next section will address strategies and actions that can reduce their negative effects.

SECTION 4. ADAPTATION POLICIES AND ACTIONS DESIGNED AND IMPLEMENTED TO REDUCE THE NEGATIVE IMPACTS OF CLIMATE CHANGE

Figure 4. Adaptation Impacts¹²⁵



¹²⁴ Mason Inman. *Carbon is forever*, Nature Reports, 2008, refer to:

<http://www.nature.com/climate/2008/0812/full/climate.2008.122.html>

¹²⁵ D.S. Lemmen, F.J. Warren and J. Lacroix. *From Impacts to Adaptation: Canada in a Changing Climate*, 2007, at: http://adaptation.nrcan.gc.ca/assess/2007/index_e.php

Risk-Based Adaptation

Adaptation needs to be an on-going and flexible process intended to reduce the exposure of societies to risks from climate variability, including extreme events.

In developing countries such as Guatemala, the levels of adaptation are far from adequate, due to the high costs imposed by variations and extremes in climate.

Risk is the combination of the likelihood and consequences of an event. Every country should have policies and plans to manage climate change risks. Such an approach would definitely strengthen decision-making processes by requiring that specific programs and projects include strategies and measures to manage risks arising from climate change variability.

Effective management of climate change related risks, through adaptation, prevents valuable resources from being wasted on disaster recovery and rehabilitation. If adaptation is reactive, as opposed to planned, the range of response options is likely to be narrower. In consequence adaptation may result to be more expensive, socially disruptive and environmentally unsustainable. The ideal scenario is that adaptation reflects current risks as well as the new risks associated with future climate change.¹²⁶

In poor countries like Guatemala, most of the time people adapt to climate variability and change as a result of an extreme event (tropical storms, hurricanes, etc.), by their own resourcefulness or out of necessity, based on their understanding and assessment of the anticipated or observed effects, and on the perceived options and benefits for response. In some cases, such adaptation process will be adequate, effective, and satisfactory, but for many other circumstances, such adaptation (reactive) may not be satisfactory or successful.

¹²⁶ Mason Inman. *Carbon is forever*, 2008, refer to:
<http://www.nature.com/climate/2008/0812/full/climate.2008.122.html>

The elements of a risk-based adaptation approach are:¹²⁷

- Assessing the risks to human systems as well as natural systems;
- Quantifying the consequence component of risk in social, environmental, and economic terms;
- Explicitly assessing adaptation options in terms of their costs and benefits in reducing unacceptable risks;
- Identifying the most effective adaptation options;
- Developing policies and action plans to reduce risks to acceptable levels; and
- Identifying the most effective mechanisms and modalities to mainstream adaptation programs into development decision making and economic planning.

To have a successful risk based adaptation process, it is necessary to have:¹²⁸

- Capacity building and awareness rising to understand and undertake adaptation;
- Developing tools for the assessment of risks and adaptation options;
- The undertaking of required assessments;
- Mainstreaming adaptation into development policies, strategies, and plans based upon the results of the assessments, including the prioritization of adaptation options;
- Provision of adequate funding, from internal and/or external sources; and
- Implementing the adaptation options through development plans, programs, and projects.

¹²⁷ Asian Development Bank. *Pacific Studies Series, Climate Proofing - A Risk-based Approach to Adaptation*, at: <http://www.chs.ubc.ca/archives/?q=node/859>

¹²⁸ Asian Development Bank. *Pacific Studies Series, Climate Proofing - A Risk-based Approach to Adaptation*, at: <http://www.chs.ubc.ca/archives/?q=node/859>

With this risk-based adaptation approach, the results will most likely be a risk-management response that is coordinated, integrated and most important cost-effective.

Resilience-Based Approach

*“The willow which bends to the tempest, often escapes better than the oak which resists it; and so in great calamities, it sometimes happens that light and frivolous spirits recover their elasticity and presence of mind sooner than those of a loftier character.”*¹²⁹

Resilience is the ability of a system to maintain key functions and processes in the face of stresses or pressures by either resisting or adapting to change.¹³⁰

The IPCC 3rd Assessment Report (known as TAR) describes vulnerability as: “The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.”¹³¹

The resilience-base approach focuses on building resilience to protect ourselves from the risks of climate change variability.

Aaron Wildavsky, one of the great policy analysts of the late Twentieth-Century, wrote extensively about the benefits of resilient social institutions. Resilient approaches maximize any country’s ability to cope with risk by maintaining a dynamic, market-based, knowledge-building strategy. Wildavsky demonstrated that uncertainties about the likelihood or extent of

¹²⁹ Albert Schweitzer. For more information about the Nobel Peace Prize 1952 Albert Schweitzer, refer to: http://www.nobelprize.org/nobel_prizes/peace/laureates/1952/schweitzer-bio.html

¹³⁰ Meaning of resilience by R2 Reef Resilience, at: http://www.reefresilience.org/Toolkit_FSA/F1b0_DefResil.html

¹³¹ IPCC 3rd Assessment Report (TAR), at: <http://www.ipcc.ch/ipccreports/tar/>

any given risk and about the effectiveness of any intervention constrain risk-reduction decisions. In the case of climate change, our knowledge of the nature and scope of risks and future conditions is low, and our knowledge about how to intervene to head off specific risks is small. This suggests that contrary to current policy approaches that focus on mitigating GHG emissions, resilience should be considered the default climate strategy.

As Wildavsky observed:¹³²

- Resilient systems build knowledge through research and build safety through efficient use of resources, enhancing the ability to respond to and reduce risks over time;
- Resilient approaches optimize use of local knowledge of specific and particular circumstances. Since resources are retained by individuals and firms in the social and economic system, people will instinctively reduce risks as they perceive them; and
- Resilient approaches create spill over knowledge by building knowledge at local levels that can then be brought into play in other areas. Research is a natural part of resilient systems.

The resilience approach is the complete opposite of the climate-stasis approach since it focuses on decentralization, deregulation and freeing markets to maximize resilience.¹³³

We all know that certain types of risk are not suited to attempted prevention, but instead must be met with the resilience needed to live with the risk. Climate change is one such risk that is virtually impossible to prevent, whether it is manmade or natural.

As efforts to mitigate GHGs fail around the world, it is long past time to broaden the tools available to us in order to make our society resilient to climate risk. Rather than remain largely focused on the quixotic effort to

¹³² Aaron Wildavsky. *Searching for Safety*, 1988

¹³³ *Ibid*

reduce GHG emissions, the resilience approach suggests shifting the majority of the policymaking attention to an agenda of resilience building and adaptation, two areas with which Governments particularly struggle. A plan for climate resilience could consist of an aggressive program of resilience building through the elimination of risk subsidies and the privatization of infrastructure.

With this in mind, there are some mitigation methods that can be applied by States. In Guatemala, for example, people are beginning to learn and use some of these methods.

SECTION 5. MITIGATION METHODS

Mitigation or GHG emissions reductions can be achieved in several general ways, which include:

Increased Energy Efficiency

Before the oil crisis of 1973, when the real price of oil rose sharply, CO₂ emissions were closely related to the gross domestic product (hereinafter: GDP) of individual countries. After the oil crisis, emissions fell away relative to GDP, which continued to rise. So, it is clear that given enough incentive (such as in the oil crises), reductions in emissions per unit GDP can be achieved. Focusing on energy efficiency will protect the earth's climate and also will make businesses and consumers richer, changes like energy efficient buildings and hybrid petrol electric vehicles can save both energy and money.¹³⁴

¹³⁴ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

Changes in Infrastructure and Behaviour

With the everyday increase of people living in big cities, it is clear that they will dominate global emissions. Evolutionary or adaptive structural changes to society are inevitable, and implicit in most forms of mitigation. How to reverse the increasing reliance on private automobile transport for commuting, shopping and other activities in modern cities is a critical example. Especially if the city is dangerous as Guatemala and citizens risk their lives daily in the public transports. Mitigation measures would encourage walking and bicycle use instead of cars and car pooling or public transport.

Personal behaviour aimed at lowering greenhouse emissions is not only about big choices like lower emissions transport and energy efficient buildings. It also can be small personal things like turning off unused lights or electrical goods that are on standby mode, replacing incandescent lights with more efficient ones, and minimising travel. Campaigns to change individual behaviour must be accompanied by urgent Government actions to facilitate such changes.

Recycling and waste management to minimise emissions is another priority, along with means to reduce water demand in areas where water supplies are threatened by evaporative losses or reduced precipitation.¹³⁵

Fuel Substitution

The substitution has to be of one available fuel for another. As long as fossil fuels continue to dominate energy production, switching from coal to oil or gas can reduce GHG emissions.¹³⁶

¹³⁵ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹³⁶ *Ibid*

Nuclear Power

Nuclear power is a major energy supply and it is seen as a solution to reducing GHG emissions. However, nuclear power is not totally free of CO₂ emissions if embedded emissions in building and later dismantling the power stations, and in mining and refining the fuel, are taken into account.¹³⁷

According to the 2007 IPCC report¹³⁸, nuclear power suffers from several major barriers to wider use: long term fuel resource constraints without recycling, economics, safety, waste management, security, proliferation and adverse public opinion.

Hydropower

Energy supplied by hydropower has increased in the last years; however, there are major concerns about the environmental and social impacts of large dams on fisheries, displacement of populations, riverine ecosystems, etc. Water storages can absorb CO₂ but many give off methane from decaying vegetable matter, so they may not be entirely emissions free. Another issue is the loss of stored carbon if forests are cleared to make way for water storages, meaning that new dams may take years to decades to cause a net decrease in carbon emissions.¹³⁹

¹³⁷ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹³⁸ For the complete 2007 IPCC Report, refer to:

http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

¹³⁹ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

Solar Energy

There is a huge potential for harnessing solar energy, although not in the most populated regions.

The problem with most forms of renewable energy is the remoteness of many good generation sites from consumer markets and these implies the need for large investment in electrical transmission grids at great capital cost and with large transmission losses.

The key problem with solar energy is not its availability and baseload¹⁴⁰ capacity with storage and large grids, but its high cost.

A variant on solar cell technology is to use sun-tracking mirrors to focus sunlight on photovoltaic receivers consisting of arrays of high efficiency solar cells that generate electricity. This would be a solution to people without access to electricity in developing countries.

Solar energy in a warmer world will be at its maximum just when it is needed to provide power for summer daytime air conditioning, in what will increasingly become a peak load situation.

It is also capable of providing power for vehicles via batteries, hydrogen, compressed air or other storage devices, thus reducing emissions and dependence on oil. That is why, and with a price on carbon pollution, solar energy is set for rapid growth in the market place.¹⁴¹

¹⁴⁰ Meaning of baseload by the Oxford Dictionaries: “The permanent minimum load that a power supply system is required to deliver”, at: <http://oxforddictionaries.com/definition/baseload>

¹⁴¹ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

Wind Power

Accordingly to the 2007 IPCC report¹⁴², wind power has been one of the fastest growing renewable energy sources.

The same as solar energy, the intermittent nature of wind power requires either storage devices or integration into a widespread grid that would enable power generation to be averaged out over large areas experiencing different wind regimes.

Increasing links between solar, wind and pumped storage hydropower is likely, with implications for optimal siting, efficiency and river conservation. Backup for occasions of low output across the whole grid can be from hydropower or relatively cheap gas turbines that need to be operated only rarely.

Wind forecasting can be used to schedule backup generators. Such backup is needed with coal fired power stations anyway, in case of break down.¹⁴³

Biomass Energy

Biomass is the accumulation of organic material from plants and animals, which is a major energy source, especially in less developed areas, where it is used for fuel for stoves and heating, usually in the form of wood or cattle dung.

This traditional biomass burning is now often being phased out in favour of fossil fuel generated electricity from urban and rural grids.

¹⁴² For the complete 2007 IPCC Report, refer to:
http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

¹⁴³ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

However, sustainable biomass energy effectively reduces GHG emissions because, even if renewable biomass is burned and the resulting CO₂ is released into the atmosphere, the fuel results from plants that take a similar amount of CO₂ out of the atmosphere.

Biomass burning effectively harvests solar energy and recycles the carbon. Hence, if CO₂ from biomass burning were to be removed and more permanently sequestered underground or elsewhere, it would result in actual reductions in atmospheric concentrations of CO₂. This may prove necessary in the future to reduce GHG concentrations to a safe level, below the maximum concentrations reached in the next century or so, thereby eventually slowing or stopping sea level rise and bringing global warming down to acceptable levels.

A complex argument with biomass for fuel is that it may force up the price of food such as corn if there is a large demand for it as feedstock for biomass energy.¹⁴⁴

Tidal and Wave Energy

Tide power installations require a large tidal range. Today tidal dams or barrages need to be built across much larger inlets or estuaries.

Some of the installations can greatly affect the tidal ecosystems and there are not many suitable sites.

The major ecosystem effects of barrages can be avoided using turbines installed on the sea floor to capture power from the currents rather like windmills do on land.

¹⁴⁴ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

Although the speed of tidal or other ocean currents is generally less than that of the wind, the much higher density of water means that ocean currents can provide the same power with smaller turbines than the wind.¹⁴⁵

Geothermal Power

The forms of geothermal power now in use are:

- Shallow mild temperature rocks or soil used for direct heat extraction in winter and for cooling in summer;
- High temperature rocks containing super heated steam, usually in geodynamical active regions (volcanic regions or thermal springs and geysers) at depths less than 2 km, with temperature above about 250°C, used for direct electricity generation; and
- Hot dry rocks, often at depths of one or more km, where heat is extracted by pumping water through the rock layers turned into steam and used in electrical generators.

This heat comes from solar radiation near the surface, by conduction from the hot interior of the Earth or from decay of radioactivity in the rocks. It is a huge resource.¹⁴⁶

The Hydrogen Economy

Hydrogen is not an energy source but an energy carrier like electricity. It can be generated by the use of fossil fuel, by renewable energy or by using nuclear power.

¹⁴⁵ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹⁴⁶ *Ibid*

It is of enormous interest because when it is burned to provide energy in a turbine or internal combustion engine, or used to produce electricity in a fuel cell, its only waste product is water.

The issue with this is how hydrogen can be generated without the emission of CO₂. If it is produced from fossil fuels it is not free from GHG emissions, or from local pollution at its point of production.

The most likely means of production of hydrogen are the reforming of natural gas, or the hydrolysis of water using electricity.¹⁴⁷

Carbon Capture and Sequestration

Carbon capture and sequestration is the reduction of emissions by capturing at CO₂ large point sources such as coal, oil or gas fired power stations and cement plants, and keeping it out of the atmosphere. The goal is to produce energy from fossil fuels free of CO₂ emissions at an affordable cost. Carbon sequestration possibilities include underground or geological storage, injection into the deep ocean, mineralisation, biological sequestration in the oceans spurred on by iron fertilisation and biological sequestration on land. At the moment carbon capture and sequestration is not yet proven at a commercial scale and will not provide fully emissions free power, due to less than 100% capture of CO₂.¹⁴⁸

Land-Based Carbon Sinks

Agriculture and forestry have usually been seen as sources of carbon and other GHG due to the energy and fertilisers applied to their management and the large areas of land clearing that is destroying standing stock of carbon in

¹⁴⁷ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹⁴⁸ *Ibid*

vegetation and soils. Biosphere carbon stock management sustains that very large areas of land are potentially available and that these could be used to remove carbon from the atmosphere in large quantities, allowing CO₂ concentrations in the atmosphere to be not simply stabilised but reduced, thus enabling “overshoot” scenarios for GHG emissions.¹⁴⁹

Geoengineering Possibilities

Geoengineering is a way of controlling or changing the climate so as to achieve a desired climatic state. The main attraction of geoengineering is that it may be cheap compared with the feared difficulties and large cost of reducing GHG emissions.¹⁵⁰

The two geoengineering possibilities are:

- Reduce sunlight reaching the Earth’s surface by reflecting it back into space via particles or mirrors placed in the upper atmosphere or space above the Earth; and
- Sequester large quantities of CO₂ in the oceans via fertilisation of the ocean to enhance biological capture of CO₂.

Some of these mitigation methods are too expensive to be implemented in developing countries like Guatemala.

As established in previous chapters, the effects of climate change are very visible in Guatemala and in many cases adaptation and mitigation are new concepts that people are beginning to understand and learn. This is why the MARN has been working lately on the response to these issues, which will be explained in detail in the next chapter.

¹⁴⁹ Pittock A. Barrie. *Climate Change. Turning up the heat*, 2005

¹⁵⁰ *Ibid*

CHAPTER 5 – THE RESPONSE IN GUATEMALA

The State of Guatemala is Party to the UNFCCC (approved by the Decree 15-95 of the Congress of the Republic of Guatemala) and the Kyoto Protocol (approved by the Decree 23-99 of the Congress of the Republic of Guatemala). In addition, the State has undertaken a series of programs aimed at taking immediate and effective actions on adaptation and mitigation of climate change.

Since ratification of the UNFCCC and the Kyoto Protocol, actions have been achieved to evaluate the impacts of climate change in the country. Those actions are largely focused on increasing the national knowledge about climate change and identifying and implementing adaptation and mitigation measures.

SECTION 1. HARD LAW OPTIONS AND SOFT LAW INITIATIVES

Some of the main national initiatives taken at technical, political and legislative levels are:

Soft Law Initiatives:

- First National Communication on Climate Change (MARN 2001);¹⁵¹
- National Policy for Environmental Education (Ministry of Education and MARN 2005);¹⁵²

¹⁵¹ To see the First National Communication on Climate Change, 2001, refer to: http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/pcn.pdf

¹⁵² To see the agreement between MINEDUC and MARN, refer to: <http://www.marn.gob.gt/aplicaciones/normas10g/pdf/518.pdf>

- Conservation, Protection and Improvement of Environment and Natural Resources Policy (Approved by Governmental Regulation No 63-2007, MARN 2007);¹⁵³
- Preliminary Inventory of Emissions and Absorptions of GHG for the year 2000 as a basis (MARN 2007);¹⁵⁴
- Installment of the Water Cabinet presided by the Vice-President of the Republic of Guatemala (Approved by Governmental Regulation No 204-2008);¹⁵⁵
- Climate Change National Strategy and the Action Plan (MARN 2009);
- Installment of the Social Environment Cabinet presided by the Vice-President of the Republic of Guatemala (Approved by Governmental Regulation No 128-2008);¹⁵⁶
- Participation in the COPs to the UNFCCC. The last participation of Guatemala was during COP 16 in Cancún, México, December 2009;¹⁵⁷
- Climate Change National Policy (MARN 2009);¹⁵⁸
- National Policy for the Integrated Management of Marine Coastal Zones (MARN 2009);¹⁵⁹
- National Clean Development Proposal (MARN 2005);¹⁶⁰
- Alignment, Harmonization and Appropriation Process of the International Cooperation in Environment and Climate Change (MARN 2009);

¹⁵³ To see the Governmental Regulation No 63-2007, refer to:

<http://www.marn.gob.gt/aplicaciones/normas10g/pdf/3.pdf>

¹⁵⁴ To see the Preliminary Inventory, refer to:

http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/igei_2000.pdf

¹⁵⁵ To see the Governmental Regulation No 204-2008, refer to:

http://www.vicepresidencia.gob.gt/v2/sites/default/files/gabinete%20agua_0.pdf

¹⁵⁶ To see the Governmental Regulation No 128-2008, refer to:

http://www.vicepresidencia.gob.gt/v2/sites/default/files/socioambiental_0.pdf

¹⁵⁷ To see the international negotiation documents, refer to MARN-National Climate Change Program-International Negotiation, at: http://www.marn.gob.gt/sub/portal_cambio_climatico/index.html

¹⁵⁸ To see the Climate Change National Policy, refer to:

http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/politica_cc.pdf

¹⁵⁹ To see the National Policy for the Integrated Management of Marine Coastal Zones, refer to:

<http://www.marn.gob.gt/documentos/novedades/pmc.pdf>

¹⁶⁰ To see the MARN Ministerial Regulation No 477-2005, refer to:

<http://www.marn.gob.gt/documentos/acuerdoond.pdf>

- Installment of the Civil Society Board on Climate Change (MARN 2009);
- Installment of the Indigenous Board on Climate Change (MARN 2009); and
- Climate Change Regional Strategy (2010).¹⁶¹

Hard Law Options:

- The issue of the MARN Ministerial Regulation No 134-2003, in which the permanent Unit in charge of the matter was created, under the administrative figure of: National Climate Change Program, appointed to the MARN;¹⁶²
- Incentives for Development Projects on Renewable Energy Law (Decree No 52-2003 by Congress-Republic of Guatemala);¹⁶³
- Designation of the MARN as the National Designated Authority of the Clean Development Mechanism –CDM (Governmental Regulation No 388-2005);¹⁶⁴
- The creation of the Clean Development National Office and the Regulation of its proceedings (MARN Ministerial Regulation No 477-2005);¹⁶⁵
- Incentives Regulation for Development Projects on Renewable Energy Law (Governmental Regulation No 211-2005);¹⁶⁶
- Installment of the Presidential Climate Change Commission (Governmental Regulation No 253-2009);¹⁶⁷ and

¹⁶¹ To see the Climate Change Regional Strategy, refer to MARN-National Climate Change Program-International Negotiation, at: http://www.marn.gob.gt/sub/portal_cambio_climatico/index.html

¹⁶² To see the MARN Ministerial Regulation No 134-2003, refer to: http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/acuerdo_ministerial.pdf

¹⁶³ To see the Decree No 52-2003, refer to: http://200.12.63.122/Legislacion/ver_decreto.asp?id=238

¹⁶⁴ To see the Governmental Regulation No 388-2005, refer to: <http://www.marn.gob.gt/aplicaciones/normas10g/pdf/9.pdf>

¹⁶⁵ To see the MARN Ministerial Regulation No 477-2005, refer to: <http://www.marn.gob.gt/documentos/acuerdoond.pdf>

¹⁶⁶ To see the Governmental Regulation No 211-2005, refer to: http://200.12.63.122/Legislacion/Ver_acuerdo.asp?id=16235

¹⁶⁷ To see the Governmental Regulation No 253-2009, refer to: http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/acuerdo_gubernativo.pdf

- Law Initiative No. 4139: Framework Law to Regulate the Reduction of Vulnerability, Obligatory Adaptation, Facing Climate Change and the Mitigation of GHG Effects (MARN 2009).

From this list of national initiatives, it is evident that the national initiatives consist of a number of hard-law and soft-law options. Moreover, as can be seen from this diverse range of initiatives, climate change is a very important issue for the MARN, which is the principal Government department mandated with responsibility for implementation of the national strategy to combat climate change. Much of the progress to date can be traced back to the First National Communication on Climate Change which was published in 1998 and this soft law initiative therefore deserves further consideration in the section below.

SECTION 2. FIRST NATIONAL COMMUNICATION ON CLIMATE CHANGE

The importance of combating climate change in Guatemala can be appreciated if one takes into consideration the scientific projections and scenarios which were published in the First National Communication on Climate Change,¹⁶⁸ that indicate increases in temperature, decreases in total mean precipitation and increases in the frequency of extreme precipitation events;¹⁶⁹ as well as in the frequency and intensity of extreme climatic events.¹⁷⁰ They also indicate that the historical behaviour (1961-1990) of annual average temperature in Guatemala shows an increasing trend, with a predominance of positive anomalies since the 1970s. There are negative anomalies of precipitation for the same period, with the largest reductions occurring between the months of June and August.¹⁷¹

¹⁶⁸ To see the First National Communication on Climate Change, 2001, refer to: http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/pcn.pdf

¹⁶⁹ Aguilar, E. et al (2005). Changes in Precipitation and Temperature Extremes in Central America and Northern South America, 1961–2003

¹⁷⁰ MARN. *Environmental Report GEO 2009*, Guatemala

¹⁷¹ MARN. *First National Communication on Climate Change*, 2001, Climate change scenarios utilized were IS92A, IS92c, IS92e

National climate change projections¹⁷² indicate that average annual temperatures could increase by 1°C to 3°C by 2050, with the month of May being the hottest, with temperatures exceeding 28°C. Areas with higher temperatures are expected to expand, and this expansion will encroach upon areas in which temperatures are currently lower, such as mountainous ones. These scenarios include high, medium, and low climate sensitivities (1.5°C, 2.5°C and 4.5°C respectively) and a wide range of predictions of global warming based on increased GHG. All three scenarios (optimistic, moderate and pessimistic) point to an average reduction in precipitation by the year 2050 for the July-September quarter, with the month of August showing the most severe reduction. This will lead to an intensification of the *canícula*¹⁷³ period with serious implications for agriculture.¹⁷⁴ An increase in the intensity of rainfall and floods has likewise been recorded as well as projected.¹⁷⁵

Based on national climate change scenarios, progressive warming is projected for Guatemala's western region, in which maximum and minimum temperatures show a tendency to increase in all scenarios (from 0.8°C to 1.5°C), while precipitation tends to decrease at the beginning of the rainy season. October tends to be the wettest month.

According to the 2009 Global Assessment Report on Disaster Risk Reduction, Guatemala has been classified as one of the world's top ten countries most vulnerable to disasters.¹⁷⁶ In recent years, the major threats of climate change are hydrometeorological (floods, landslides, and droughts). The MARN has indicated that 87.5% of Guatemalan territory has some degree of drought susceptibility, with 49% present showing high drought risk. Eighteen of the

¹⁷² MARN. *First National Communication on Climate Change*, 2001, Climate change scenarios utilized were IS92A, IS92c, IS92e

¹⁷³ A characteristic of the rainy season in Central America, the *canícula* is a hot spell that occurs in the middle of the season. If it is out of phase or prolonged, it threatens crops and can lead to their partial or total loss

¹⁷⁴ MARN. *First National Communication on Climate Change*, 2001

¹⁷⁵ CEPAL. *The Economics of Climate Change in Latin America and the Caribbean, Synthesis 2010*, United Nations, Santiago de Chile, Chile

¹⁷⁶ UNISDR. This analysis was conducted to include not only climate change risks, but also risks associated with seismic and volcanic activity. For the complete text of the 2009 Global Assessment Report on Disaster Risk Reduction, refer to:

<http://www.preventionweb.net/english/hyogo/gar/report/index.php?id=1130&pid:34&pih:2>

country's twenty-two departments contain areas threatened by desertification. According to the vulnerability study for water resources, the scenarios for 2030 show a probable reduction in surface water flow of between 10% (moderate scenario) to 50% (pessimistic scenario).¹⁷⁷ This reduction in water flow, along with the predicted increases in temperature and decreases in precipitation, will result in a diminished water supply for ecosystems, human consumption, and irrigation, with consequential impacts on human welfare.

An increase in water demand of 300% by 2050 and 1,600% by 2100 has been estimated, while total water availability, compared to current levels, could fall by 35% for the B2 scenario and 63% for the A2 scenario by 2100.¹⁷⁸ This leads to an estimate of changes in water-use intensity that shows all Central American countries except Belize exceeding critical values of water stress to an extent similar to that of Egypt and some countries of the Arabian Peninsula today.¹⁷⁹

An increase in the intensity of rainfall will produce an increase in the frequency and intensity of floods. Flow rate studies in the basins of the Nahualate, Coyolate, and Madre Vieja Rivers show an increase in average flow rates in May (the beginning of the rainy season) of 89% to 141% over historical averages.¹⁸⁰ Estimated erosion rates are 45 t. of sediment per ha. per year.¹⁸¹

Despite the increased risk of flooding, few structural measures have been taken at an operational level to prevent floods. In particular, there have not

¹⁷⁷ MARN. *First National Communication on Climate Change*, 2001

¹⁷⁸ The IPCC Special Report on Emissions Scenarios (SRES) estimates the global population, economic activity, and GHG emissions to the year 2100. These scenarios simulate the global climate system, comprised of a set of interrelated variables (GDP, population, technology, energy, emissions, etc.), which are internally consistent. Each scenario describes a possible future. The A2 family of scenarios—economic growth with strong focus on the regional—describes a very heterogeneous world based on self-sufficiency and the preservation of local identities, and showing a slow convergence of regions, while the B2 family of scenarios -environmental sensitivity with a highly regional approach—describes more gradual and less extreme changes, including geopolitical developments, demographics, growth in productivity, technological dynamics, etc.

¹⁷⁹ CEPAL. *The Economics of Climate Change in Latin America and the Caribbean, Synthesis 2010*, United Nations, Santiago de Chile, Chile

¹⁸⁰ INSIVUMEH. Water flow trends in hydrometeorological stations during May, 2010, Guatemala

¹⁸¹ MARN. *Environmental Report GEO 2009*

been sufficient infrastructural projects for flood mitigation such as the construction of levees and the dredging of rivers. Moreover, many of the projects completed to date do not rely on appropriate technical studies that take climate change and variability into account. In some instances, the result is that some projects end up exacerbating problems downstream as well as creating a false sense of security.¹⁸² Essentially, the cause of the problem is the absence of sufficient fiscal resources to undertake the large-scale capital projects that are needed to combat climate change. Thus, the occurrence of landslides on major infrastructural routes is a regular occurrence during the rainy season.

The increased frequency and intensity of extreme events (tropical storms, hurricanes, floods, and droughts), as well as altered temperature and precipitation patterns and rising sea levels, threaten ecosystems and biodiversity in Central America. Processes such as coastal erosion, depletion of aquifers, saline intrusion into groundwater; and, in some instances desertification are now common occurrences in some parts of Guatemala.¹⁸³

On the other hand, the rise in sea level presents other risks, such as increased coastal erosion and coastal flooding that affect wetlands, estuaries, and the abundance and diversity of hydrobiological resources. One of the major consequences of these changes is that they bring about changes to marine ecosystems. Some of the possible changes in the Guatemalan ecosystems will be explained in the next section.

SECTION 3. CHANGES IN ECOSYSTEMS IN GUATEMALA AS A RESULT OF CLIMATE CHANGE

From the scientific studies that have been completed, it is evident that for increases above 2.5°C in the ambient temperature there will be major

¹⁸² MARN. *Analysis of Future Vulnerability of Water Resources to Climate Change*, Climate Change National Policy

¹⁸³ MARN. *First National Communication on Climate Change*, 2001

changes in the structure and function of ecosystems, changes in ecological interactions, and shifts in the geographical distribution of species.¹⁸⁴ As a consequence, there are negative impacts on biodiversity and ecosystem services (e.g. water and food security.)

The effects of a changing climate on ecosystems have already been observed. Such observations include changes in the carbon and nitrogen cycles, species distributions, population sizes, timing of reproduction or migration and length of growing season.

With respect to expected changes in ecosystems in Guatemala, the country's First National Communication on Climate Change, simulated the distribution of ecosystems in accordance with each scenario and concluded that coniferous forests will be the most affected by climate change, due to habitat reduction caused by expanding dry areas. The composition of forests could be affected due to climatic variations, and this could result in the loss of species incapable of withstanding higher temperatures, reducing biodiversity. According to the optimistic, normal, and pessimistic scenarios, between 0.38% and 3.67% of Guatemala will undergo severe changes in forest cover. An increase in the frequency of forest fires is also expected.¹⁸⁵ Of course, these forests are not only important in the context of the role they play as a carbon sink but also there are an important asset in the emission trading scheme.¹⁸⁶

Ecosystem functions are important because they provide services of benefit to humans. The main services provided by ecosystems, such as nutrient cycling, carbon sequestration, pest regulation and pollination, sustain agricultural productivity. In Guatemala, the main services provided by ecosystems are erosion control, food provisioning and products derived from biodiversity and

¹⁸⁴ IPCC. *Climate Change 2007. Synthesis Report*, Contributions from Work Groups I, II, and III

¹⁸⁵ MARN. *First National Communication on Climate Change*, 2001

¹⁸⁶ In Chapter 2 we already mention the Emissions Trading (the Carbon Market) mechanism of the Kyoto Protocol

agro diversity.¹⁸⁷ For example, Guatemala produces close to 19 million m³ of timber, per year, with a high proportion (93%) to be used as wood fuel.¹⁸⁸

Ecosystem services help reduce exposure or sensitivity and increase the adaptive capacity of most sectors of society. Ecosystem services provide agriculture with important factors of resistance and risk mitigation; and, the value of these increases when the climate is changing. When conditions change, the existence of a greater number and variety of interactions that facilitate the functioning of an ecosystem helps favour different groups of organisms (e.g., pollinators), so that they can continue to provide ecosystem services. Climate change has implications for the quality and extent of forests, the loss of genetic resources available for agricultural production, the loss of food and the distribution and productivity of certain species.¹⁸⁹

Current climate change trends, combined with other pressures on ecosystems, will lead to reduced ecosystem services; and, this loss will reduce human well-being at all levels.¹⁹⁰ Some foreseen changes to ecosystem services include a decrease in the availability of water, food, timber, and fuel (provisioning services), a loss of genetic diversity (supporting services), altered flow volumes in streams, an increase in polluted runoff and changes in the distribution pattern of disease vectors and pests, due to changes in temperature (regulating services).¹⁹¹ Some reported effects on biodiversity and ecosystems in Guatemala are changes in ecosystems composition and structure, changes in altitudinal and latitudinal distribution, and species isolation, with subsequent changes in services provisioning. In addition, there have been reported changes in water regimes and an increase in landslides. In Guatemala, the most affected ecosystems will be mountain forests (coniferous forests, cloud forests and evergreen tropical forests). As a result, the Government has highlighted the importance of building altitudinal

¹⁸⁷ MARN-CONAP. *Preliminary assessment of Climate Change potential impacts on Biodiversity and Forests of Guatemala; recommendations for mitigation and adaptation*, Draft version 2011

¹⁸⁸ UNEP. *Global environment outlook: Latin America and the Caribbean GEO LAC 3*, 2010

¹⁸⁹ FAO. *Climate Change*, 2008

¹⁹⁰ Locatelli. *Facing an Uncertain Future: How Forests and People Can Adapt to Climate Change*, 2008

¹⁹¹ Pereira. *Condition and Trends of Ecosystem Services and Biodiversity*, 2005

corridors for climate change adaptation. This recommendation has been emphasized for the highlands zone.¹⁹²

In Guatemala, some actions have been undertaken to evaluate the impacts of climate change in the country. Those actions are directed to identifying and implementing adaptation and mitigation measures. One of the actions is the Initiative for the Force Adaptation and Obligatory Mitigation Climate Change Guatemalan Law which is commented below.

SECTION 4. INSTRUMENTS WHICH FACILITATE ADAPTATION AND MITIGATION: THE INITIATIVE FOR THE FORCE ADAPTATION AND OBLIGATORY MITIGATION CLIMATE CHANGE GUATEMALAN LAW

The justification for this proposal is that in the last couple of years the country has experienced an increase in the magnitude and the frequency of natural phenomenons. Some of the effects of climate change in the country have included:

- Loss of human lives;
- The reduction of the availability and exhaustion of the water sources;
- The impact and changes in the geographic distribution and plague season, vectors, depredators and diseases;
- The space modifications in the life zones and in the normal climate conditions;
- The alterations and block in the trophic chain (food chain) in the land and marine coast systems;
- Harvest loss and production capacity;
- The increase of the forest fires due to drought;
- The destruction of the infrastructure due to floods and landslides;

¹⁹² MARN-CONAP. *Preliminary assessment of Climate Change potential impacts on Biodiversity and Forests of Guatemala; recommendations for mitigation and adaptation*, Draft version 2011

- The increase of alimentation insecurity;
- The loss of natural spaces and habitats;
- Impacts in the urban-marginal areas; and
- Environmental social and economic impacts, mainly in the agricultural, stockbreeding and fishing sectors.

After suffering the mayor effects of the drought in the dry corridor area complemented with a food crisis in 2009, the MARN saw the importance of concentrating the national efforts to reduce the vulnerability and increase the adaptation to the negative impacts of the climate change in the territory, hence a proposal for the Force Adaptation and Obligatory Mitigation Climate Change Guatemalan Law was generated.

This initiative has been considerate as a national emergency, a matter of national security since the country needs to be able to tackle the effects of climate change and react properly.

The law responds in form and in substance to the special nature of the problem. It opts for the principle to not create new instances unless it is absolutely necessary and reinforces the sector rectority and promotes the institutional leadership. It identifies, in the agenda of other sectors, the principal elements that need to be treated to contribute to the effort of the “force” adaptation and visualize the specific actors to guarantee the effects of the action. It also activates the Government, the Municipalities and the citizens in general to act in a coordinated, urgent and appropriate way to face the challenges ahead.

The Proposed Structure of the Force Adaptation and Obligatory Mitigation Climate Change Guatemalan Law is:

CHAPTER I: GENERAL DISPOSITIONS

Section I: Object, Objective, Range of Application

Section II: Definitions

CHAPTER II: GUIDING PRINCIPLE

- a) *In Dubio Pro Natura*
- b) Precaution
- c) Who Contaminates Pays and Rehabilitates
- d) Integrality
- e) Cultural Identity
- f) Support Capacity
- g) Participation

CHAPTER III: DEVELOPMENT OF NATIONAL CAPACITIES AND TECHNOLOGY TRANSFER

- a) Research
- b) National Climate Change Information System
- c) Planning and Organization of the Public Investment Process
- d) Adaptation and Mitigation National Climate Change Action Plan
- e) Territorial Regulations for the Climate Change Adaptation and Mitigation
- f) Adaptation and Mitigation National Climate Change Action Plan
- g) Territorial Regulations for the Climate Change Adaptation and Mitigation

CHAPTER IV: FORCED ADAPTATION TO THE CLIMATE CHANGE IMPACTS

- a) Risk Management Related to Extreme Weather Phenomena
- b) Guides for Vulnerability Reduction
- c) Institutional Strategic Plans for Vulnerability Reduction and Climate Change Adaptation and Mitigation

CHAPTER V: OBLIGATED MITIGATION OF THE GREENHOUSE EMISSIONS

Section I: Emissions Reduction

Section II: Carbon Markets

CHAPTER VI: SENSITIVITY AND PUBLIC PARTICIPATION

CHAPTER VII: FINANCIAL RESOURCES

CHAPTER VIII: FINAL AND TRANSITORY DISPOSITIONS

Some important dispositions of the Climate Change Law Initiative include:

- Article 1 of the proposal states: “The object of the law is to establish the necessary regulations to prevent, plan and respond in an urgent,

- Article 2 establishes: “The objective of the present law is that the State of Guatemala, thru the central Government, the Municipalities, the organized civil society and the general population, adopt practices of risk prevention, vulnerability reduction, adaptation and mitigation to the climate change, taking advantage of the potential of the country for the reduction of the GHG emissions”;
- Article 3 builds the obligatory binding of the application aspects to all its habitants, public entities (autonomic and decentralized); and
- Article 4 provides the definitions for: Adaptation, Global Warming, Climate Change, and Change in the use of the Land, Carbon Capture, Greenhouse Effect, GHG, Risk Management, Carbon Markets, Mitigation, Environmental Service, Climate Variability and Vulnerability.

The importance of this proposal is that the Climate Change Law includes all the thematic aspects that the experts and the international conventions recommend to treat. This initiative is one of the few regulations worldwide in the matter of climate change law so Guatemala is currently an example to other countries in the region.

It is important to mention that this initiative was presented to the Guatemalan Congress on the 9 November 2009 by the President of the Environmental, Ecology and Natural Resources Commission of the Congress. With this, the administrative procedure began and the initiative was sent back to the Environmental, Ecology and Natural Resources Commission for the approve report. 4 March 2010 was the official presentation of the initiative to the full Congress. The Environmental, Ecology and Natural Resources Commission issued the approved report on the 9 August 2010. The 1st reading of the proposal at the full Congress was on the 12 April 2011. The 2nd reading was on the 28 April 2011. At this moment, the 3rd and last reading is the only step left for the law to be approved by Congress and then officially promulgated in

the Guatemalan Official Journal. Once a law is published in the Official Journal it comes into force in the next eight days.

The MARN has been giving legal environmental consultancy to the Environmental and Ecology Commission of the Guatemalan Congress hoping that the law will be approved as soon as possible. This has been a great effort since the objective is to get the law approved before the general elections at the end of 2011.

SECTION 5. CLIMATE CHANGE LEGISLATION

The Climate Change National Policy

The Guatemalan Ministry of Environment and Natural Resources fulfilling its legal mandate, worked during 2009 on the Climate Change National Policy proposal which was approved by President Álvaro Colom through Government Agreement No 329-2009 in December 2009.¹⁹³

As outlined in previous chapters, Guatemala is prone to natural disasters; hence, it has become of vital importance to adopt climate change mitigation and adaptation strategies. To face those challenges it is necessary to have the coordinated participation of multiple stakeholders, which is the justification for the Climate Change National Policy.

The Scope of the Policy includes the vulnerability reduction of the country to extreme events, the reinforcement of the adaptation capacity, the contribution to the reduction of the GHG and the use of the carbon markets.

The General Object of the Policy is that the State of Guatemalan through the central Government, the Municipalities, the civil society and the citizens,

¹⁹³ To see the complete text of the Climate Change National Policy and the Government Agreement, refer to: http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/politica_cc.pdf

adopts risk prevention practices, vulnerability reduction and improvement to the climate change adaptation and the contribution to the reduction of the GHG in the territory, so that the quality of the life of its inhabitants improves and also the impact capacity in the international negotiations of climate change gets strengthened.

The Specific Objects of the Policy are:

- 1) Development of climate change national capacities;
- 2) Vulnerability reduction and the improvement in adaptation to climate change; and
- 3) Mitigation of GHG emissions.

The Impact Areas of the Policy are:

- 1) Development of national capacities and technology transfer:
 - a. Creation and transfer of technology and knowledge;
 - b. Proper productive practices;
 - c. National capacities in climate change and institutional coordination;
 - d. Education and public awareness; and
 - e. Indigenous people.
- 2) Vulnerability reduction and the improvement in adaptation and risk management:
 - a. Territorial order for climate change adaptation and mitigation;
 - b. Risk management and climate change adaptation; and
 - c. Vulnerability reduction and climate change adaptation improvement in key sectors of the society.
- 3) Mitigation of GHG emissions:
 - a. Climate change mitigation;
 - b. Energy production and consumption making the most of the natural renewable resources;
 - c. The use of forestry resources;
 - d. Waste management;

- e. Carbon markets; and
- f. Innovative financial mechanisms.

The Guiding Principles of the Policy are:

- 1) The plans, actions and strategies have to have this policy as foundation;
- 2) Public participation has always to be taken into consideration;
- 3) The protection of human lives in climate change extreme events;
- 4) The protection of the agricultural production against climate change effects;
- 5) The infrastructure building plans have to have all the quality and security measures taking into consideration the vulnerability to climate change and the risks to be faced up;
- 6) To give preference to human labour over capital technology;
- 7) To apply the Principle *In Dubio, Pro Natura* (In case of a doubt, defer to nature);
- 8) To take into consideration the variability and climate change in the promotion of the traditional and ancestral practices for the use and management of the natural resources;
- 9) To take the precaution measures to anticipate, prevent, compensate and to reduce the climate change impacts;
- 10) To apply the Polluter Pays Principle (this principle states that the industrial corporation or persons responsible for causing environmental contamination must pay the costs of cleaning up, controlling the cause and preventing further fouling of the environment);
- 11) The integrated management of the water resources;
- 12) To incorporate the climate change variables in every plan and development instruments; and
- 13) To increase the institutional coordination in climate change matters.

The Climate Change National Policy was the main foundation for the Initiative of the Force Adaptation and Obligatory Mitigation Climate Change Guatemalan Law. The Policy and the Initiative are the results of the team

work lead by the former Minister of Environment and Natural Resources Luis Alberto Ferraté Felice.

National Policy for the Integrated Management of Marine Coastal Zones

As established before, the increased frequency and intensity of extreme events, as well as altered temperature and precipitation patterns and rising sea levels, threaten ecosystems and biodiversity in Guatemala. Processes such as coastal erosion, depletion of aquifers, saline intrusion into groundwater and desertification have been reported. On the other hand, the rise in sea level presents other risks, such as increased coastal erosion and coastal flooding that affect wetlands, estuaries, and the abundance and diversity of hydrobiological resources in the country.

The MARN has the mandate to elaborate all the public policies related to the hydrographic basin, coastal zones, oceans and marine resources.

In 2008, a specialized group began to work in the National Policy for the Integrated Management of Marine Coastal Zones, which was approved by the President Álvaro Colom by the Government Agreement No 328-2009 in December 2009.¹⁹⁴

Climate change effects have also heavily impacted the fishing and aquaculture communities in Guatemala.¹⁹⁵ These little communities play a key role in maintaining healthy ocean ecosystems in the face of change. It is very important to take into consideration the vulnerability of these small communities, which live along the coastline, due to the increased threat of contamination and most importantly, the effects of climate change yet to be felt. The marine coast resources are very important for the livelihoods of these poor communities along the coast line. These systems are very vulnerable right now due to the contamination treats and the loss of the tidal flow volume.

¹⁹⁴ To see the complete text of the National Policy for the Integrated Management of Marine Coastal Zones, refer to: <http://www.marn.gob.gt/documentos/novedades/pmc.pdf>

¹⁹⁵ MARN. *First National Communication on Climate Change*, 2001

The vulnerability to natural disasters of these communities and the marine coast ecosystems have to be prevented reduced and mitigated by the implementation of risk management measures. Adaptation and mitigation measures, to ensure improved integrated coastal and aquatic resource management are therefore essential, both for restoring carbon sink capacity, as well as for health, livelihood, incomes and food security.

The Importance of the National Policy for the Integrated Management of Marine Coastal Zones lies in the fact that the Guatemalan coastline is around 402 km. It includes 7 Departments, 17 Municipalities and about 300 communities that live in the coastal zone. This implicates a direct influence on 300,000 people living in the coastal Municipalities and indirectly over 3 million people in the Departments. The Guatemalan EEZ and the territorial sea have an area over the 116,000 km².

The Guiding Principles of the Policy are:

- 1) Ecological balance;
- 2) National sovereignty;
- 3) Integral human development;
- 4) Prevention;
- 5) Precaution;
- 6) Sustainable use of the natural goods and services;
- 7) Respect to the cultural diversity;
- 8) The adoption of the ecosystemic approach; and
- 9) Public participation.

The General Object of the Policy is that the marine and coastal ecosystems and its hydrographic basins are protected, managed and well used to guaranty the stay and equitable development of the people in the coastal zone.

The Specific Objects of the Policy are:

- 1) The restoration, conservation and integral management of the marine coastal ecosystems, hydrographic basins and its biological diversity; and, the effective management of its goods and services;
- 2) The protection of the natural marine and coastal resources and its services for the benefit of the Guatemalan people;
- 3) Better practices for the productive sector that guarantee the permanency of the ecosystems;
- 4) The access of the local communities to the goods and services of the marine and coastal resources;
- 5) The improvement of the knowledge and research of the ecosystems and marine and coastal resources;
- 6) Adaptation and mitigation strategies to reduce the vulnerability of the coastal communities;
- 7) The implementation of the rights and obligations that derive from national and international laws regarding to the marine and coastal zone;
- 8) The empowerment of the local Municipalities to enforce the National Policy for the Integrated Management of Marine Coastal Zones; and
- 9) The harmonization of the National Policy for the Integrated Management of Marine Coastal Zones with other national initiative.

The Strategic Lines for the achievement of the Policy are:

- 1) Territorial order;
- 2) Economic processes and financial mechanisms;
- 3) Institutional Strengthening;
- 4) Upholding of the national and international laws regarding the coast and marine zone;
- 5) Promote the integral human development that guaranties the social and economic development which contributes to the reduction of the poverty and guaranties the food security;
- 6) Prevention of the degradaton and contamination;

- 7) Creation and transfer of knowledge;
- 8) Ecosystem conservation and restoration; and
- 9) Climate change.

The MARN is now structuring the Strategy and Action Plan of the National Policy for the Integrated Management of Marine Coastal Zones for its implementation. Parallel to this, the MARN is also working on the strengthening of the territorial institutional coordination for the coastal and marine management, which is part of the integrated coastal zone management, as will be seen below.

SECTION 6. INTEGRATED COASTAL ZONE MANAGEMENT

The integrated management of the coastal zone and the hydrographic basins is set in the general objectives of the National Policy for the Integrated Management of Marine Coastal Zones.¹⁹⁶

The reason for this is that the coastal zone in Guatemala is the one that receives the impacts of the inadequate management of high and half parts of the hydrographic basins.¹⁹⁷

When the National Policy for the Integrated Management of Marine Coastal Zones was elaborated, different sectors were incorporated such as: Government institutions and non-Governmental organizations (health, education, ports, energy and mines), private sector (banana companies, African palm companies, mines) and civil society (associations, community counsels, comities).¹⁹⁸ The vision is that the natural goods and services that come from the coastal zone get incorporated as key elements for development.

¹⁹⁶ MARN. *National Policy for the Integrated Management of Marine Coastal Zones*, 2009

¹⁹⁷ MARN. Internal document, 2009

¹⁹⁸ MARN. *National Policy for the Integrated Management of Marine Coastal Zones*, 2009

With the elaboration of the Strategy and Action Plan of the National Policy for the Integrated Management of Marine Coastal Zones, now in progress, the object is to support the conformation of management structures in the coastal zone, especially in the Caribbean Zone, where a managing group of the National Policy will be organized. This group will be formed by Governmental institutions, non-Governmental organizations, civil society and the private sector, especially small fishing associations.¹⁹⁹ The most interesting part of this exercise is that the action geographical field of the managing group will go beyond the coastal belt spreading to the high and half parts of the hydrographic basins, taking as managing axis the water resource.

Since the MARN does not have a specialized Unit in charge of all coastal and marine matters, the office in charge of the coastal and maritime subject is the Mesoamerican Biological Corridor/Mesoamerican Coral Reef System Unit.²⁰⁰

Now, it is important to mention that in May of 2010, the Guatemalan Vice Presidency in charge launched the Pacific Development Plan called: "Coastal Pacific: A Sea of Opportunities".²⁰¹ This initiative integrates the lines of economic, social and environmental development in the Pacific Coastal Zone, as can be seen in the next Figure 5. This plan links itself directly with the work program of the National Policy for the Integrated Management of Marine Coastal Zones.

The main object of this plan is to build an economic competitive region, socially integrated with environmental sustainability, from the shared potential territory. This plan represents the opportunity of establishing the port activity in the Pacific Zone as one of the work engines.

¹⁹⁹ MARN. Internal document, 2010

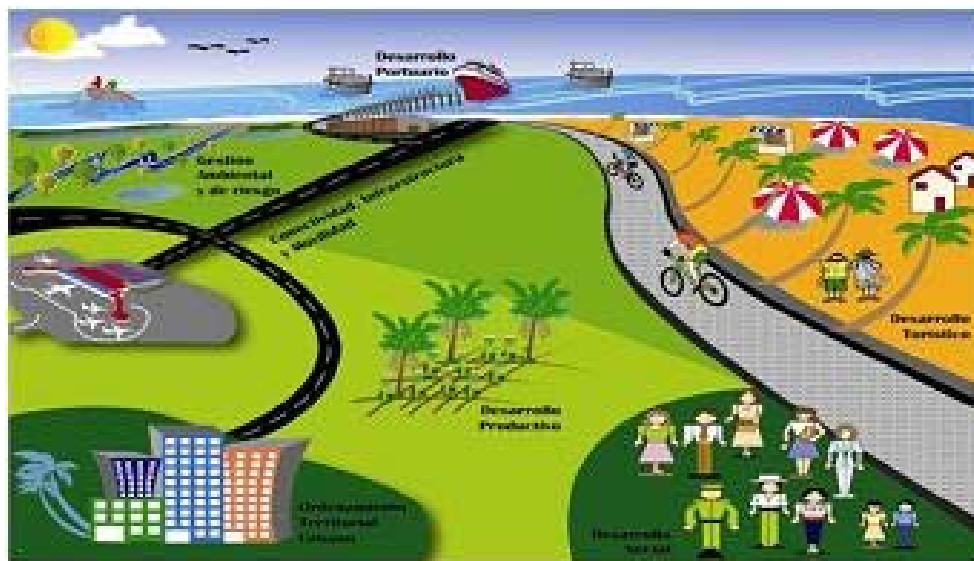
²⁰⁰ For more information about the Mesoamerican Biological Corridor/Mesoamerican Coral Reef System Unit, refer to: <http://www.marn.gob.gt>

²⁰¹ For more information about the Coastal Pacific Plan, refer to: <http://www.vicepresidencia.gob.gt/v2/content/litoral-del-pacifico>

The objectives of the Coastal Pacific: A See of Opportunities Plan are:

- Social development;
- Environmental and risk management;
- Productive development for family economies;
- Urban territorial order;
- Tourist development;
- Connectivity, infrastructure and mobility;
- Port development;
- Institutional strengthening; and
- Maritime development.

Figure 5. The Coastal Pacific Plan: A See of Opportunities²⁰²



Along with the integrated coastal zone management strategies, there are further actions and proposals that will be described in the next chapter.

²⁰² Office of the Vice President of Guatemala. The Coastal Pacific Plan, at: <http://www.vicpresidencia.gob.gt/v2/content/litoral-del-pacifico>

CHAPTER 6 – RECOMMENDATIONS FOR FURTHER ACTION AND CAPACITY BUILDING

SECTION 1. ADDRESSING THE ACTUAL GUATEMALAN MARINE COASTAL ZONE SITUATION

A coastal zone is a transition zone where land and freshwater meet saline water, and across which the effects of land on the ocean, and *vice versa*, are transferred and modified. Coastal zones are a crucial battleground in the current fight against climate change.²⁰³

Coastal areas are one of the most vulnerable of all environments to the impacts of climate change. The projected impacts from global warming in these areas include rising sea levels, stronger tropical storms, larger storm surges, increasing sea surface temperatures; and the acidification of surface waters. Such impacts will be felt mostly in the coastal ecosystems and coastal communities, threatening the livelihoods, health and welfare of the people that live in these areas.²⁰⁴

In Guatemala, the coastal communities in the Pacific Coast have suffered in the past years from continuous flooding in the low-lying coastal zones, which has destroyed their infrastructure.

A coastal system forms part of the larger marine ecosystem that includes coasts and open ocean areas. For the Fourth Assessment Report (AR4) of the IPCC, coastal systems are considered as the interacting low-lying areas and shallow coastal waters, including their human components.²⁰⁵ This includes adjoining coastal lowlands, which have often developed through

²⁰³ Stimson, Regional Voices, Editors: David Michel and Amit Pandya, *Coastal Zones and Climate Change*. The Henry L. Stimson Center, 2010

²⁰⁴ *Idem*

²⁰⁵ For the complete text of the AR4 Report, refer to:

http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

sedimentation during the Holocene (past 10,000 years), but excludes the continental shelf and ocean margins [and inland seas].²⁰⁶

The IPCC 4th Assessment Report (AR4) states that, globally, coasts are undergoing adverse consequences from climate change, such as sea level rise, inundation, erosion, and ecosystem loss.²⁰⁷ The IPCC report also states that coasts are highly vulnerable to extreme events such as cyclones, extreme waves, storm surges, altered rainfall and runoff patterns; and ocean acidification. The overall impacts of climate change are “virtually certain to be overwhelmingly negative”.²⁰⁸ Climate change and its associated effects pose serious risks to coastal biodiversity.²⁰⁹

Climate change is projected to affect climate variability, increasing the frequency and severity of storm/tidal surges, tropical cyclones, hurricanes, etc. These phenomena also cause coastal flooding, erosion, saltwater intrusion into fresh waterways, salinization of soils, and destruction of coastal infrastructure. Global warming will also increase sea surface temperatures as surface waters absorb heat from higher air temperatures. Such altered temperature regimes can significantly affect the reproduction and survival of species unless they can adapt quickly enough.²¹⁰

The conservation and sustainable use of Guatemala’s biological richness is of great national importance, and its protected areas are an essential component of the country’s conservation strategy.

²⁰⁶ Robert J. Nicholls et al.. *Coastal Systems and Low-Lying Areas*, in M. L. Parry et al., eds., *Climate change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press, 2007

²⁰⁷ Nicholls *et al.*, *op.cit.*

²⁰⁸ *Ibid*

²⁰⁹ A. R. Watkinson, J. A. Gill, and M. Hulme. *Flying in the face of climate change: a review of climate change, past, present and future*, *Ibis* 146, Suppl. 1, 2004

²¹⁰ Nicholls *et al.*, *op.cit.*; Nicholas Harvey and Robert Nicholls. *Global sea-level rise and coastal vulnerability*, *Sustainable Science* 3, No. 1, 2008

The Guatemalan System of Protected Areas (hereinafter: SIGAP),²¹¹ who is governed by the Guatemalan National Council of Protected Areas (hereinafter: CONAP),²¹² currently includes a total of 270 areas covering 35,209 km², which equates to 32.33% of the national territory.

The six existing marine protected areas within the SIGAP represent less than 6% of the total area, and just one marine-protected area situated in the Caribbean region contains a marine portion, representing less than 0.5% of the total marine area of the country. The Pacific Coastal Zone has 6,068 ha. of protected land (0.18% of the total coverage of the SIGAP), 46.14% of which is classified as Multiple Use Area, 32.96% is classified as National Park Lands and 20.9% is designated as Natural Private Reserve.²¹³

In the Caribbean coastal zone, there are three marine protected areas in existence with a total of 188,080 ha., which include a Wildlife Refuge, a Multiple Use Area and a Permanent Ban Zone. In addition, Guatemala has four wetlands and coastal lagoons that have been declared RAMSAR²¹⁴ sites.²¹⁵

The importance of the country's marine coastal zone is evidenced by the goods and services that it offers, including aquaculture, fishing, sailing, tourism and recreation, commercial services, habitat for biodiversity and the protection of the coastline. It is estimated that all of those goods and services currently provide the country with between \$216 million USD and \$314 million USD in annual revenue. Brackish water aquaculture is especially lucrative, with an average annual estimated value of \$20 million USD. The average annual revenue generated by national fishing production is approximately \$49 million USD, and sport fishing on the Pacific Coast generates close to \$2 million USD annually.²¹⁶

²¹¹ For more information about the SIGAP, refer to: <http://www.conap.gob.gt/biodiversidad/sigap>

²¹² For more information about the CONAP, refer to: <http://www.conap.gob.gt>

²¹³ MARN. Internal document, 2011

²¹⁴ For more information about the RAMSAR Convention on Wetlands, refer to: http://www.ramsar.org/cda/en/ramsar-home/main/ramsar/1_4000_0

²¹⁵ MARN. Internal document, 2011

²¹⁶ *Ibid*

Although the annual revenue from tourism in protected areas in Guatemala as a whole is estimated to be equivalent to 13% of the country's national budget, there is a lack of accurate statistics regarding tourism in the marine protected areas.²¹⁷

SECTION 2. PINPOINTING THE PROBLEM

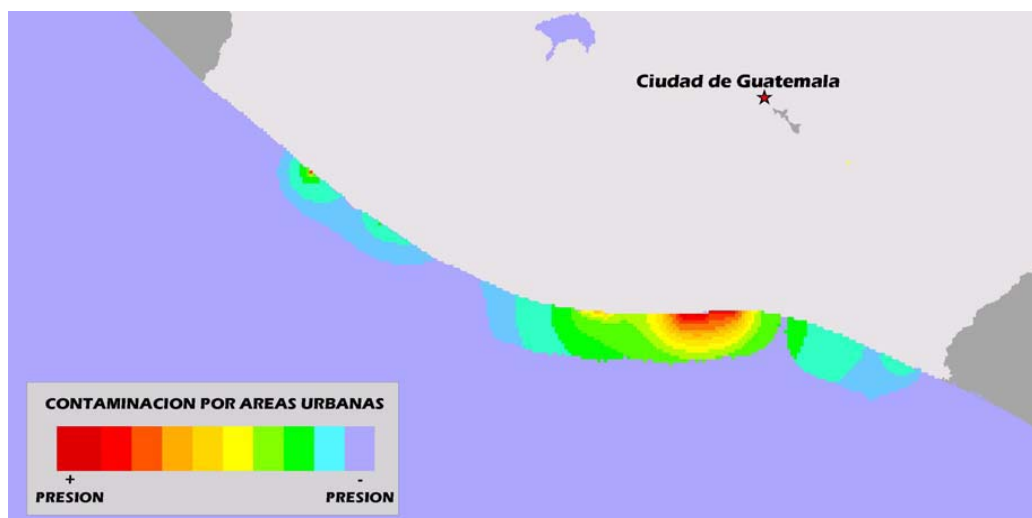
Because conservation and sustainable-use strategies for natural systems in Guatemala have traditionally been focused on the terrestrial protected areas and the establishment of the marine coastal marine protected areas has fallen well behind, many marine coastal species and ecosystems have been put at risk. The ecosystems are also suffering the impacts of climate change.

The most significant threats to marine coastal biodiversity, particularly in the Guatemalan Pacific, include contamination caused by unplanned coastal development (urban, industry and tourism expansion) and unregulated marine transportation, overexploitation of marine coastal resources including unsustainable fishing practices and loss of habitat and natural cover due to unplanned development, creating a particularly critical situation for the country's mangroves.

The levels of contamination for the urban areas in the Pacific Coast can be seen in Figure 6.

²¹⁷ MARN (2011). Internal document, Guatemala

Figure 6. Contamination Caused by Urban Areas in the Pacific²¹⁸



Since 1950, mangroves have lost 70% of their original cover, with serious implications for their associated fauna and the environmental services they provide, including the reduction of their potential use as breeding areas for fish, mitigation of impacts from climate change; and, reduction of impacts from storms and hurricanes.²¹⁹

In addition, the loss of mangroves has resulted in the reduction of food options and income for local communities in the form of harvesting fauna (e.g., bivalves: *Anadara* sp, *Grandiarca* sp; crabs: *Ucides occidentalis* and *Achrostichium daenifolium* and mullet: *Mugil curema* and *Mugil cephalus*) and sustainable timber extraction and charcoal production.

The range of the Guatemalan mangroves during the years of 2006 and 2007 can be seen in Figure 7.

²¹⁸ PNUMA. *Análisis de vacíos y omisiones para el Pacífico de Guatemala*, at: http://www.pnuma.org/agua-miaac/SUBREGIONAL%20MESO/MATERIAL%20ADICIONAL/BIBLIOGRAFIA-WEBGRAFIA/Modulo%201%20MIAAC%20en%20el%20contexto%20de%20gestion%20para%20D S/Analisis%20de%20Vacios/Doc%202.%20Analisis_Vacios_Marino-Costero.pdf

²¹⁹ MARN. Internal document, 2011

Figure 7: Mangroves Range in the Pacific Zone (2006-2007)²²⁰



The size of the marine area (currently under protection in Guatemala) is inadequate for the conservation of the representative marine coastal ecosystem, and significantly falls below the standards of the Central American region (15%) and the future objectives proposed within the Convention on Biological Diversity (hereinafter: CBD)²²¹ of 10%. A study performed by SIGAP's Gap Analysis Committee in 2009, which evaluated the management effectiveness of marine protected areas, revealed that on average, marine protected area management in the Pacific and Caribbean regions is not satisfactory.²²²

Overall, the current situation is that there is little capacity for environmental officials to effectively manage the marine coastal ecosystems, particularly within the Municipalities, which are responsible for the administration of natural resources within their jurisdictions as established by the Guatemalan Municipal Code and the Guatemalan Decentralization Act (Decree 14-2002). Equally critical has been the lack of inter-institutional and inter-sectorial coordination in developing national and local policies and programs for the

²²⁰ PNUMA. *Análisis de vacíos y omisiones para el Pacífico de Guatemala*, at: http://www.pnuma.org/agua-miaac/SUBREGIONAL%20MESO/MATERIAL%20ADICIONAL/BIBLIOGRAFIA-WEBGRAFIA/Modulo%201%20MIAAC%20en%20el%20contexto%20de%20gestion%20para%20D/S/Analisis%20de%20Vacios/Doc%202.%20Analisis_Vacios_Marino-Costero.pdf

²²¹ For more information about the CBD, refer to: <http://www.cbd.int>

²²² MARN. Internal document, 2011

protection and sustainable use of marine coastal ecosystems. For example, activities of the agriculture and fishing sectors, which are under the supervision of the Fish and Aquaculture Management Direction²²³ in the Guatemalan Ministry of Farming, Livestock, and Food (hereinafter: MAGA),²²⁴ are usually carried out without any consideration given to their environmental impacts. MAGA, through the Guatemalan National Bureau of Land Reserves (hereinafter: OCRET),²²⁵ is the entity charged with the administration of Territorial Reserves of the State of Guatemala (the 3 km. land belt along the coastline); and, implements programs and activities for the development of these areas with little coordination of environmental authorities (e.g. MARN and CONAP).

One of the issues that need to be addressed immediately is the lack of protection of marine coastal biodiversity and the loss and degradation of marine coastal ecosystems. Although marine-protected areas are considered by the Government of Guatemala as essential for the protection of marine coastal biodiversity, only six marine protected areas exist in the country, and they are insufficient to meet national conservation needs.²²⁶

The current marine protected areas also lack proper management and are underfunded. Specific data on the marine protected areas finances are not available; however, the financial gap to cover the basic management costs of all of the protected areas administered by CONAP is around \$7.8 million USD per year, and available funding is projected to be \$7.6 million USD per year for the 2012-2017 year periods.²²⁷

The long term solution to the multiple threats, including climate change, facing the marine coastal biodiversity of Guatemala depends on its effective

²²³ For more information about the Fish and Aquaculture Management Direction, refer to: http://portal.maga.gob.gt/portal/page/portal/uc_unr/NORMAS%20Y%20PROCEDIMIENTOS

²²⁴ For more information about MAGA, refer to: <http://www2.maga.gob.gt>

²²⁵ For more information about OCRET, refer to: <http://ocretgt.org/perfil.php?PHPSESSID=5f36d01c4939813d7ee9274df0529342>

²²⁶ For more information about the Guatemalan Protected Areas or the CONAP, refer to:

<http://www.conap.gob.gt/>

²²⁷ MARN. Internal document, 2011

protection through marine protected areas and the promotion of their sustainable use supported by a strengthened legal and institutional framework, improved skills of environmental officials to monitor and mitigate threats to biodiversity, improved marine protected areas management effectiveness; and, collaborative efforts between key Government and non-Government stakeholders.

This could result in the recovery of important ecosystem services, such as their capacity to oxygenate coastal waters, serve as nurseries, helping restore fish stocks, or shelter the shoreline from storms and extreme weather events.

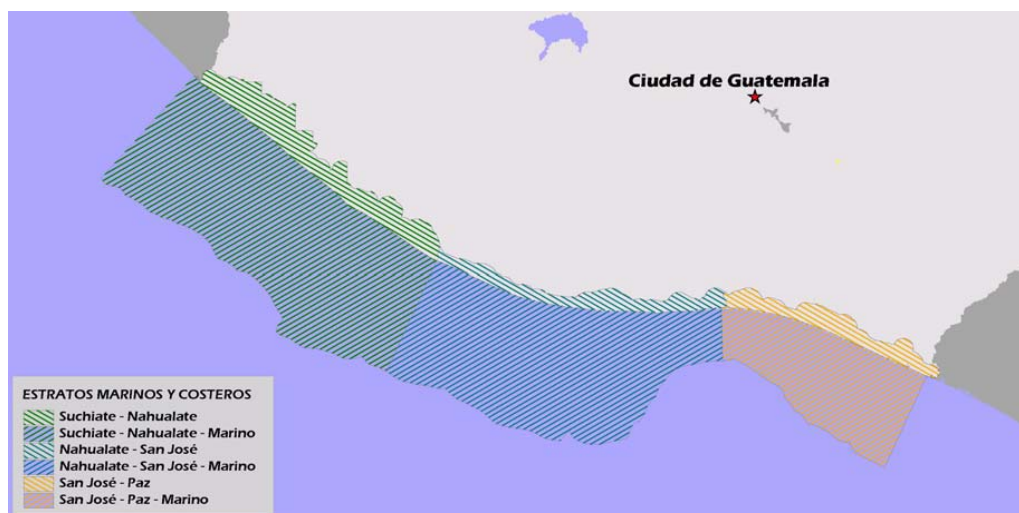
At the same time, by stopping the loss and degradation we would rebuild an important natural carbon sink, thereby contributing to mitigating CO₂ emissions and, hence, climate change.²²⁸

A Conservation Strategy will permit the Government of Guatemala to establish new marine protected areas in the Pacific region, area shown in Figure 8, to increase marine ecosystem representativeness within the SIGAP; and, push forward the establishment of a network of marine protected areas by the year 2012, in accordance with the guidelines of the COP 7 of the CBD.²²⁹

²²⁸ Hemminga, M.A., and C.M. Duarte. *Seagrass Ecology*, 2000

²²⁹ For more information about the CDB COP 7, refer to: <http://www.cbd.int/cop>

Figure 8: Marine and Coastal Stratum in the Guatemalan Pacific Zone²³⁰



However, there are some barriers that prevent the conservation and sustainable use of biodiversity in marine protected areas in Guatemala, which are shown in Table 3 below.²³¹

Table 3. Guatemalan Marine Protected Areas barriers

<p>Deficient legal and institutional framework for the conservation of biodiversity in marine coastal areas</p>	<p>A principal barrier to the effective protection of marine coastal biodiversity through marine protected areas and the promotion of their sustainable use is the lack of a legal and institutional framework that facilitates the coordinated development of conservation efforts among the various State agencies (e.g., MARN, CONAP and MAGA), Municipal Governments and the productive sectors (e.g. fishing, energy and maritime ports/transportation). Equally important is the lack of legal clarity regarding authority over protection and management that prevents effectively addressing the threats to marine coastal biodiversity, particularly unsustainable fishing practices, contamination of coastal and</p>
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²³⁰ PNUMA. *Análisis de vacíos y omisiones para el Pacífico de Guatemala*, at: http://www.pnuma.org/agua-miaac/SUBREGIONAL%20MESO/MATERIAL%20ADICIONAL/BIBLIOGRAFIA-WEBGRAFIA/Modulo%201%20MIAAC%20en%20el%20contexto%20de%20gestion%20para%20D/S/Analisis%20de%20Vacios/Doc%202.%20Analisis_Vacios_Marino-Costero.pdf

²³¹ MARN. Internal document, 2011

	marine waters, loss of habitat and climate change impact.
<p>Limited capacity of marine protected areas officials, local environmental authorities; and, private sectors to counteract existing threats to biodiversity</p>	<p>The protection of marine coastal biodiversity is also limited by the lack of skills by marine protected areas and local environmental authorities to develop effective planning and management of marine coastal areas; to monitor impacts on marine protected areas and biodiversity from coastal development; to implement measures that will allow to strengthen the resilience of marine protected areas and ecosystems to the impacts of climate change; to develop financial plans for the optimization of conservation based investments; and, to implement effective strategies for monitoring and control. In addition, there is limited capacity among SIGAP officials to effectively manage the marine protected areas, including development of management plans, administration, and development of financial strategies (e.g., business plans and mechanisms for revenue generation and reinvestment), that are necessary to achieve sustainability. Existing marine protected areas have not been established using ecological criteria and a great disparity exists in the coverage of coastal areas under protection (which have been prioritized), with respect to strictly marine areas. Finally, there is limited knowledge within the fishing sector (commercial and traditional) regarding biodiversity friendly practices.</p>
<p>Deficient standards and tools for the integrated conservation of marine coastal ecosystems</p>	<p>The slow development of marine protected areas in Guatemala has resulted in a lack of mechanisms and tools that promote marine coastal ecosystem protection. Few efforts have been directed towards the establishment of agreements among the authorities and the productive sectors (e.g. energy, maritime ports/transportation and fishing) that permit the use of sustainable and biodiversity friendly practices that would provide benefits for the private sectors as well as for marine coastal biodiversity. Neither have strategies been developed to integrate marine coastal conservation, development needs, income-generating alternatives and food security for local communities; and, to establish conservation partnerships.</p>

SECTION 3. FURTHER ACTIONS AND PROPOSALS

With this overview, what needs to be done is to promote the protection of marine coastal ecosystems and the sustainable use of their goods and services through effectively managed marine protected areas in order to ensure their permanence, while at the same time contributing to improving the economic welfare of the Guatemalan population. These strategies will also help to shelter the shoreline from storms and extreme weather events that are imminent effects of climate change.

The protection and sustainable use of the Guatemalan marine coastal biodiversity of global, national, and local importance can be done by creating new marine protected areas in the Pacific region, expanding the existing ones, by improving marine protected area management effectiveness; and, by increasing marine protective areas revenues.

The development of an Integrated Guatemalan Marine Coastal Management Program is vital. This will be central for a strengthened institutional and regulatory framework for the conservation and sustainable use of marine coastal biodiversity and effective marine protected area management.

The Integrated Guatemalan Marine Coastal Management Program could be developed in a participatory manner so that the key local, regional and national stakeholders of the marine coastal zone of Guatemala (Government and private and civil sectors), contribute to the development of related proposals and guidelines; and, are properly informed about the Management Program goals and strategies.

The reinforcement of existing Guatemalan legislation on fishing (Fisheries Act), coastal land use and development (National Reserves Act – OCRET), and energy and mines (Energy and Mines Act) is essential, so that the conservation and sustainable use of marine coastal biodiversity and support to marine protected area management become important considerations for

the development of activities within those sectors. Reforms to the Fishing Act must include updates to regulations for species of commercial importance so that conservation and socioeconomic objectives are incorporated; including traditional and biodiversity friendly catch methods.

With this, the Guatemalan National Forest Institution's (hereinafter: INAB)²³² Regulation of Mangroves will be strengthened and mechanisms to implement CONAP's Regulation of Mangroves will be defined so that mangroves are effectively protected and adequately managed in order to reverse current trends in mangrove loss and degradation in the Pacific Coast.

It is important to facilitate institutional reform that will strengthen coastal Municipalities by implementing the Strategic Guideline 8.3 of the Guatemalan National Policy for the Integrated Management of Marine Coastal Zones, which promotes institutional building and enhancing inter institutional coordination as part of a national strategy to protect marine coastal ecosystems.²³³

The financial sustainability of marine protected areas could be achieved through the development of business plans for each of the new marine protected areas and for the existing marine protected areas in the Pacific region; with the implementation of an action plan for public-private dialogue to encourage voluntary financial contributions from the private sector to marine protected areas (e.g., maritime transportation, communications and tourism, and by adjusting the coastal land lease rates established through OCRET so that a percentage is redirected to support marine protected area management.

²³² For more information about INAB, refer to: <http://www.inab.gob.gt>

²³³ To see the complete text of the National Policy for the Integrated Management of Marine Coastal Zones, refer to: <http://www.marn.gob.gt/documentos/novedades/pmc.pdf>

SECTION 4. THE EXPECTED RESULTS

This actions combined, will result in a new institutional structure for marine protective areas management and the conservation and sustainable use of marine coastal biodiversity with more clearly defined goals, roles and responsibilities, as well as improved coordination, participation and financing mechanisms, all of these accordingly to the objectives of the Climate Change National Policy and the National Policy for the Integrated Management of Marine Coastal Zones.²³⁴

The proposed actions will enhance the institutional and individual capacities for effective marine protected area management and the conservation and sustainable use of marine coastal biodiversity.

The establishment of most needed Marine Units within the MARN and CONAP will be a way to strengthen their skills to promote marine coastal biodiversity conservation. These units will need to have the staff and funding necessary to cover management basic needs, to be properly equipped, and to have their operational procedures in place.

Funds will also be needed for the development of the management plans for the new marine protected areas in the Guatemalan Pacific region, as well as updating the management plans for the two existing marine protected areas to be expanded, and this will include the development of all technical studies (i.e., biophysical, socioeconomic and legal) related to their creation/expansion.)

These marine protected areas could be supported by monitoring plans designed to assess the status of their biodiversity and that will be integrated into a monitoring and surveillance program to monitor threats to ecosystems

²³⁴ To see the objectives of the Climate Change National Policy and the National Policy for the Integrated Management of Marine Coastal Zones, refer to:
http://www.marn.gob.gt/sub/portal_cambio_climatico/docs/politica_cc.pdf and
<http://www.marn.gob.gt/documentos/novedades/pmc.pdf>

in Guatemala's marine coastal zones (e.g. contamination, unsustainable fishing, unplanned tourism and climate change) and facilitate Government decision making to reduce impacts.

A Monitoring and Surveillance Program will be needed. It could be supervised by the MARN and will have informational nodes in CONAP's headquarters and regional offices; and, in the four coastal Municipalities that will benefit from institutional strengthening actions as part of the implementation of the National Policy for the Integrated Management of Marine Coastal Zones.

The Monitoring System to be developed will facilitate the development of baseline information to determine the status of key species (e.g., sea turtles, the hammerhead shark, the whiptail stingray and the green spiny lobster), which will serve as indicators to evaluate future impacts.

The development of Participatory Resource Use Plans for marine coastal zones (in the Caribbean and in the Pacific), defining the permitted uses and restriction for marine coastal biodiversity and marine protected areas will complement the tools and mechanism that will increase the management effectiveness of the seven existing marine protected areas in Guatemala.

SECTION 5. CAPACITY BUILDING

A Skills-Building Program that will facilitate the delivery of the previously mentioned outputs will also strengthen the capacities of local and national stakeholders. The skills building program could include the training of Government officials (from Municipalities, CONAP, MARN, MAGA, INAB, and the Ministry of Defense/Navy), representatives from the private sector (e.g. energy, agriculture, maritime ports/transportation industries, tourism and urban development), and local communities in marine coastal planning, environmental monitoring, financial planning and the effects of climate change on marine coastal ecosystems, the training of members of fishing federations

and traditional and commercial fishermen in sustainable and biodiversity friendly fishing practices. Training of State officials and non-Government co-administrators of the SIGAP to improve their skills in marine protected area management and the development of business plans should also be put in place.

Finally, a much needed Awareness Program will allow leaders of coastal communities and productive sectors (fishing, tourism, energy, agro-industry, marine transportation, urban development and maritime industry) to become familiar with, and monitor compliance of, environmental policies, rules, and legislation regarding the marine coastal zone and marine protected areas.

The impact of training will be a success since the lack of accurate environmental information regarding these issues is one of the most common problems in all sectors.

The goal is to facilitate synergies between marine protected area authorities and private sectors for the conservation and management of marine coastal ecosystems of Guatemala.

A Pilot Program could facilitate the conservation and management of marine and coastal biodiversity. This program could contemplate cooperation agreements between protected area authorities (CONAP and Municipalities) and the energy, fisheries, and maritime ports/transportation sectors, which will contribute to the conservation and sustainable use of biodiversity in marine protected areas and their surrounding marine coastal ecosystems. A development of a Coast Wide Program for the prevention, reduction and control of land based contamination of marine and coastal ecosystems jointly with Municipalities, local communities, and key private sector groups (oil, maritime transportation agro-industry, tourism, and urban development), will be essential. The program objective will be to promote the responsible use of agro-chemicals, reverse trends in degradation of riparian environments in coastal watersheds; and, also ensure of the proper management of solid and liquid wastes.

The definition of Climate Change Guidelines for strengthening the resilience of marine coastal ecosystems to the impacts of climate change are vital, as well as the development and implementation of Conservation and Sustainable Use Plans for key marine species considering traditional use practices by local communities.

SECTION 6. SUSTAINABLE FISH MANAGEMENT

Stable catches and sizes of selected fisheries species in areas of the Pacific region can be achieved by updating Fishing Management Plans for species of commercial importance to include conservation criteria.

It will also help the creation of communal areas for responsible fishing with support from the Municipal Governments, and by promoting the adoption of appropriate measures from the Food and Agriculture Organization of the United Nations (hereinafter: FAO) Code of Conduct for Responsible Fisheries²³⁵ by the local fishing groups, which may include fishing gear selectivity, protection of the aquatic environment and responsible aquaculture.

And most importantly, these fishing management plans will improve food security for local communities through the development of conservation strategies for key species and ecosystems of local economic importance.

By providing these socioeconomic benefits to the coastal communities, key stakeholders will become active participants in the conservation and sustainable use of marine coastal species and ecosystems of global importance; thereby strengthening their resilience to the impacts of climate changes.

The conservation of 6,725 ha. of mangroves on the Pacific Coast is also imperative. That is why the development of a Participatory Plan for the

²³⁵ For more information about the FAO Code of Conduct for Responsible Fisheries, refer to: <http://www.fao.org/docrep/005/v9878e/v9878e00.htm>

conservation, restoration and sustainable use of the mangroves on the Pacific Coast; and, the implementation of a Pilot Project for participatory conservation and sustainable use of mangroves and the protection of riparian corridors in the Pacific Coast in the Manchón-Huamuchal coastal area is necessary. The pilot project could include incentives to promote conservation and the sustainable use of mangroves. Lessons learned from the pilot project will be available to other local communities to promote the restoration and protection of mangroves and the design of riparian conservation corridors in other regions of the Pacific Coast.

SECTION 7. IMPACT OF CLIMATE CHANGE ON MARINE COASTAL ECOSYSTEMS

Through the establishment of new marine protected areas and the expansion of the existing ones, connectivity between marine coastal ecosystems will be established, providing movement of species between different habitats and thereby serving as temporary refuge in the face of potential climate change events.

The protection of the mangroves will help to mitigate the impacts from storms and hurricanes associated with climate change, through the reduction of their intensity and the prevention of erosion in different coastal zones, with benefits for marine coastal species populations as well as the human populations settled in areas surrounding the mangroves.

Finally, national and municipal level authorities have to be trained in the resilience of ecosystems to climate change to adopt conservation and management strategies to mitigate at the minimum the inevitable climate change effects.

SECTION 8. CURRENT PROJECTS

The MARN is working at the moment in the last details of the project: *Conservation and Sustainable Use of Biodiversity in Coastal and Marine Protected Areas*, with the Global Environmental Facility (hereinafter: GEF).

The GEF project objective is to promote the protection of marine coastal ecosystems and the sustainable use of their goods and services through effectively managed marine protected areas, in order to ensure their permanence, while at the same time contributing to improving the economic welfare of the Guatemalan population.

The GEF project will contribute to increased revenue for protected area systems to meet total expenditures required for management by allowing for an increase in funding from Government and non-Government sources for marine protected areas and revenue generation.

Guatemala's National Policy for the Integrated Management of Marine Coastal Zones defines the objectives and strategies regarding the sustainable use of coastal and marine goods and services in the country.²³⁶ Furthermore, the National Policy for the Integrated Management of Marine Coastal Zones has within its proposed strategies the institutional strengthening and coordination of the Government agencies responsible for the marine coastal zones (e.g. marine protected areas and biodiversity, forests, fisheries, State territorial reserves, control and surveillance, and maritime ports) and the civil sector. This project is consistent with the National Policy for the Integrated Management of Marine Coastal Zones and will contribute to its implementation through the project components. In addition, the GEF project is consistent with the Guatemalan Law of Protected Areas (Decree 4-89

²³⁶ To see the objectives and strategies of the National Policy for the Integrated Management of Marine Coastal Zones, refer to: <http://www.marn.gob.gt/documentos/novedades/pmc.pdf>

modified by Decree 110-96),²³⁷ which establishes that biodiversity is an integral part of the natural patrimony of Guatemalans, and therefore, must be conserved through effectively managed protected areas.

One of the components of the GEF project is aim to facilitate synergies between managed protected areas authorities and private sectors for the conservation and management of marine coastal ecosystems in the Pacific region of Guatemala.

The total GEF project cost is approximately of \$5 million USD with duration of 60 months. The approval is planned by August or September of 2011.

In the Mesoamerican Barrier Reef ecoregion (Guatemalan Caribbean Zone), there is also a project with the GEF Trust Fund, regarding the Conservation and Sustainable Use of the Mesoamerican Barrier Reef System.

The objective of this project was to assist Belize, Guatemala, Honduras and Mexico in managing the Mesoamerican Barrier Reef ecoregion as a shared, regional ecosystem; safeguard biodiversity values and functional integrity, and to create a framework for its sustainable use. The components of the project aimed to support immediate improvements in marine and coastal protected areas, through planning, management, and monitoring efforts; specifically, through the establishment of a marine protected areas data-baseline and monitoring programs; the development of management plans for marine protected areas; the supply of basic equipment and infrastructure for marine protected areas planning; and, a trans-boundary cooperation in policy, protection and management of marine protected areas.

Capacity building for Marine Protected Areas (MPA) in the Mesoamerican Barrier Reef ecoregion management included regional training courses/workshops, namely the Marine Park and Tourism Resource

²³⁷ To see the complete text of the Guatemalan Law of Protected Areas, refer to: http://200.12.63.122/Legislacion/ver_decreto.asp?id=1570 and http://200.12.63.122/Legislacion/ver_decreto.asp?id=908

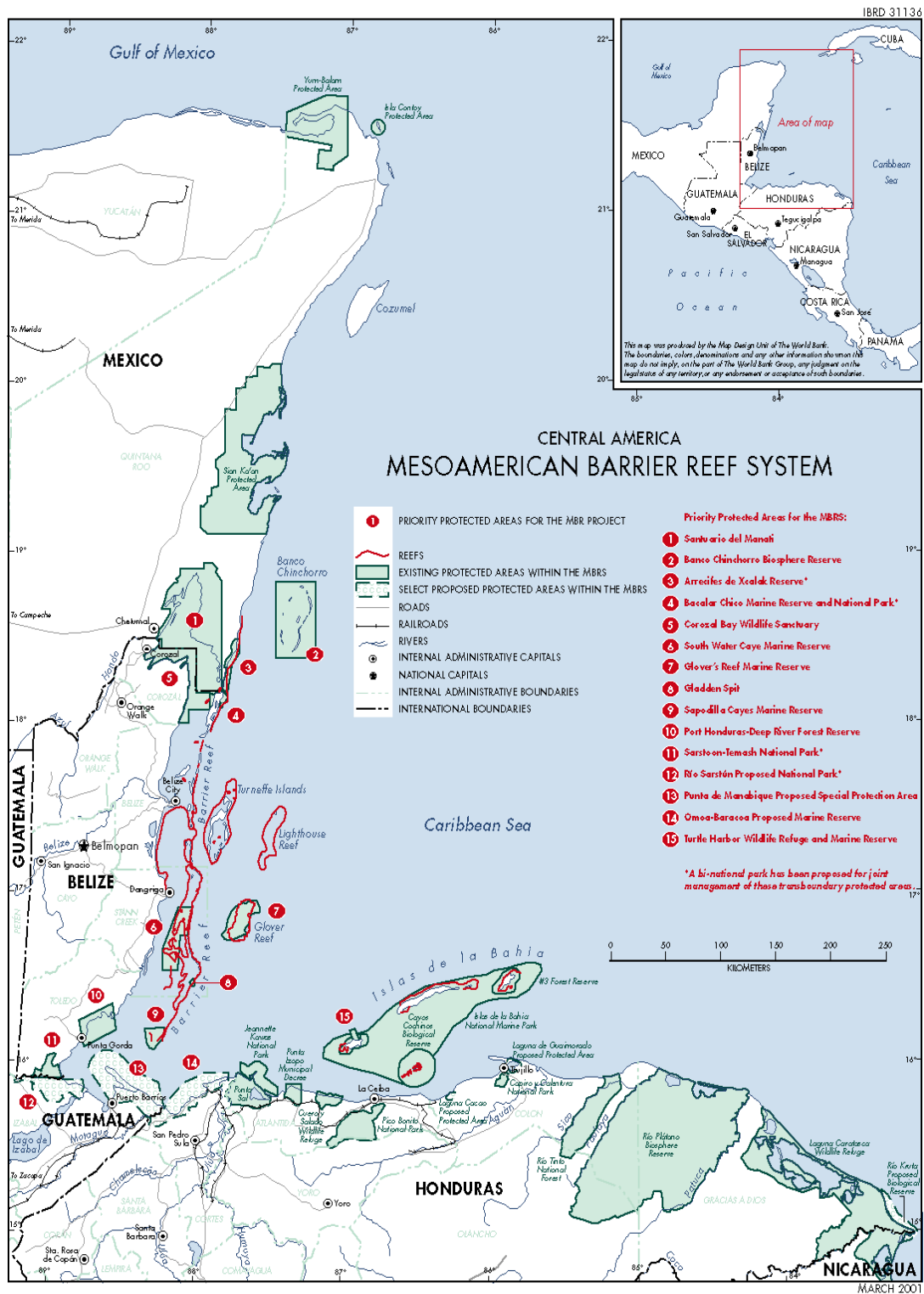
Development Program and Training Library Development, the establishment of a regional environmental monitoring and information system, and the developing of a web-based environmental monitoring and information system, as tools to organize and disseminate environmental data on reefs and ecosystems in the Mesoamerican Barrier Reef ecoregion. Targeted research supported field studies, including water quality flows and the developing of a hydrodynamic surface flow model. One of the objectives was the promotion of sustainable fisheries management through institutional strengthening; and, monitoring, and, to facilitate sustainable coastal/marine tourism, through policy dialogues and a cooperative action forum. Also, the project included the development of public awareness campaigns, that did provide formal/informal education; and, all of this was supported by the coordination of a regional steering committee, a consultative group, and the Program Coordination Unit.

This project in the Mesoamerican Barrier Reef ecoregion, had a duration of six years (2001-2007) and an approximate cost of \$24.2 million USD.

The Millennium Development Goals for this project were to ensure the environmental sustainability and to develop global partnership for development.

The map in Figure 9 shows the areas of the project in México, Belize, Guatemala and Honduras.

Figure 9. Mesoamerican Barrier Reef System²³⁸



²³⁸ Guatemalan Ministry of Environment and Natural Resources –MARN. Internal document, 2011

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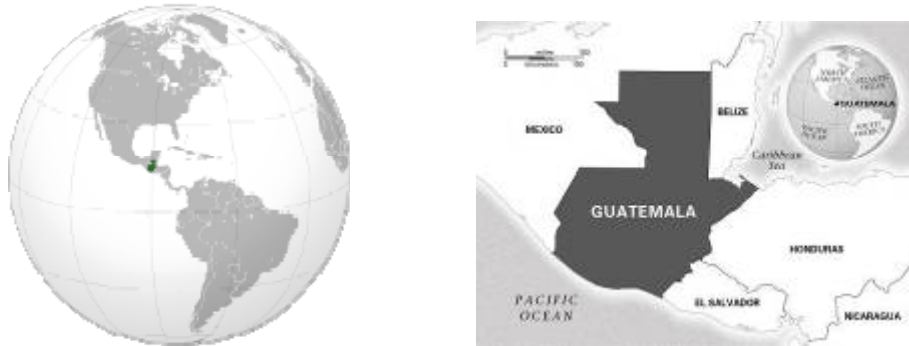
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APPENDIX I – GUATEMALA: COUNTRY OF THE ETERNAL SPRING

Figure 1. Map of Guatemala^{239/240}



Guatemala's background information will be presented in this appendix in order to give context to the research.

People

Guatemala has rich cultural diversity, which predates the arrival of the Spanish conquistadors in the 15th century. Today, Ladinos and European make up more than 60% of the population; most of the rest are Indian, predominantly Maya.

The most important Indian communities in Guatemala are the *K'iche'*: 9%, *Kaqchikel*: 9%, *Mam*: 8% and *Q'eqchi'* 7%.²⁴¹ The dominance of an Indian culture within its interior uplands distinguishes Guatemala from its Central American neighbors.

²³⁹ Wikipedia. File: *Guatemala* (orthographic projection), at: [http://en.wikipedia.org/wiki/File:Guatemala_\(orthographic_projection\).svg](http://en.wikipedia.org/wiki/File:Guatemala_(orthographic_projection).svg)

²⁴⁰ Worldmapfinder. *Map of Guatemala*, at: http://www.worldmapfinder.com/Map_Detail.php?MAP=55331&FN=guatemalamap.jpg&MW=1799&MH=1277&FS=301&FT=jpg&WO=0&CE=4&CO=34&CI=0&IT=0&LC=1&PG=1&CS=utf-8&FU=http://www.peacecorps.gov/wws/educators/lessonplans/graphics/guatemalamap.jpg&SU=http://www.peacecorps.gov/wws/educators/lessonplans/lesson.cfm?lpid=442

²⁴¹ There are a number of important sources of information on the socio-cultural make-up of Guatemala including the website of the Ministry of Culture and Sports, at: <http://www.mcd.gob.gt> and the Guatemala Tourism Board (Instituto Guatemalteco de Turismo -INGUAT), at: <http://www.visitguatemala.com/web/index.php?lang=english>

The numbers are accordingly to Whitaker's Almanack 2011. A&C black Publishers Ltd. London; 2010

The origin of the name Guatemala is Indian, but its derivation and meaning are still undetermined. Some hold that the original form was *Quauhtemallan*, indicating an Aztec rather than a Mayan origin, which means “land of trees”.

The country’s contemporary capital, Guatemala City, is a major metropolitan centre and Quetzaltenango in the western highlands has a major concentration of the Indian population. Interestingly, on the basis of cultural traits, the population is divided into two main ethnic groups: Ladinos and Maya, who make up the vast majority of Indians in Guatemala and form several cultures. The Ladinos comprise those of mixed Hispanic-Maya origin. While the Maya account for slightly less than ½ of the country’s total population, they make up about ¾ of the population in the western highland provinces. There are also some Spanish-speaking *Xinca* in southern Guatemala; and more than 15,000 *Garifuna* people of mixed African and Caribbean descent in the north-eastern port towns of Livingston and Puerto Barrios. Their ancestors came to the Central American coast from Caribbean Islands in the 18th century. Ladinos are the more commercially and politically influential group and they make up most of the urban population.²⁴²

Spanish is the official language; nevertheless, there are 20 Mayan languages, creating a social barrier even in the Indian communities.

Miguel Angel Asturias, an international recognized Guatemalan poet and novelist who won the Lenin Peace Prize in 1966 and the Nobel Prize in Literature in 1967 for his vivid literary achievement, deep-rooted in the national traits and traditions of Indian peoples in Guatemala and Latin America.²⁴³ His work is strongly rooted in Guatemalan history, such as his 1946 novel “*El Señor Presidente*” (“The President”), a powerful attack on Guatemala’s military dictatorship.

²⁴² Britannica, Academic Edition. Profile: *Guatemala*, at: <http://www.britannica.com/EBchecked/topic/701217/Guatemala>

²⁴³ For more information about Miguel Angel Asturias refer to: Nobel Prize, the Official Website of the Nobel Prize, at: http://nobelprize.org/nobel_prizes/literature/laureates/1967/asturias-bio.html

Geography and Boundary Issues

Figure 2. Borders of Guatemala²⁴⁴



Guatemala is located in Central America and it is bordered by México to the north and west, the Pacific Ocean to the southwest, Belize to the northeast, the Caribbean Sea to the east and Honduras and El Salvador to the southeast. In terms of geographical size and population, it is relatively small country with an area of 109,117 sq km. and with a relatively large population, which is currently estimated at 14,377,000 people (2010 estimate).²⁴⁵

The longstanding territorial *differendum* between Guatemala and Belize dates back to the 1800. The position of Guatemala is that it inherited territorial rights of Belize from Spain at the time of its independence. Its present claim to the southern half of Belize and all of its islands (or Cayes) follows its rejection in 1940 of the 1859 “Convention between Her Majesty and the Republic of Guatemala relative to the Boundary of British Honduras.” Article 1 of this treaty defined the borders of the British Settlement in Belize. However,

²⁴⁴ Britannica, Academic Edition. Profile: *Guatemala*, at: <http://www.britannica.com/EBchecked/topic/701217/Guatemala>

²⁴⁵ *Ibid*

Guatemala's Constitution allows for a claim to challenge the entirety of Belize's territory. Although there are claims that Britain reneged on a promise to build a road as part of the treaty, Article 7 states that the two countries would "agree conjointly to use their best endeavours" to establish the easiest communication route from the Atlantic Coast to the Capital of Guatemala. It is these and other claims, upon which the International Court of Justice will be called to judge. When Belize gained its independence from the United Kingdom of Great Britain and Northern Ireland (UK) in September 1981, Guatemala decided not to recognise Belize due to its on-going territorial claim, and as such consular relations were cut with both Belize and the UK. From 1975 successive United Nations resolutions endorsed Belize's right to self-determination, independence and territorial integrity. As relations improved, in September 1991 Guatemala decided to recognise Belize as a sovereign and independent State, while still maintaining its territorial claim. Guatemalan/UK diplomatic relations were resumed in December 1986. Since 2000, Belize and Guatemala have had a series of meetings under the auspices of the Organization of American States (hereinafter: OAS) in an attempt to resolve the dispute through peaceful negotiation. On 8 November 2000, Belize and Guatemala signed an Agreement on Confidence Building Measures, which provided a framework for managing disagreements and preventing incidents in the adjacency zone (a buffer zone extending 1 km. east and west of the border line). In September 2002, two OAS-sponsored facilitators (one each appointed by Belize and Guatemala), presented comprehensive recommendations to both countries on how the dispute could be settled, including some adjustment to the land border and new maritime limits giving Guatemala an EEZ of some 2,000 sq nm. (The Governments of Belize and Honduras each agreed to contribute 1,000 sq nm. to this zone.) The OAS Facilitators also recommended establishing a tri-national ecological park covering coastal, insular and maritime areas of Belize, Guatemala and Honduras; and, a substantial internationally financed Development Trust Fund. Although the Belize Government publicly supported these OAS recommendations, the Guatemalan Government, citing constitutional difficulties, officially informed the OAS in August 2003 that the country could not support them. Both Governments, however, continued to work with the

OAS to secure an agreement. In September 2003, the UK joined the 'Group of Friends' established under the OAS to help resolve the dispute. Following negotiations in New York City in September 2005, Guatemala and Belize signed a Framework for Negotiation and Confidence Building Measures. In November 2007, when regular meetings of both countries under the auspices of the OAS failed to reach agreement on a definitive solution, the OAS Secretary General recommended the dispute should be submitted to an international tribunal, specifically the International Court of Justice for Independent Arbitration. Both countries accepted this recommendation and in December 2008 signed a Special Agreement setting out their agreement to follow the International Court of Justice path. The Special Agreement also set out the rules of engagement for the International Court of Justice case and the questions to be asked at the national referendums (which are required in both countries before the case can be referred to the International Court of Justice).²⁴⁶

In the 66th session of the General Assembly (September 2011,) the Guatemalan President Álvaro Colom reiterated the country's commitment to re-launching the regional integration process of the Central American Integration System. He stated that Guatemala also supported the creation of the Community of Latin American and Caribbean States. In addition, he mentioned that the Guatemalan Government had taken steps to resolve the age-old territorial dispute with Belize by signing a special agreement that would permit both countries to seek a juridical solution through the International Court of Justice. He also said that the Guatemalan Congress had approved the special agreement, which would now be put to a national referendum.²⁴⁷

Guatemala has a Treaty with Mexico on the Delimitation of the Border that dates back to 1882. In this treaty Guatemala renounced for ever the rights, which it deems it had to the territory of the State of Chiapas and its district of

²⁴⁶ Britannica, Academic Edition. Profile: *Belize*, at: <http://www.britannica.com/EBchecked/topic/59500/Belize/276042/Independence>

²⁴⁷ For more information about Colom's statement at the UN General Assembly General Debate of the 66th Session, refer to: <http://gadebate.un.org/66/guatemala>

Soconusco, and consequently, considers that territory an integral part of the United Mexican States. Also, the limits of the new frontier were established in this treaty. In 1961 an exchange of notes between Mexico and Guatemala was made, constituting an agreement on the establishment of an international boundary and water commission.²⁴⁸

Climate

Since Guatemala is located within the tropics and with elevations ranging between sea level and more than 13,000 f. (4,000 m.), it experiences a diversity of climates. Predominantly it is a tropical climate with some geographical variations. Thus, for example below 3,000 f. (900 m.) in elevation the average monthly temperatures range between 70°F and 80°F (21°C and 27°C) throughout the year. This may be contrasted with the highlands where between 3,000 f. and 5,000 f. (900 m. and 1,500 m.) the temperatures range between 60°F and 70°F (16°C and 21°C); and from 6,000 f. to 9,000 f. (1,500 m. to 2,700 m.), they range between 50°F and 60°F (10°C and 16°C). Above 9,000 f. temperatures are marginal for crops, but the grazing of animals is also possible. Near-desert conditions prevail in the middle section of the Motagua River Valley,²⁴⁹ whereas precipitation in excess of 150 inches (3,800 mm) occurs at higher elevations of the Pacific-facing volcanic row and on the north- and east-facing slopes of the sierras. In general, a dry season prevails between November and April. This is tempered however by moisture-laden trade winds from the Caribbean yield rainfall throughout the year on north- and east-facing slopes. An average of 40 to 80 in. (1,000 mm. to 2,000 mm.) of precipitation is received in southern and eastern Guatemala, but this is doubled in areas located nearer the Caribbean shoreline.

²⁴⁸ For more information about the delimitation agreement or the exchange of notes between Guatemala and México, refer to: the Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs website, at: <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/STATEFILES/GTM.htm>

²⁴⁹ For more information about the Motagua River Valley, refer to: http://www.eoearth.org/article/Motagua_Valley_thornscrub

One critical factor in the climate is the occurrence of severe tropical storms, especially during the months of September and October, which often deluge the country with damaging floods. Strong winds accompanying these storms, as well as winter invasions of cold air, occasionally place crops at risk. Hurricane Mitch, one of the deadliest tropical hurricanes ever in the Atlantic Ocean, which brutally struck nearby Honduras and Nicaragua in October 1998, also caused extensive damage in Guatemala, displacing nearly 100,000 people.²⁵⁰

On the positive side, one of the most important things in the country is the rich biodiversity. The country has 14 ecoregions ranging from Mangrove Forests, to both ocean littorals with 5 different ecosystems. Guatemala has 252 listed wetlands, including 5 lakes, 61 lagoons, 100 rivers and 4 swamps. Of international significance is Tikal National Park, declared a National Park on 26 May 1955, having originally been established as a national monument in 1931. Tikal National Park was accepted as a United Nations Educational, Scientific and Cultural Organization (hereinafter: UNESCO) World Heritage site in 1979.²⁵¹ Tikal National Park and *Laguna del Tigre* (a Ramsar site) are located in the department of Petén within the Maya Biosphere Reserve of 2,112,940 ha, making it the second largest forest in Central America after Bosawas (northern part of Nicaragua). Guatemala is world famous for its distinctive fauna with 1,966 known animal species and 7,754 species of vascular plants.²⁵²

²⁵⁰ Britannica, Academic Edition. Profile: *Guatemala*, at:

<http://www.britannica.com/EBchecked/topic/701217/Guatemala>

²⁵¹ For more information about the Tikal National Park in the UNESCO website, refer to:

<http://whc.unesco.org/en/list/64>

²⁵² Accordingly to the USAID, FIPA and EPIQ Guatemala Biodiversity and Tropical Forest Assessment, at: http://www.usaid.gov/gt/docs/tropical_forrest_assesment.pdf

History

There are some excellent sources of academic literature, which address the turbulent history of Guatemala. The origins of the country's history can be tracked back to its origins in the Mayan and Aztec civilisations that flourished in the area until the Spanish conquest in 1523-4, after which the area became a Spanish colony.

Guatemala gained its independence in 1821, and formed part of a Central American Federation of former Spanish provinces from 1823 to 1839. After independence, the country was ruled by a series of dictatorships and military regimes, interspersed with periods of democratic Government. In 1960 a civil war began between military Governments, right-wing vigilantes²⁵³ and left-wing guerrillas that lasted for 36 years and during which over 200,000 people died or disappeared. In 1996 the democratically elected, civilian Government concluded a Peace Agreement with the left-wing Guatemalan Revolutionary National Unity guerrillas that ended the civil war; and, began a process aimed at reducing the size and political influence of the army. This process has been continued by successor Governments and continues today.²⁵⁴

One of the major milestones in the modern history of Guatemala is associated with the struggle of the indigenous Indian community during the war years. This reached international attention when Rigoberta Menchú, a Quiché Maya and an advocate for indigenous people throughout Latin America, was awarded the Nobel Peace Prize in 1992.²⁵⁵

On a similar vein, an independent Human Rights and Truth Commission: Commission for Historical Clarification (*Comisión para el Esclarecimiento*

²⁵³ Meaning of vigilante by the Oxford Dictionaries: "A member of a self-appointed group of citizens who undertake law enforcement in their community without legal authority, typically because the legal agencies are thought to be inadequate", at:

<http://oxforddictionaries.com/definition/vigilante?q=vigilante>

²⁵⁴ Whitaker's Almanack 2011. A&C black Publishers Ltd. London; 2010

²⁵⁵ Britannica, Academic Edition. Profile: *Guatemala*, at:

<http://www.britannica.com/EBchecked/topic/701217/Guatemala>

For more information about Menchú's Nobel Peace Prize, refer to: Nobel Prize, the Official Website of the Nobel Prize, at: http://nobelprize.org/nobel_prizes/peace/laureates/1992/tum.html

Histórico) was established on June 23, 1994, as a part of a Peace Agreement between the Guatemalan Government and the Revolutionary National Unity of Guatemala, and the Accord for Firm and Lasting Peace was signed in 1996. In 1999 this Truth Commission found that 93% of human rights abuses during the war had been instigated by the security forces. The total number of people killed was over 200,000, 83% of the victims were Mayan and 17% were Ladinos. In 2000 and 2004 the Guatemalan State formally admitted guilt in several human rights crimes, paying damages to the victims. Regrettably, only a small number of the military personnel found to be responsible for the atrocities have been so far been prosecuted.²⁵⁶

Today, Guatemala is a relatively fragile democracy and a slow political and economic recovery continues into the early 21st century. Elections have been held regularly since 1996, but, because there are many political Parties, which tend to be small and short-lived, convergence on political solutions has been rare. Fear of a military return to power has preoccupied voters in the first years of the 21st century.

Political and Administrative Structures

Guatemala is a constitutional democracy in the European sense. The Political Constitution of the Republic of Guatemala²⁵⁷ adopted in 1986 defines the country as a sovereign democratic republic and divides power among three Governmental branches: legislative, executive and judicial.²⁵⁸ This division of power is common in modern democracies. Legislative power is delegated to a unicameral Congress, whose members are elected to four-year terms through direct, popular suffrage.²⁵⁹ Executive power is vested in the President, who is both the head of Government and the Head of State; and, the Vice President,

²⁵⁶ For more information about the Truth Commission in Guatemala, refer to: United States Institute of Peace, at: <http://www.usip.org/publications/truth-commission-guatemala>

²⁵⁷ To see the complete text of the Political Constitution of the Republic of Guatemala, refer to: <http://www.constitutionnet.org/vl/political-constitution-republic-guatemala>

²⁵⁸ Articles 140 and 141 of the Political Constitution of the Republic of Guatemala

²⁵⁹ Articles 157 of the Political Constitution of the Republic of Guatemala

both of whom are also elected to five-year terms by popular vote.²⁶⁰ Our current President is Álvaro Colom but this may soon change as 2011 is an election year and there are a number of economic and other factors which may bring about political change. The Supreme Court, with at least nine Justices, has jurisdiction over all the Tribunals of the country. The Supreme Court magistrates are elected by Congress for terms of five years.²⁶¹

For administrative purposes, Guatemala is divided into 22 Departments, each headed by a Governor appointed by the President. The Departments in turn are divided into 332 Municipalities, which are governed by Councils presided over by Mayors, elected directly by popular ballot.

Economy

Guatemala is a less-developed country largely dependent upon traditional commercial crops such as coffee, sugar and bananas as the basis of its market economy. Vigorous economic growth during the 1960's and '70's was followed, as in most of Latin America, by national indebtedness and low or negative economic growth rates in the 1980's.²⁶²

While the return of nominal civilian control in the late 1980's helped to improve foreign investment, tourism, and the economy in general, negative trade balances and foreign indebtedness continued to hamper the economy.

In recent years, the Government has attempted to revitalize the economy by fostering the diversification and expansion of non-traditional exports such as cut flowers and snow peas, and by creating free-trade zones and establishing assembly plants to encourage the expansion and decentralization of manufacturing.

²⁶⁰ Articles 182 and 184 of the Political Constitution of the Republic of Guatemala

²⁶¹ Articles 214 and 215 of the Political Constitution of the Republic of Guatemala

²⁶² Britannica, Academic Edition. Profile: *Guatemala*, at:
<http://www.britannica.com/EBchecked/topic/701217/Guatemala>

By the beginning of the 21st Century more than half of the population lived below the poverty line. Similarly to Ireland in the 20th Century, remittances from nationals living abroad accounted for a larger source of foreign income than exports and tourism combined. Although agriculture provides employment for about 2/5 of the workforce, it contributes less than one-fourth of the gross national product (GNP).

Traditional peasant agriculture, focused upon the production of corn, beans and squash for domestic consumption, is concentrated on small farms or *milpas* (temporary forest clearings) in the highlands, but production of these staples has lagged behind population growth. Fortunately, the agricultural resources of Guatemala are rich. Although rugged landscapes prevail in much of the volcanic region,²⁶³ numerous highland basins and the Pacific piedmont and coastal plain provide productive soils for agriculture. The wide range of climates allows for a diversity of crops.

Guatemala has developed into a major world supplier of cardamom which is a spice consisting of whole or ground dried fruit, or seeds. Cardamom has a warm, slightly pungent and highly aromatic flavour somewhat reminiscent of camphor. Cardamom has become a very popular seasoning in South Asian dishes, particularly curries and in Scandinavian pastries.²⁶⁴

Increasingly, peasants who have long produced grains and beans and tended sheep are turning to the production of non-traditional commodities as fruits, vegetables, flowers and ornamental plants, which are destined for export and for rapidly growing urban markets within the country.

Both forest and fishing resources have considerable potential. Forest products are derived primarily from the tropical forests of Petén and the coniferous forests of the highlands. Commercial fishing in the Pacific has developed;

²⁶³ For more information about the Volcanoes of Guatemala, refer to:
<http://www.mayaparadise.com/volcanos/volguatee.htm>

²⁶⁴ Refer to Britannica, Academic Edition. *Cardamom*, at:
<http://www.britannica.com/EBchecked/topic/95404/cardamom>

and, includes a catch of crustaceans, especially shrimp and such fish as tuna, snapper and mackerel, most of the catch is exported.²⁶⁵

Guatemala is a member of three Regional Fisheries Management Organizations (hereinafter: RFMO): The Inter-American Tropical Tuna Commission (hereinafter: IATTC),²⁶⁶ The International Commission for the Conservation of Atlantic Tunas (hereinafter: ICCAT),²⁶⁷ and The International Whaling Commission (hereinafter: IWC).²⁶⁸

In conclusion, it can be seen that Guatemala suffers from a huge imbalance in wealth and a civic structure and that the infrastructure is still recovering from the Civil War. The International Monetary Fund's (IMF) funding and foreign aid have underpinned the Government's economic reforms and stabilisation programmes, but the trade deficit and high levels of corruption and the uncontrollable violence remain a major problem which is undermining the long-term viability of the governance structures.

As previously mentioned, remittances from expatriates, equivalent to about 2/3 of export revenue, are vital to the economy. The overall economic figures are pretty stark. Around 56% of the population lives below the poverty line and nearly half are dependent on agriculture, which contributes 13.2% of the Gross Domestic Product (GDP) and accounts for over 40% of exports. Industry accounts for 25.8% of GDP and the services sector, which includes tourism, for 61% of GDP. The Gross National Income (GNI) is \$36,600 million USD; \$2,680 USD *per capita* (2008 est). The annual average growth of GDP is 0.5% (2009 est). The inflation rate is 2.3% (2009 est). The total external debt is \$7,489 million USD (2009 est).²⁶⁹

²⁶⁵ Refer to Britannica, Academic Edition. Profile: *Guatemala*, at:

<http://www.britannica.com/EBchecked/topic/701217/Guatemala>

²⁶⁶ For more information about the IATTC, refer to IATTC official website, at:

<http://www.iattc.org/HomeENG.htm>

²⁶⁷ For more information about the ICCAT, refer to: <http://www.iccat.org/en>

²⁶⁸ For more information about the IWC, refer to: <http://www.iwcoffice.org>

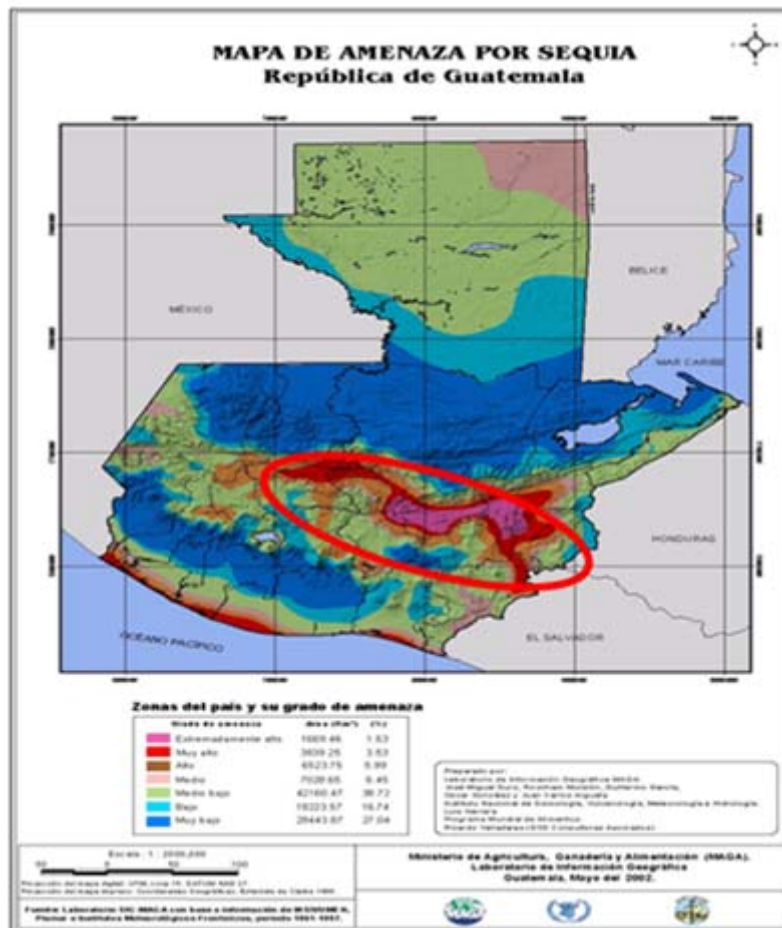
²⁶⁹ Whitaker's Almanack 2011. A&C black Publishers Ltd. London, 2010

In terms of the Oxford Poverty and Human Development Initiative (OPHI) and the Human Development Report Office of the UNDP, Guatemala places at number 116 in the Multidimensional Poverty Index, in the medium human development category.²⁷⁰

²⁷⁰ For more information about the Multidimensional Poverty Index, refer to: Human Development Reports, at: <http://hdr.undp.org/en/statistics/mpi>
To see Guatemala's rank in the Index, refer to:
http://hdr.undp.org/en/media/HDR_2010_EN_Table5_reprint.pdf

APPENDIX II – SUPPLEMENTARY FIGURES/TABLES

Table 1. Map of Drought Treat in Guatemala

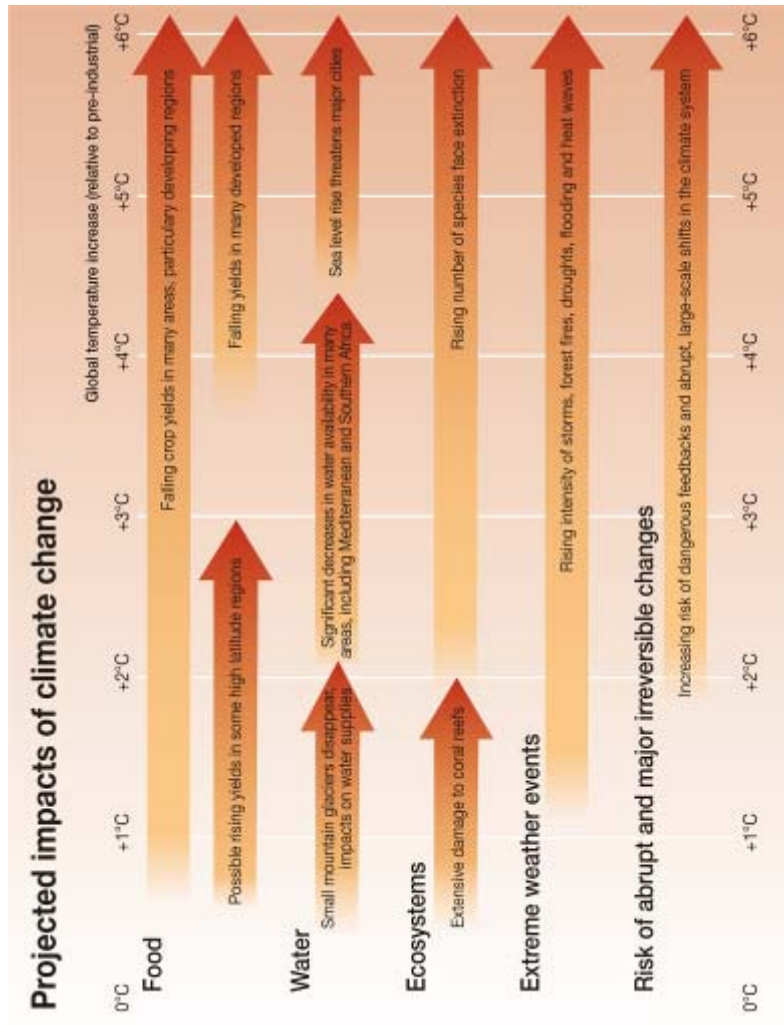


Source: MARN::

<http://www.sia.marn.gob.gt/aplicaciones/MARNIA/indexGIS.html>

Reference: Footnote No 8, pp 12

Figure 1. Projected Impacts of Climate Change



Source: Stern Review, see: <http://maps.grida.no/go/graphic/projected-impact-of-climate-change>

Reference: Footnote No 36, pp 22

Table 2. UNFCCC Annex I and Annex II Countries List

Annex I Countries

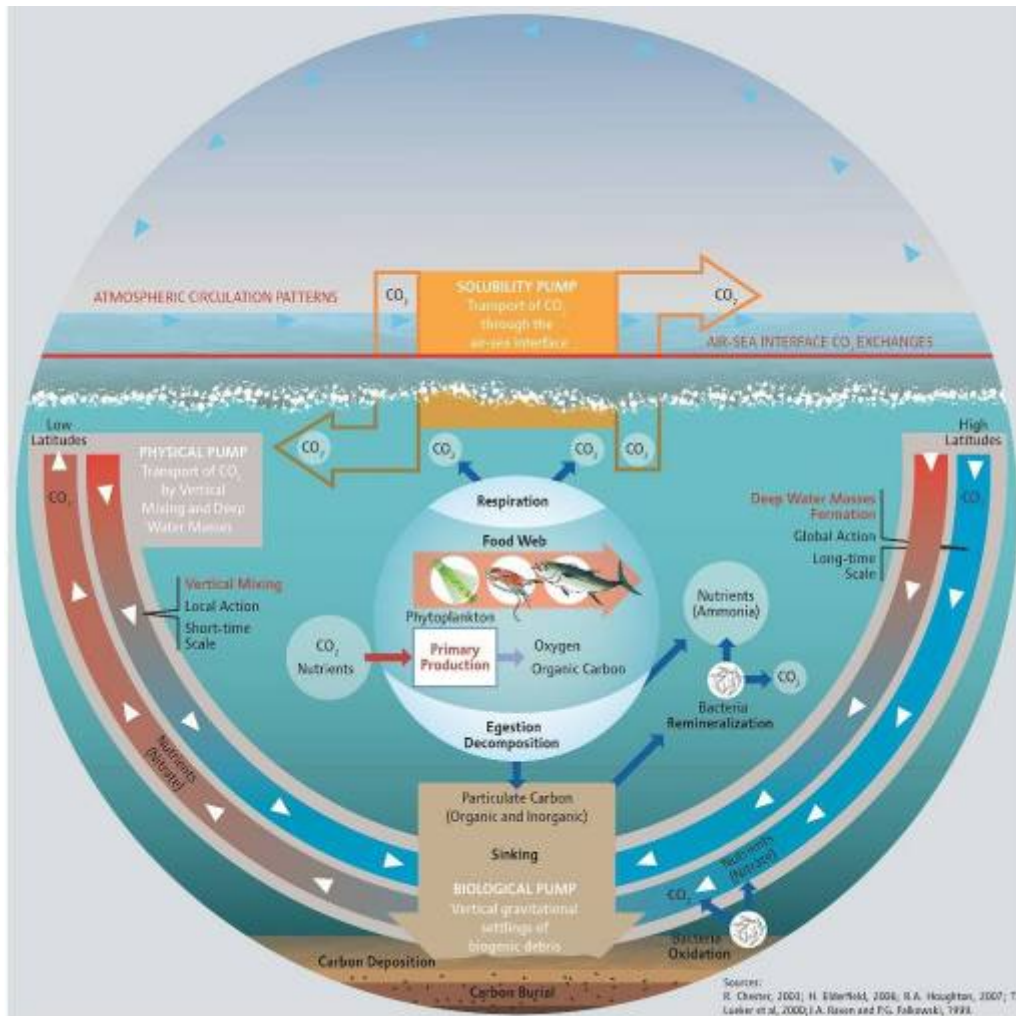
Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States of America and the European Union.

Annex II Countries

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States of America and the European Union.

Reference: Footnote No 48, pp. 28

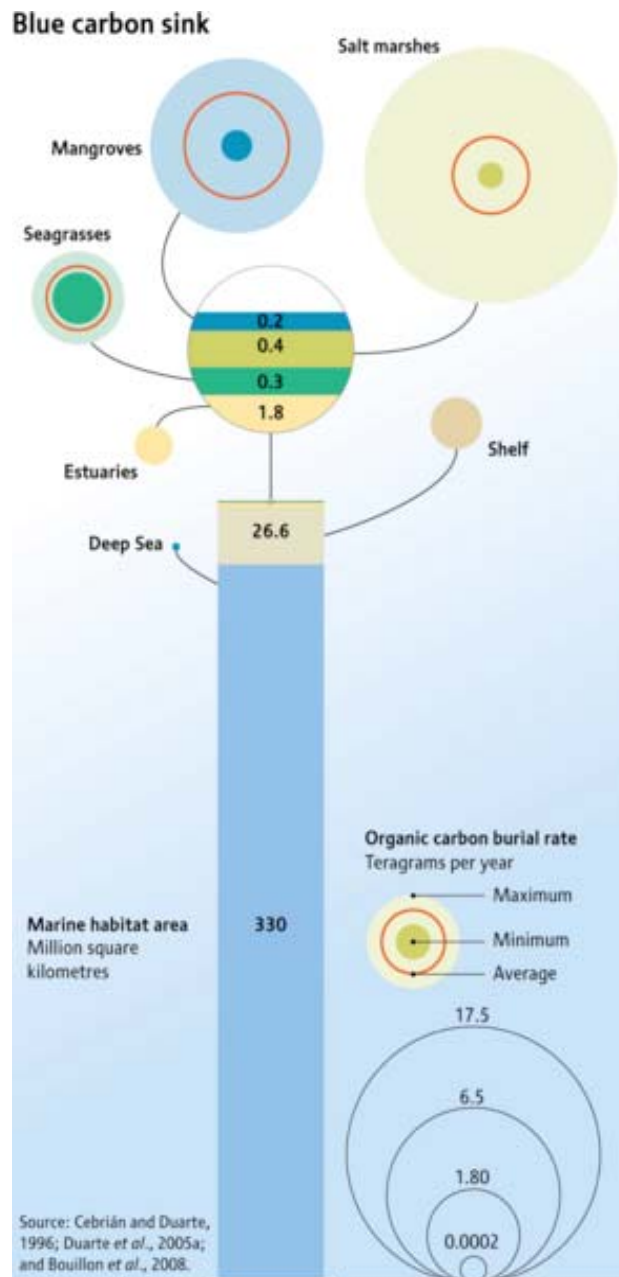
Figure 2. Atmospheric Circulation Patterns



Source: Blue Carbon - The Role of Healthy Oceans in Binding Carbon, see: <http://maps.grida.no/go/graphic/atmospheric-circulation-patterns1>

Reference: Footnote No 66, pp. 34

Figure 3. Blue Carbon Sinks



Source: Blue Carbon - The Role of Healthy Oceans in Binding Carbon, see: <http://maps.grida.no/go/graphic/blue-carbon-sinks>

Reference: Footnote No 74, pp. 37

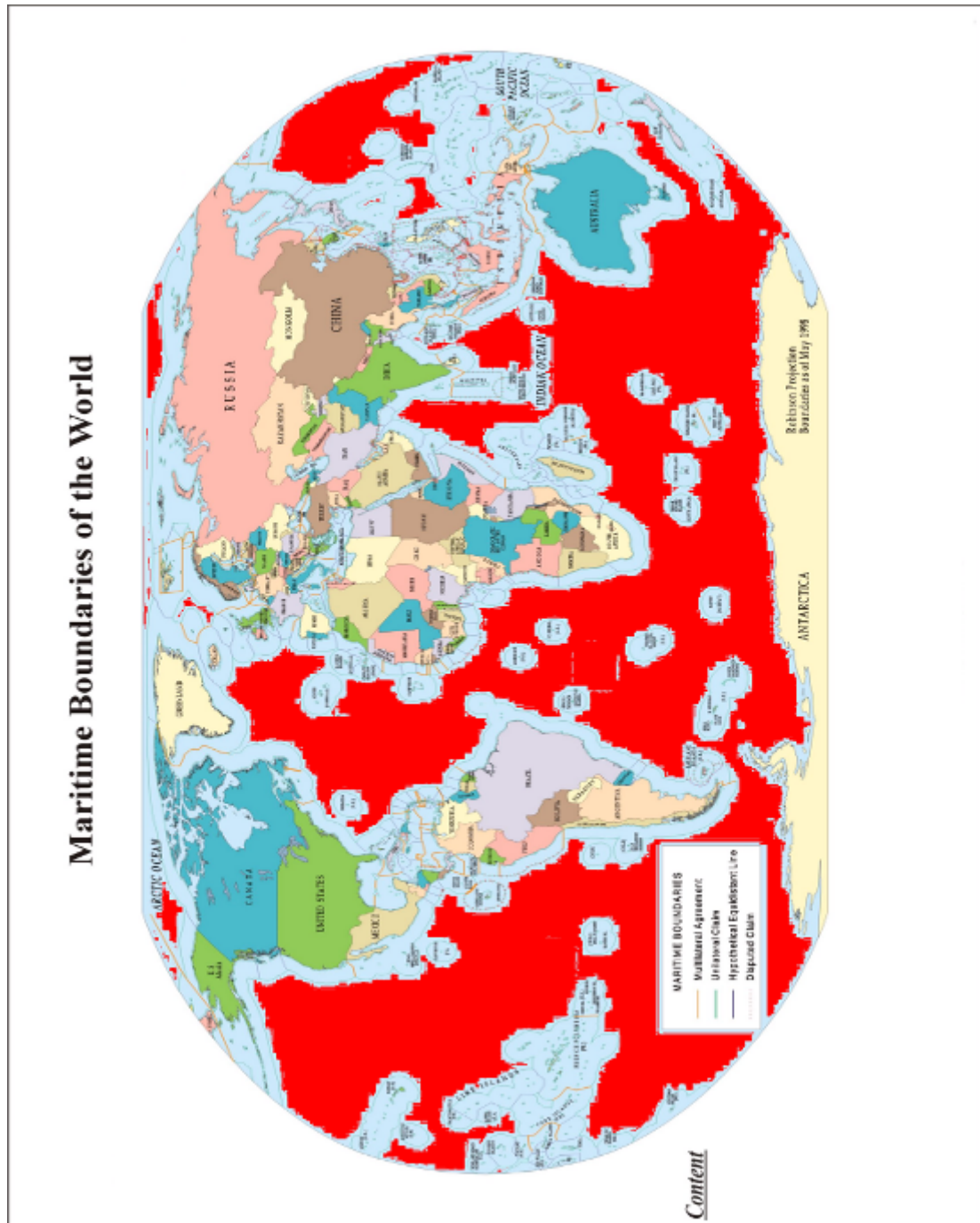
Figure 4. The Carbon Cycle and the Blue Carbon: The Role of Healthy Oceans in Binding Carbon



Source: Blue Carbon - The Role of Healthy Oceans in Binding Carbon, see: <http://maps.grida.no/go/graphic/carbon-cycle1>

Reference: Footnote No 78, pp. 38

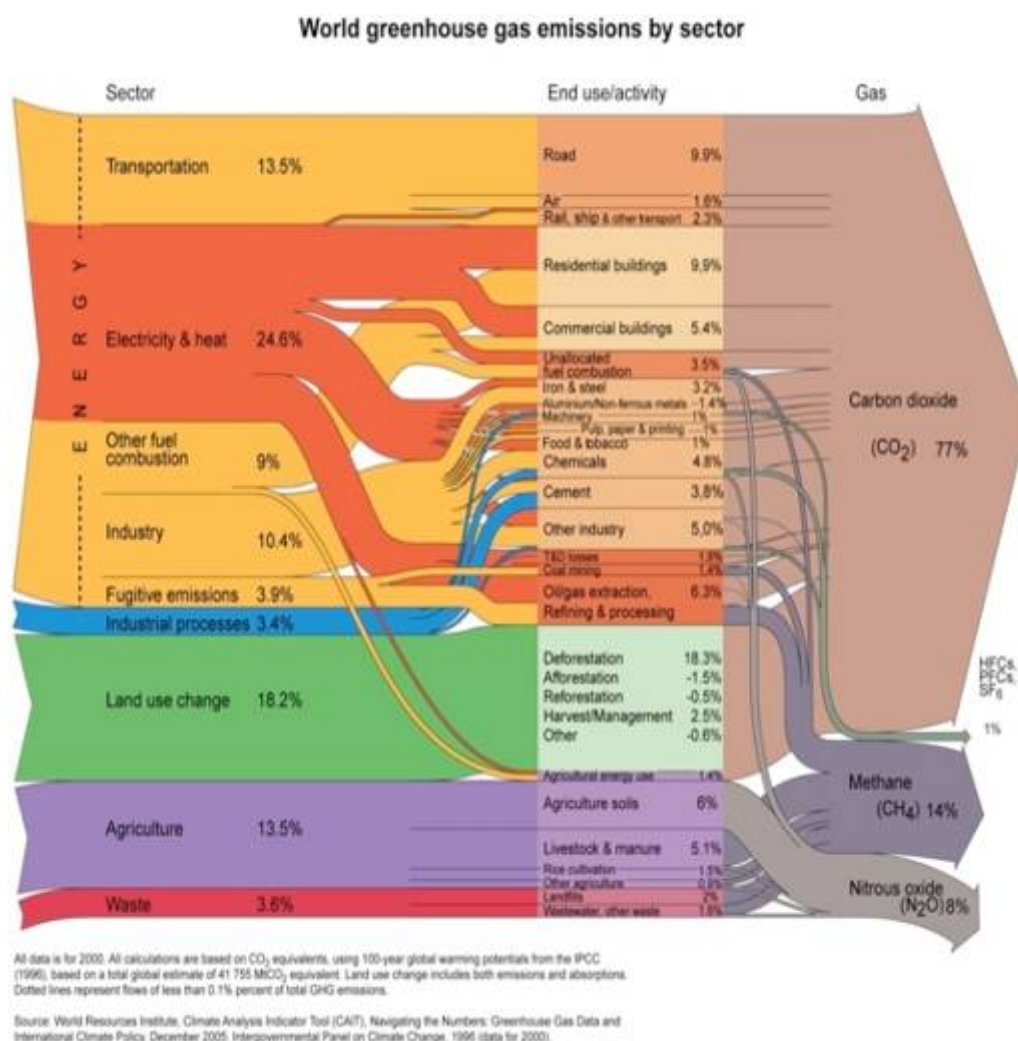
Figure 5. Maritime Boundaries of the World



Source: Dr. Ronán Long, Jean Monnet Chair of European Law, School of Law, National University of Ireland, Galway, Ireland.

Reference: Footnote No 90, pp. 42

Figure 6. World Greenhouse Gas (GHG) Emissions by Sector



Source: Blue Carbon - The Role of Healthy Oceans in Binding Carbon, see: <http://maps.grida.no/go/graphic/world-greenhouse-gas-emissions-by-sector2>

Reference: Footnote No 120, pp. 57

APPENDIX III – CONFERENCE OF THE PARTIES (COP) TO THE UNFCCC

Each of the COPs will now be briefly examined.

COP 1: Berlin, Germany (Berlin Mandate)

March 1995 - At the first COP, several States Parties voiced concerns about the adequacy of countries abilities to meet commitments under the UNFCCC. These were expressed in a United Nations Ministerial Declaration known as the Berlin Mandate, which established a two-year Analytical and Assessment Phase, to negotiate a "comprehensive menu of actions", for countries to pick from and choose future options to address climate change. In particular, countries were to choose those option, which for them, individually, made the most economic and environmental sense. The Berlin Mandate exempted non Annex I countries from additional binding obligations, in keeping with the Principle of Common but Differentiated Responsibilities, established in the UNFCCC even though, collectively, the larger, newly industrializing countries were expected to be the world's largest emitters of GHG emissions over the lifetime of the UNFCCC.²⁷¹

COP 2: Geneva, Switzerland

July 1996 - The United Nations Ministerial Declaration of the COP 2 reflected the position taken by the United States of America as set out in the statement presented by Timothy Wirth, former Under Secretary for Global Affairs for the U.S. State Department at that meeting, which:

- a) Accepted the scientific findings on climate change proffered by the IPCC in its 2nd Assessment (1995);
- b) Rejected uniform "harmonized policies" in favour of flexibility; and
- c) Called for "legally binding mid-term targets".

²⁷¹ For the complete text of the UNFCCC, refer to: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

This was a pragmatic approach and in many ways continues to reflect the concerns of the United States to this day.

COP 3: Kyoto, Japan (Kyoto Protocol to the UNFCCC)²⁷²

December 1997 - As mentioned previously, the Kyoto Protocol on Climate Change was adopted by COP 3 in Kyoto, Japan, after intensive negotiations and compromise on the part of States Parties. Most industrialized nations and some central European economies in transition (Annex II countries) agreed to legally binding reductions in GHG emissions of an average of 6% to 8% below 1990 levels between the years 2008-2012, which was defined as the first emissions budget period. The United States would be required to reduce its total emissions an average of 7% below 1990 levels, however the United States Congress did not ratify the treaty after President Clinton signed. The George Bush administration explicitly rejected the Kyoto Protocol in 2001. Interestingly, the rejection of ratification by the United States Senate Foreign Relations Committee of the Kyoto Protocol is not unusual, in so far as they have failed to ensure the United States ratification of a number of other multilateral treaties such as the 1982 United Nations Convention on the Law of the Sea (UNCLOS).²⁷³

COP 4: Buenos Aires, Argentina (Buenos Aires Plan of Action)²⁷⁴

November 1998 - Many climate change experts expected that the remaining issues unresolved in Kyoto would be finalized at the COP 4. However, the complexity and difficulty of finding agreement on these issues proved insurmountable and Parties agreed an alternative approach by adopting a 2 year Plan of Action, which became known as the Buenos Aires Plan of

²⁷² For the list of COP 3 decisions, refer to:

http://unfccc.int/meetings/kyoto_dec_1997/session/6279/php/view/decisions.php

²⁷³ For the complete text of the UNCLOS, refer to:

http://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf

²⁷⁴ For the list of COP 4 decisions, refer to:

http://unfccc.int/meetings/buenos_aires_nov_1998/session/6278/php/view/decisions.php

Action.²⁷⁵ The focus of this Action Plan was to advance efforts and to devise mechanisms for implementing the Kyoto Protocol to the UNFCCC. Initially, the target was to complete this objective by 2000. During COP 4, Argentina and Kazakhstan expressed their commitment to take on the GHG emissions reduction obligation and they became the first two non Annex countries to do so.

COP 5: Bonn, Germany²⁷⁶

October 1999 - The COP 5 was primarily a technical meeting, and did not reach major conclusions regarding the legal and substantive detail of the blueprint for combating climate change.

COP 6: The Hague, Netherlands²⁷⁷

November 2000 - During COP 6, the discussions evolved rapidly into a high level negotiation over the major political issues. These included a major controversy over the United States proposal to allow credit for carbon "sinks" in forests and agricultural lands, satisfying a major proportion of the United States emissions reductions in this way. Moreover, there was disagreement over consequences for non compliance by countries that did not meet their emission reduction targets; and difficulties in resolving how developing countries could obtain financial assistance to deal with adverse effects of climate change and still meet their obligations to plan for measuring and possibly reducing GHG emissions. In the final hours of COP 6, despite some compromises agreed between the United States and some European Union countries, notably the United Kingdom, the European Union countries as a whole, led by Denmark and Germany, rejected the compromise positions, and the talks in The Hague collapsed. Jan Pronk, the President of COP 6, suspended it without agreement, with the expectation that negotiations would

²⁷⁵ To see the complete text of the Buenos Aires COP Report, refer to: UNFCCC, COP 4, at: <http://unfccc.int/cop4/resource/docs/cop4/16a01.pdf>

²⁷⁶ For the list of COP 5 decisions, refer to: http://unfccc.int/meetings/bonn_oct_1999/session/6276/php/view/decisions.php

²⁷⁷ For the list of COP 6 decisions, refer to: http://unfccc.int/meetings/the_hague_nov_2000/session/6274/php/view/decisions.php

later resume.²⁷⁸ As a follow-on, it was later announced that the COP 6 meetings (termed "COP 6-2") would be resumed in Bonn, Germany in 2001.

COP 6-2: Bonn, Germany²⁷⁹

July 2001 - During COP 6-2 the United States delegation to this meeting declined to participate in the negotiations related to the Kyoto Protocol to the UNFCCC; and, chose to act as observers at that meeting. As the other Parties negotiated the key issues, agreement was reached on most of the major political issues, to the surprise of most observers given the low level of expectations that preceded the meeting.

The agreements included:

- a) Flexible Mechanisms;
- b) Carbon Sinks;
- c) Compliance; and
- d) Financing.

COP 7: Marrakech, Morocco (Marrakech Accords)²⁸⁰

October 2001 - During COP 7 the negotiators completed the work of the Buenos Aires Plan of Action, finalizing most of the operational details and setting the stage for nations to ratify the Kyoto Protocol to the UNFCCC. The completed package of decisions and measures are now commonly known as the Marrakech Accords. In line with their previous position at the UNFCCC, the United States delegation continued to act as an observer, declining to participate in active negotiations. Other Parties continued to express their hope that the United States would re engage in the process at some point, but indicated their intention to seek ratification of the requisite number of countries to bring the Kyoto Protocol into force (55 countries representing 55% of

²⁷⁸ John Hickman & Sarah Bartlett, Berry College. *Global Tragedy of the Commons at COP 6*, refer to: Greens.org, at: <http://www.greens.org/s-r/24/24-26.html>

²⁷⁹ For the list of COP 6-2 decisions, refer to: http://unfccc.int/meetings/bonn_jul_2001/session/6275/php/view/decisions.php

²⁸⁰ For the list of COP 7 decisions, refer to: http://unfccc.int/meetings/marrakech_oct_2001/session/6273/php/view/decisions.php

developed country emissions of CO₂ in 1990). A target date for bringing the Kyoto Protocol into force was put forward, which was the World Summit on Sustainable Development (WSSD) to be held in Johannesburg, South Africa in 2002.

Briefly stated, the main decisions at COP 7 included:

- a) Operational rules for international emissions trading among Parties to the Kyoto Protocol and for the Clean Development (CDM) and Joint Implementation Mechanisms;
- b) A compliance regime that outlined consequences for failure to meet emissions targets but deferred to the Parties to the Kyoto Protocol, once it came into force, the decision on whether those consequences would be legally binding;
- c) Accounting procedures for the flexibility mechanisms; and
- d) A decision to consider at COP 8 how to achieve a review of the adequacy of commitments that might lead to discussions on future commitments by developing countries. This was a major achievement in light of the protracted difficulties that had been encountered previously.

COP 8: New Delhi, India (Delhi Ministerial Declaration)²⁸¹

October 2002 - Again, considerable progress was made at COP 8 in New Delhi, India. More specifically, COP 8 adopted the Delhi Ministerial Declaration²⁸² that, amongst others, called for efforts by developed countries to transfer technology and minimize the impact of climate change on developing countries. It is also approved the New Delhi Work Programme²⁸³ on Article 6 of the UNFCCC.²⁸⁴

²⁸¹ For the list of COP 8 decisions, refer to:

http://unfccc.int/meetings/new_delhi_oct_2002/session/6272/php/view/decisions.php

²⁸² To see the complete text of the Delhi Ministerial Declaration, refer to: UNFCCC, at:

http://unfccc.int/cop8/latest/delhidecl_infprop.pdf

²⁸³ To see the Draft Decision -/CP.16 about the implementation of the amended New Delhi Work Programme on Article 6 of the UNFCCC, refer to: UNFCCC, at:

http://unfccc.int/files/meetings/cop_16/conference_documents/application/pdf/20101204_cop16_cmp_art6.pdf

²⁸⁴ Article 6 of the UNFCCC is about education, training and public awareness

COP 9: Milan, Italy²⁸⁵

December 2003 - There were two major milestones achieved at COP 9 concerning fiscal measures and regarding the timetable for reviewing national reports. The Parties agreed to use the Adaptation Fund established at COP 7 in 2001 primarily in supporting developing countries to better adapt to climate change. The Fund would also be used for capacity building through technology transfer. At COP 9, the Parties also agreed to review the first national reports submitted by 110 non-Annex I countries.

COP 10: Buenos Aires, Argentina²⁸⁶

December 2004 - The COP 10 discussed the progress made since the first Conference of the Parties to the UNFCCC 10 years ago and its future challenges, with special emphasis on climate change mitigation and adaptation. In line with this agenda and with a view to promote the capacity of developing countries to better adapt to climate change, the Buenos Aires Plan of Action was adopted. The Parties also began discussing the Post Kyoto mechanism on how to allocate emission reduction obligation following 2012, when the first commitment period ends.

COP 11/ CMP 1: Montreal, Canada (Montreal Action Plan)²⁸⁷

November 2005 - The COP 11 was also the first Meeting of the Parties to the Kyoto Protocol (CMP) since their initial meeting in Kyoto in 1997. In contrast to previous meetings, it was one of the largest intergovernmental conferences on climate change ever. The event marked the entry into force of the Kyoto Protocol to the UNFCCC. The Montreal Action Plan is an agreement which was agreed at the end of the conference with the purpose of extending the life

²⁸⁵ For the list of COP 9 decisions, refer to:

http://unfccc.int/meetings/milan_dec_2003/session/6271/php/view/decisions.php

²⁸⁶ For the list of COP 10 decisions, refer to:

http://unfccc.int/meetings/buenos_aires_dec_2004/session/6270/php/view/decisions.php

²⁸⁷ For the list of COP 11 decisions, refer to:

http://unfccc.int/meetings/montreal_nov_2005/session/6269/php/view/decisions.php

of the Kyoto Protocol beyond its 2012 expiration date and with a view to negotiating deeper cuts in GHG emissions.

COP 12/ CMP 2: Nairobi, Kenya²⁸⁸

November 2006 - In the COP 12/CMP 2 some progress was made in the areas of support for developing countries and the Clean Development Mechanism (CDM). The Parties adopted a five year plan of work to support climate change adaptation by developing countries; and, agreed on the procedures and modalities for the Adaptation Fund. They also agreed to improve the projects for CDM. As an aside it should also be mentioned that at this meeting, the phrase “climate tourists” was first coined by the Non-Governmental Organizations (NGO) to describe some delegates who attended the conference as mere tourist instead of working at the summit.

COP 13/ CMP 3: Bali, Indonesia (Bali Action Plan)²⁸⁹

December 2007 - COP 13 had a very high political and media profile. The COP 13/CMP 3 agreement, on a timeline and structured negotiation on the post 2012 framework, the end of the first commitment period of the Kyoto Protocol to the UNFCCC, was achieved with the adoption of the Bali Action Plan. The Ad Hoc Working Group on Long term Cooperative Action under the UNFCCC (AWG-LCA) was established as a new subsidiary body to conduct the negotiations aimed at urgently enhancing the implementation of the UNFCCC up to and beyond 2012.

COP 14/CMP 4: Poznan, Poland²⁹⁰

December 2008 - In the COP 14/CMP 4 delegates agreed on principles for the financing of a fund to help the poorest nations cope with the effects of

²⁸⁸ For the list of COP 12 decisions, refer to:

http://unfccc.int/meetings/nairobi_nov_2006/session/6267/php/view/decisions.php

²⁸⁹ For the list of COP 13 decisions, refer to:

http://unfccc.int/meetings/bali_dec_2007/session/6265/php/view/decisions.php

²⁹⁰ For the list of COP 14 decisions, refer to:

http://unfccc.int/meetings/poznan_dec_2008/session/6264/php/view/decisions.php

climate change and they approved a mechanism to incorporate forest protection into the efforts of the international community to combat climate change.

COP 15/CMP 5: Copenhagen, Denmark (Copenhagen Accord)²⁹¹

December 2009 - Since the end of the first commitment period of the Kyoto Protocol to the UNFCCC was eminent, the last two COPs, COP 15 in Copenhagen, Denmark and COP 16 in Cancún, México were closely followed by the media and the international community. The public imagination was captured by the “Seal the Deal” campaign. The United Nations “Seal the Deal” campaign urged countries to stimulate political will and public support for reaching a comprehensive global climate agreement in Copenhagen.²⁹² The overall goal for COP 15/CMP 5 was to establish an ambitious global climate agreement for the period from 2012 when the first commitment period under the Kyoto Protocol expires. The final result was a little bit disappointing to everyone. After disagreement over the Danish Text²⁹³ produced by the Conference Chair, Danish Prime Minister Lars Rasmussen, and an unexpected last minute agreement between large states, the final result was the Copenhagen Accord,²⁹⁴ which was “noted” by the COP 15. This Accord was not legally binding for the Parties because it was not a consensus decision. The negotiations on extending the Kyoto Protocol had unresolved issues as did the negotiations on a framework for long term cooperative action.

²⁹¹ For the list of COP 15 decisions, refer to:

http://unfccc.int/meetings/copenhagen_dec_2009/session/6262/php/view/decisions.php

²⁹² For more information about the Seal the Deal campaign, refer to: <http://www.sealthedeal2009.org>

²⁹³ To read news about the Danish Text, refer to: BBC News, at:

<http://news.bbc.co.uk/2/hi/science/nature/8402502.stm>

²⁹⁴ Decision 2/CP.15, at: <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf#page=4>

COP 16/CM 6: Cancún, México²⁹⁵

November 2010 - In the COP 16 in Cancún, the three-page “Accord” from Copenhagen became a thirty-page document²⁹⁶ that reiterated and expanded on what was agreed the year before in Denmark and also gave it legal status. Nonetheless, there was no agreement on a long term emission reduction target or a peak year for global emissions. There was also little progress on a successor to the Kyoto Protocol to the UNFCCC. So, to make a long story short, if no significant progress is made in the next COP 17 in Durban, South Africa in November 2011, the result could be that the Kyoto Protocol to the UNFCCC may simply be abandoned in 2012 and the international community can simply not afford such an outcome. With so much invested, so much at stake, and so much more to do, there is no turning back.

²⁹⁵ For the list of COP 16 decisions, refer to:

http://unfccc.int/meetings/cancun_nov_2010/session/6254/php/view/decisions.php

²⁹⁶ Decision 1/CP.16, at: <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2>