2. Literature Review.

2.1 Climate Change.

Climate change has been widely recognized as the challenge of the 21st century. It has gained unprecedented attention in recent years within the scientific community, policy-makers, the media and society in general. Research on climate change is continuously evolving and the amount of information on the subject has increased exponentially.

The quality of information available on causes, effects and consequences of climate change has also increased due to improved studies and wider scientific research: according to Ralph Cicerone, President of the National Academy of Science, "…global warming may be the most carefully and fully studied scientific topic in human history" (p. 30). The level of consensus reached by the scientists around the world is clear on three things: Global warming is happening, it is human-caused and the consequences for inaction could be "disruptive" and "irreversible". (Union of Concerned Scientists [UCS], 2007b)

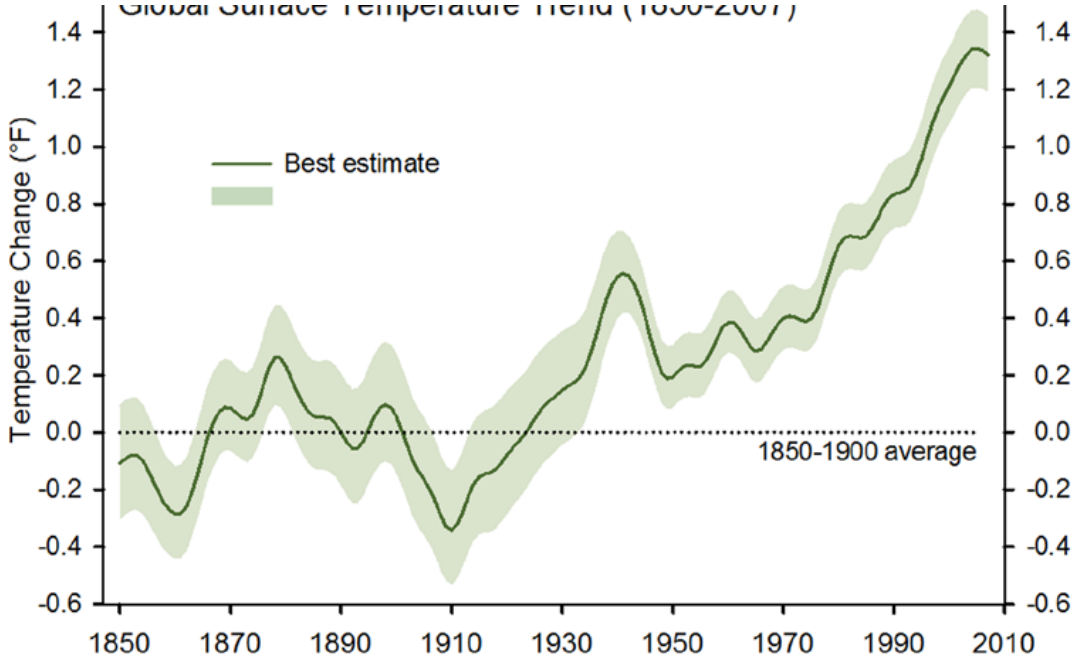
2.1.1 Definition and impact.

The Fourth Assessment Report (AR4) elaborated by the three working groups of the Intergovernmental Panel on Climate Change (IPCC) from the United Nations will be the main base of the climate change analysis for the purpose of this paper. The IPCC is a panel of climate experts that include more than 1,200 scientists in 120 countries. Because of its depth, coverage, and the degree of international cooperation involved in it, the AR4 is the most current authoritative reference on climate change. Released in November, 2007, the publication presents more accurate approximations and probabilities than the former assessment reports.

Climate change is defined by the IPCC (2007a) as "…a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer" (p.30). Climate change is often used as a synonym for the term global warming; however, global warming refers more to the combined results of human-caused greenhouse gas emissions and variations in solar irradiance that lead to the warming of the earth's surface. (Nodvin, 2008)

Scientific evidence shows consistent change in the climate of the earth. The eleven years comprehended in the 1995-2006 period were the hottest in the record of global surface temperature, measured since 1850 (see figure 2.1). Global temperature increased by 0.6°C while it was most likely the hottest century for the northern hemisphere in 1000 years. However a changing climate does not mean higher temperatures only. (Ferrey, 2008; Intergovernmental Panel on Climate Change [IPCC], 2007b)

Figure 2.1 Global Surface Temperature Trend (1850-2007).



Source: Pew Center on Global Climate Change (2008).

Rising sea level naturally driven by thermal expansions, melting glaciers and ice caps, and the polar ice sheets, has increased in average from 1.8mm per year since 1961 to 3.1 from 1993 until today. Snow cover, ice extent and mountain glaciers have significantly declined. Ice extent in the Arctic has eroded since 1978 at a 2.7% rate per decade (7.4% in the summer) (IPCC, 2007b).

While precipitation increased in the eastern North and South America, northern Europe and north and central Asia, it has happened otherwise in the Mediterranean and the southern

parts of Asia and Africa. However, a larger area of the earth has been covered by draught. Cold days, cold nights and frosts have, very likely, decreased in frequency in most parts of the world during the past 50 years. Heat waves and heavy precipitation on the other hand have become more frequent. Warmer sea levels have caused tropical cyclones to become more destructive since 1970, as it is confirmed by longer and more intense storms. (Emanuel, 2005; IPCC, 2007b)

2.1.2 Causes.

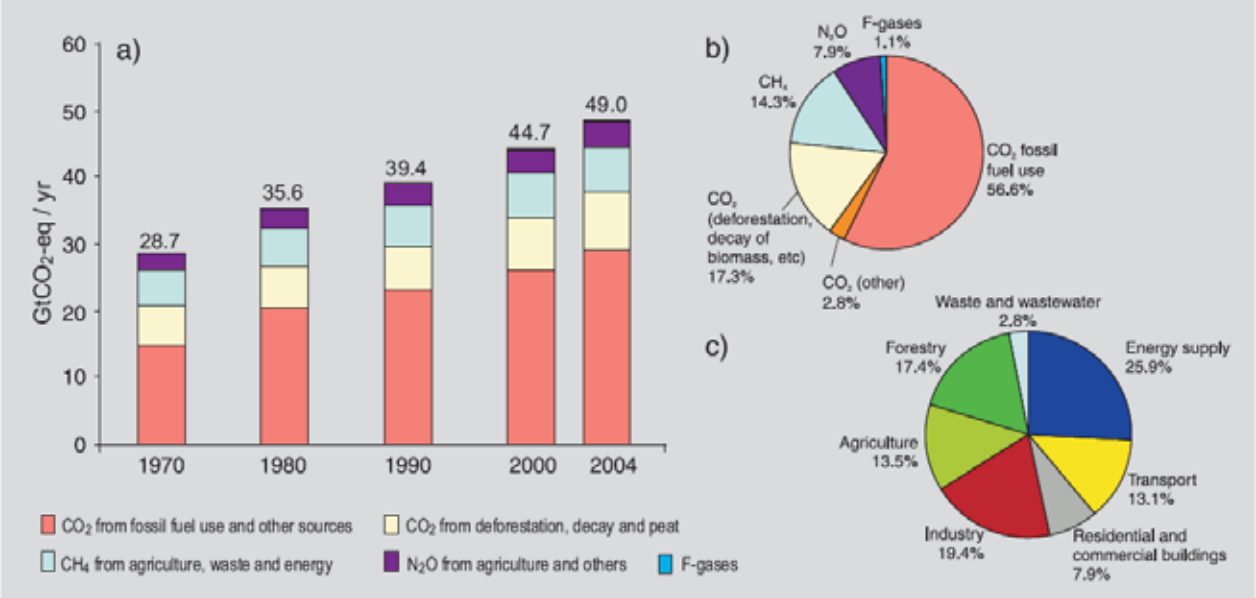
The drivers for climate change can be natural and man-caused. Natural events like volcanic activity and changes in solar radiation influence the earth's climate. Greenhouse gases have a direct impact on the earth's climate: As the sun radiates heat into the earth's atmosphere, some of it is bounced back to space while most of it is absorbed by the greenhouse gases. This phenomenon is known as the greenhouse effect and is part of the earth's natural processes. Without it, temperature in the atmosphere would be around -18°C, and life would not be possible (Pew Center on Global Climate Change, 2008).

However, according to the IPCC (2007b) "global greenhouse gas (GHG) emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004" (p.5). Moreover, concentration of Carbon Dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) has increased substantially due to human activities since 1750. These GHGs, as well as gases like fluorine, chlorine or bromine (also known as halocarbons) are caused by human activities. The link between these emissions and the recent global warming is almost certain: "Most of the observed increase in global average temperatures since the mid-20th century is *very likely* (more than 90% certainty) due to the observed increase in anthropogenic (man-caused) GHG concentrations" (p.5). This human influence has exacerbated the greenhouse effect causing the earth's temperature to rise at unusual levels. (IPCC, 2007b)

Carbon Dioxide's global warming potential is the highest, due to the quantity released, heat radiation properties and residence time in the atmosphere and therefore, it is the most relevant anthropogenic greenhouse gas. CO_2 and CH_4 concentrations for 2005 have been the highest in 650,000 years (IPCC, 2007b). A British Antarctica Survey researcher revealed in a study made by deep ice-drilling in the Antarctica that carbon dioxide levels today are the highest point in 800,000 years. (Amos, 2006; Ferrey, 2008)

Human activities are responsible for the high levels of carbon dioxide in the atmosphere; it is the anthropogenic GHG with highest presence in the atmosphere. As Figure 2.2b shows, CO_2 emissions from fossil fuel use and deforestation accounted for almost 74% of the total GHG concentration.

Figure 2.2 Global Anthropogenic GHG Emissions.



Source: IPCC Fourth Assessment Report (2007a).

(a) Global annual emissions of anthropogenic GHGs from 1970 to 2004. (b) Share of different anthropogenic GHGs in total emissions in 2004 in terms of carbon dioxide equivalents (CO_2-eq). (c) Share of different sectors in total anthropogenic GHG emissions in 2004 in terms of CO_2-eq. (Forestry includes deforestation.)

On human impact-related emissions on climate change, the IPCC (2007b) concluded:

Human influences have:

- *very likely* contributed to sea level rise during the latter half of the 20th century
- *likely* contributed to changes in wind patterns, affecting extra-tropical storm tracks and temperature patterns
- *likely* increased temperatures of extreme hot nights, cold nights and cold days
- *more likely than not* increased risk of heat waves, area affected by drought since the 1970s and frequency of heavy precipitation events.

(IPCC, 2007b, p.6)

2.1.3 Projected Warming and its Impacts.

2.1.3.1 Projected Warming.

"There is high agreement and much evidence that with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades."

(IPCC, 2007b)

The IPCC developed different models with various levels of GHG emissions and their corresponding scenarios in the document called Special Report on Emissions Scenarios (SRES). A general increase in global GHG emissions of 25-90% is projected in the 2000-2030 period. Should current emissions levels continue or increase, it is "very likely" that climate change will be significantly larger in the 21st century than the preceding one. An increase in global temperature of 0.2°C is expected for the next two decades. Even with constant 2000 emission levels, the increase for the same period would be of 0.1°C (IPCC, 2007b).

Under specific scenarios, the changes are more noteworthy. The following projections correspond to the 21st century and are based on levels from 2090-2099 relative to 1980-1999: Under a high emissions scenario, dubbed A1F1 where the world experiences "very rapid economic growth, a global population that peaks in mid-century and rapid introduction of new and more efficient" but still fossil-intensive technologies, projections show increases in temperature of 4°C and in sea level rise of 0.26-0.59m (IPCC, 2007b).

2.1.3.2 Global Impacts.

The impact of such warming scenarios could be devastating in terms of water and food supply, ecosystem and coastal damage and human health. Natural phenomena would increase in quantity and intensity. Access to food and water, more severe climate and increased flooding would change the way people live their daily lives. Additionally to the social and ecological costs, financial costs associated to global warming effects would also prove disastrous.

Semi-arid areas such as the Mediterranean Basin, western United States, southern Africa and the Brazilian northeast would suffer a decrease in water resources. Hundreds of millions would experience water scarcity and draught in mid-latitudes and semi-arid low latitudes (IPCC, 2007b).

Unprecedented coral-reef mortality and species extinction at a rate of 40% could be reached by the end of the century. Rising sea levels could make 30% of the global coastal wetlands disappear affecting millions of people. If migration is considered a serious issue today, it will be aggravated as millions suffer land displacement. A rise of 0.5 meter in sea level would threaten 6 million people in Bangladesh. By mid-century 200 million may be permanently displaced because of rising sea levels, and more intense floods and droughts. (IPCC, 2007b; Stern, 2006)

Subsistence farmers and fishers would feel increased serious negative impacts. Cereal productivity in various regions would fall sharply. By 2020, some African countries could see their crops reduced by up to 50%. This effect would severely increase the already-tragic malnutrition issues in the world's poorest continent. Food security would be also put at risk in most of Latin America as crops and livestock productivity would decrease. (IPCC, 2007b)

Morbidity and mortality from heat waves, floods, malnutrition and infectious, diarrheal and cardio respiratory diseases are expected to worsen, especially in Africa, Asia and Latin America. Tropical cyclones would be more destructive, severely increasing human and financial losses (Emanuel, 2005; IPCC, 2007b).

The global economy could experience hard blows caused by severe changes in the earth's climate. Economic growth is often cited as one of the main reasons, if not the only one, for failing to engage in thorough and significant carbon-emission regulations (e.g. the United States government withdrawal from the Kyoto Protocol); ironically, it is inaction that could hinder economic development during the 21st century.

Economic risks related to international trade range from flooding of international financial hubs and important trade ports like New York, London, Tokyo, Shanghai and Hong Kong to threatened agricultural crops worldwide. Damage to roads and ports would alter transportation and distribution flows. Global prices in agricultural goods would suffer from distortions due to unexpected changes in rain and weather patterns. Countries would experience difficulties with their balance of payments because of decreased exports and increased need for food and other imports. Decreases in productivity and output in general not only threaten agriculture, but also the tourism industry. (Jones, Keen, Norregaard, & Strand, 2007; Stern, 2006)

Lord Stern, a prominent UK economist and academic, released one of the largest and most discussed reports on the economic aspects of climate change, ordered by the British chancellor Gordon Brown in 2006. Stern considers that “climate change is the greatest market failure the world has ever seen…” (p.i). The main conclusion from the Stern Review on the Economics of Climate Change is very clear: the cost of inaction would be far greater than that of mitigation. (Stern, 2006)

According to models employed by Stern in his report, the cost associated with not stabilizing carbon emissions today could represent a reduction of 5-20% of the global Gross Domestic Product annually now and forever (based on the estimate of the costs of climate change for the next two centuries). The upper part of the range corresponds to a broader analysis that includes elements like the economic impact on human health and environment (non-market variables), increased responsiveness from the climate system towards GHG emissions and the reassigning of a more evenly distributed burden that usually affects poor regions more than developed countries. (Stern, 2006)

The situation of poverty would become aggravated by climate change. The social, economic and environmental impacts would not be evenly distributed: The poorest regions and populations will suffer the most for a situation that was caused mainly by the carbon dioxide emitted by the rich countries. Agriculture will be the hardest-hit economic sector by climate change, and it is the one that the vast majority of developing poor countries relies on the most. Low income in such regions will make adaptation very hard and will constrain their accessibility to basic services and healthcare. (Stern, 2006)

Insurance-related financial costs related caused by extreme weather pose serious economic risks. United States hurricanes, typhoons in Japan and European windstorms, could cost up to $27 billion by the 2080s while annual costs for flooding in Europe could top $150 billion on the same decade. Capital requirements by insurer’s would increase by 90% and 80% for hurricanes in the US and typhoons in Japan, respectively. Premium increases related to higher capital costs of losses from windstorms could reach 60% (Asociation of British Insurers, 2005).

2.1.3.2.1 Impacts in New York City.

New York City will be severely affected by global warming. During the second half of the 21st century, the city's general population will see their daily activities completely changed, while the intensive corporate activity will have to adapt to a much rougher environment. The following findings consider a high-emissions scenario.

Temperature would become significantly warmer. During the last 30 years of the 21st century, days per year with temperature over 32°C (90°F) would increase to 70 from only 15 during the 1960-1999 period while days over 37°C (100°F) would increase to 25 from 7 respectively. Such heat waves would put New Yorkers' health severely at risk, like it happened in the summer of 2006 when 46 senior citizens died from strokes (UCS, 2007a).

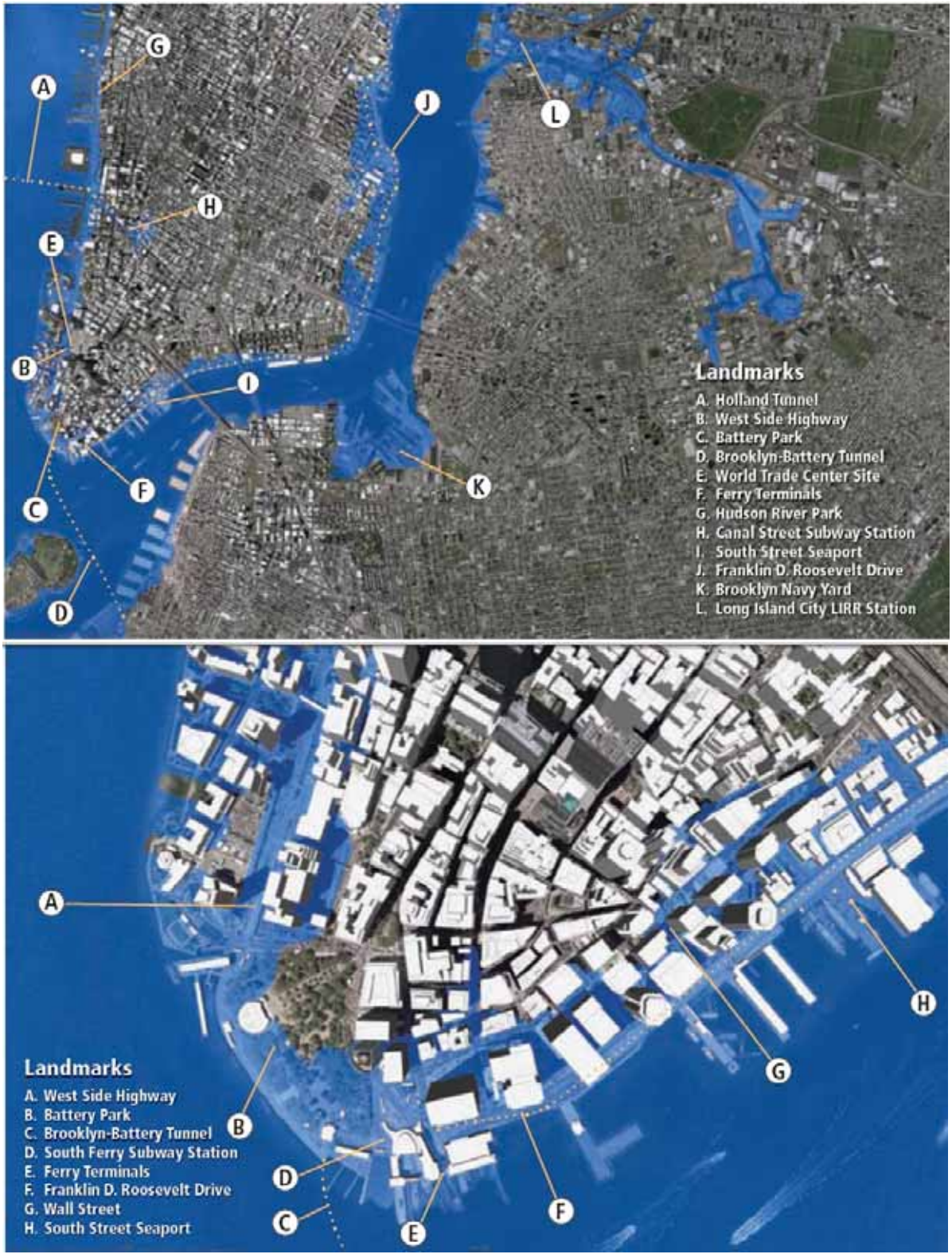
Global warming is also expected to worsen air quality in the city. Days with poor air quality would quadruple by the last quarter of the century. This scenario would increase cases of cardiovascular and respiratory diseases. Asthma cases, currently prevalent in 25% of the infant population in Central Harlem, would boost to deadlier levels. Pollen production would intensify and make longer allergy seasons, leading to increased symptoms (UCS, 2007a).

A significantly different coastline would result from rising sea levels. New York has the most populated coastline in the United States with coastal property insured for up to $1.9 trillion. With the coastline significantly increasing every year, the monetary and infrastructure damages to this highly populated NYC area would soar. (UCS, 2007a)

Fishing and agriculture industries would also be in great danger. The Long Island Sound lobster fishery would be lost by the 2050s. The state's dairy industry and milk supply to the city would be under great constraint as milk production could drop 15% by the end of the century. Yields from crops would decrease significantly and would have to feature more pesticide use, as northward expansion of pests would happen because of increasing summer temperatures. (UCS, 2007a)

New York City experiences a severe coastal flood every century, but under a high emissions scenario, this 100-year flood would happen every 10 years. As Figure 2.3 shows, crucial transportation infrastructure, as well as ports and financial, commercial and residential areas would have be exposed to more regular flooding. (UCS, 2007a)

Figure 2.3 New York City's 100-Year Flood.



Source: UCS Report on Confronting Climate Change in the US Northeast (2007a).

2.1.4 Mitigation.

Stern claims that "the risks of the worst impacts of climate change can be substantially reduced if greenhouse gas levels in the atmosphere can be stabilized between 450 and 550 parts per million (ppm) CO_2 equivalent" (p.vii). The task seems particularly challenging since levels currently are between 385 and 430 ppm and rising 2ppm per year. For such stabilization to be achieved, annual emissions would have to be reduced 80% (from current levels) by 2050. When Lord Stern elaborated his report on the economics of climate change in 2006, he estimated that annual costs of achieving stabilization would be around 1% of global GDP; however, in a recent conference in June 2008, Stern increased his estimate of the cost to 2% of global GDP. This adjustment was due to recent evidence suggesting climate change is happening at a faster pace than initially calculated. (Jowit & Wintour, 2008; Stern, 2006)

The scientific consensus recognizes that just as this projected level of warming is human-induced, its correction or stabilization at least can only be possible with "concerted human intervention". The Royal Society and the IPCC claim that a "lack of full scientific certainty about some aspects of climate change is not a reason for delaying an immediate response that will, at a reasonable cost, prevent dangerous anthropogenic interference with the climate system" (The Royal Society, 2005).

Reduction in global emissions has to be achieved at great scale in order to significantly reverse the impacts of climate change. Incentives to reduce them could be developed in the form of new technology investments, financial encouragement and the creation of a carbon market. The potential for mitigation could increase significantly if efforts are coordinated within the international community through mechanisms like emissions targets, R&D programs, common policy adoption, implementation of development-oriented action and the expansion of financial instruments (IPCC, 2007b). Lord Stern (2006) focuses on four main points that international frameworks for action should include: emissions trading, technology cooperation, action to reduce deforestation and adaption.

The Kyoto Protocol to the United Nations Convention on Climate Change is the most relevant organized effort involving international cooperation. It binds ratifying countries to achieve relevant reductions (at least 5%) of the greenhouse gases CO_2, CH_4 and N20 to 1990 levels by the 2008-2012 period. The protocol seeks to realize the ultimate goal of the convention which is to prevent "dangerous anthropogenic interference with the climate system". Countries are listed as either

Annex I (developed) and Non-Annex I (developing). While Annex I countries are legally committed to the reductions and reporting, Non-Annex I countries are free to embark in projects within the protocol. The protocol creates a carbon market where countries that have surplus of emissions units can sell them to countries that have reached their cap. (European Commission, 2008; United Nations, n.d.)

The importance of the protocol is undeniable as it represents the "stimulation of an array of national policies, and the creation of an international carbon market and new institutional mechanisms that may provide the foundation for future mitigation efforts" (IPCC, 2007). Nevertheless, it falls short from involving the largest individual carbon polluters; China, which in 2006 surpassed the United States as the world's no.1 carbon emitter by 8%, is not bound to reduce its emissions since it is an Non-Annex I country (just like India or Brazil). The United States, now the second largest carbon polluter, and Australia signed but did not ratify the protocol, remaining free from any reduction enforcement. It was until the change of administration in 2007 that Autralia ratified it. (Netherlands Environmental Assessment Agency, n.d.)

People and organizations may contribute significantly to emissions reductions. Although, in broad terms, individual actions by citizens and organizations may seem isolated and irrelevant, they are highly valuable when assessing real collective action. Transportation, industry, building management, recycling, waste management and agriculture should be revamped and the way humans and institutions adopt and promote such changes will be the success drivers of the efforts to deal with the challenge.

2.2 Climate Change and International Business.

The constant and, often times, inherent battle between corporations and environmentalism has drastically changed during the last decades. Companies have gone from being the usual target of environmental activists to organizations that measure, monitor and reduce their pollution levels. The reason behind the shift in attitude usually goes far beyond ethics or morals. The same way information, commerce and markets have been transformed, globalization has also reshaped how companies perceive themselves in a world that is becoming dangerously warmer. As Steven Ferrey (2008) says, “global warming impacts are the side effect” to the manifest globalization of commerce.

2.2.1 Early Antagonism.

Such change of scope did not happen smoothly. A great deal of corporations, mostly related to fossil-fuel burning, tried to deny global warming by exaggerating the lack of full scientific certainty of the link between this activity and global warming . The Global Climate Coalition, a group of 50 companies and organizations was created in 1989 to resist any national policy that would seek any commitment on emissions reductions. The coalition spent millions in a public relations and advertising campaigns that warned of the economic dangers related to cutting greenhouse emissions. It also argued that increased carbon dioxide levels would increase crop production that would consequently help alleviate world hunger. A sharp decline started in 1997 and persisted for 5 years when prominent members like DuPont, British Petroleum, Royal Dutch Shell, Texaco, Ford and DaimlerChrysler started to withdraw because of the negative publicity it attracted. By 2002 the Global Climate Coalition collapsed and has been inactive until today. (Beder, 2000; Claussen, 2001)

Following the Global Climate Coalition, the most relevant effort to question the general scientific conclusion of the link between climate change and human activity, was developed by the oil giant ExxonMobil. A report from the Union of Concerned Scientists (2007b) shows that ExxonMobil, the world’s largest company in terms of revenue, net income and market capitalization, donated from 1998-2005 approximately $16 million to fund studies and researched that created uncertainty about the issue. “In an effort to deceive the public about the reality of global warming, ExxonMobil has underwritten the most sophisticated and most successful disinformation campaign since the tobacco industry misled the public about the scientific evidence linking smoking to lung cancer and heart

disease" (p.1). The similarities between both campaigns' tactics are staggering: uncertainty manufacture, information laundering, promotion of scientific spokespeople that discredited peer-reviewed scientific findings, attempts to distract the attention from action and use of political leverage to influence policy. Even the use (and the eventual disintegration) of institutes that lobbied policy-makers and tried to influence the media through the use of doubtful scientific research, like the Global Climate Coalition and the Tobacco Institute, evidence how analogous both efforts were. A leaked memo from the American Petroleum Institute, of which ExxonMobil is still a member, featured the strategy to be pursued by the group: Provide climate change skeptics with "logistical and moral support", "thereby raising questions about and undercutting the 'prevailing scientific wisdom' (Krugman, 2006)."

Documents from the United States State Department disclosed how the White House considered the firm "among the companies most actively and prominently opposed to binding approaches [like Kyoto] to cut greenhouse gas emissions" (p.28) . Other documents revealed how President George W. Bush thanked ExxonMobil's contribution to his climate policy through a State Department undersecretary, whose note sent to the company read: "POTUS [the President of the United States] rejected Kyoto, in part, based on input from you (p.20)." (UCS, 2007b)

ExxonMobil's stance on climate change prompted worldwide reaction. The Royal Society from Great Britain sent ExxonMobil a letter in September 2006 requesting the firm to stop funding groups responsible for the spread of disinformation regarding global warming. The unprecedented letter also chided the company for its "inaccurate and misleading" statements on the issue. Earlier that same year, economics Nobel recipient Paul Krugman blamed the then CEO Lee Raymond for turning ExxonMobil into an enemy of the planet. (UCS, 2007b)

Although most of the company's funding to the same organizations continues to this day, its position regarding climate change has been modified significantly. In February 2007 ExxonMobil made a historic announcement when Rex W. Tillerson, the firm's CEO appointed in 2006, conceded that greenhouse gases released by cars and industries are factors in global warming (Donnelly, 2007). In its 2007 Corporate Citizen Report, ExxonMobil mentions its achievements in greenhouse gas emissions mitigation and scientific collaboration with the IPCC, once the target of its criticism (ExxonMobil Corporation, 2007). The company's leadership replacement for a less outspoken critic of environmental regulation and increasing pressure from the media and other influential scientists and personalities could explain the sudden shift in policy. The company is

currently trying to portray itself as having a hands-on approach to the global warming challenge and the recent hike in oil prices. It released a costly ad campaign for the summer 2008 featuring its CEO discussing ExxonMobil's commitment to providing energy to the world while caring for the environment and the technological advances the company has embraced to improve energy efficiency. Russell Gold (2008) from the Wall Street Journal claims "Exxon's ads are part of a growing effort by the industry to counter a political backlash against rising oil prices and global-warming worries."

2.2.2 Part of the Solution.

Currently, relevant corporate resistance to admit the scientific consensus on global warming is virtually inexistent. (A notable exception would be General Motors Vice Chairman for Global Product Development Bob Lutz, who personally denies human responsibility in global warming.) The scientific debate, which was "largely an industry disinformation campaign that lasted for 15 years", is now over (p.387). Corporations, which cause most of the "pollution, deforestation and natural resource degradation (p.385)" in the world, have a great potential to become part of the solution to global warming. (Lehner, 2008)

Having recognized the degree of incidence of corporate activity on the environment, the next step in taking part in solving the climate crisis resides in how to calculate such impact. Because of its persistence in the environment, measurability and translatability, carbon dioxide will be "the world-wide environmental currency of this century" by which "corporate responsibility will be measured and accounted for (p. 421)." Globalization is shaping the way the measurement and accountability principles are being upheld. Environmental regulation in the past was often localized and was mainly based on heterogeneous measurements. Corporations' compliance with environmental laws and commitments in the 21st century will be based on universal standards, applicable to their local and global operations. (Ferrey, 2008)

According to Peter Lehner (2008), Executive Director of the Natural Resources Defense Council (NRDC), there are three ways to green a corporation: by greening its operations, its supply chain and the markets it participates on. A firm has control over the first two, while the third one is mostly shaped by external forces like policies or consumer behavior. Calculating a company's carbon footprint (the amount of carbon emissions represented in metric tons of CO_2 caused by its activities) by analyzing and computing its operations and supply chain processes, will enable the setting of reduction targets. Such reductions would be achieved by modifying or replacing the high carbon

activities with ones associated with lower carbon levels. The carbon emissions associated with activities that can't be modified or changed can be compensated with carbon offsets. A carbon offset is a financial instrument that represents the reduction of one metric ton of CO_2 emissions by funding renewable energy projects (solar, wind and waste-based) that produce that carbon equivalent (TerraPass Inc, n.d.). A company can achieve carbon neutrality by eliminating or offsetting the total emissions associated with its activities.

Reducing a company's carbon footprint would significantly reduce its ecological footprint, a more relevant, yet harder to calculate measurement. The United Nations Environment Program (UNEP) defines ecological footprint as "an index of the area of productive land and aquatic ecosystems required to produce the resources used and to assimilate the wastes produced by a defined population at a specified material standard of living, wherever on Earth that land may be located (2008, p. 517)."

The list of companies that have started reducing their operations and supply chain carbon footprint keeps growing at unprecedented levels. Not only have they noticed that reducing energy consumption will help them in terms of marketing; it is also saving them money in terms of energy bills. Google became carbon neutral at the beginning of 2008. The internet company also has one of the largest solar panel installations in the United States that translates into savings of 30% of the total energy consumed at its Mountain View corporate campus in California. Canon's headquarters building in the UK features solar panels that generate up to 35kw, motion sensors for lighting and concrete that absorbs heat for better insulation. Bank of America's recycling program saves more than 200,000 trees a year and its employees receive a $3,000 incentive for buying hybrid cars. Whole Foods Market has bought carbon credits in wind energy that offset 100% of its electricity use. Although it hasn't specified a clear time-frame, Wal-Mart has also committed to power all of its stores with 100% renewable energy. In 2006 Starbucks saved the equivalent of 78,000 trees only by offering recycled-paper sleeves. Sun Microsystems plans to reduce 20% of its carbon emissions by 2012 through the use of cooler and more energy-saving technology in their computer chips as well as implementing a work from home program for thousands of its employees. Panasonic's goal for carbon emissions reductions is 300,000 metric tons of CO_2 by 2010. The unprecedented pressure for "going green" evidently comes from consumers that are demanding more environmental products than ever before. And it is evidently working. (Google Inc, 2008; Hurt III, 2008; Iwata, 2008)

Companies are also going a step further in their environmental commitment by creating C-Level suite sustainability positions. Often given vice-President or chief officer titles, the environmental positions are in charge of keeping companies' operations the most sustainable possible. Apart from the measuring of carbon footprints and setting goals for emissions-reduction, their activities range from analyzing alliances with providers and consumers for product development, to contributing with insight in product research and marketing campaigns. In many cases, sustainability officers have the last word in crucial business decisions. DuPont's chief sustainability officer prevented the firm from acquiring a company whose business was not eco-sustainable. In the case of Hilton Hotels, the job is being performed by the executive vice-President for brands who is committed to reducing the carbon footprint of its 3,000 hotels by setting standards within operations, architecture and suppliers relations. Companies are not only seizing the green hype by realizing isolated projects that appease green customers: they are increasingly interested incorporating sustainability in their business and merging it with efficiency. (Deutsch, 2007)

Environmental responsibility has also inspired corporate activism. In 2007, a group of companies and NGOs joined together to create the United States Climate Action Partnership (USCAP). Its members are requesting congress and the White House a mandatory cap and trade system that would reduce carbon emissions 60-80% of today's levels by 2050. This joint partnership seems rare in nature because of the usual corporate regulation-inspired suspicion. However they are also seeking to have more influence in a regulation that seems imminent. It also seems ironic that some of its members, like DuPont, Chrysler, Ford, General Motors, Shell and British Petroleum, were firms that belonged to USCAP's defunct nemesis: the Global Climate Coalition. (Donnelly, 2007)

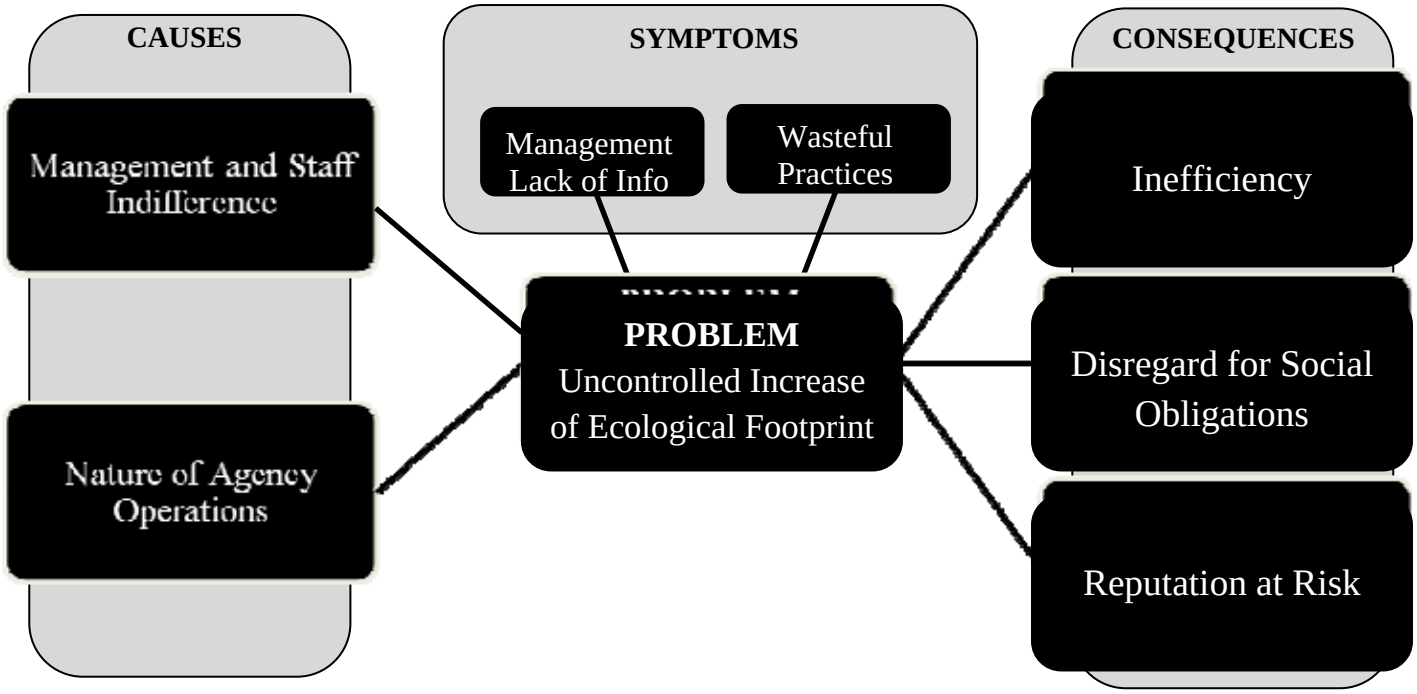
More recently, internet giant Google presented a proposal called Clean Energy 2030 that outlines the path for achieving coal and oil independence within the United States in 22 years. Estimated reductions by 2030 based on 2008 levels feature "fossil fuel-based electricity generation by 88%, vehicle oil consumption by 38%, dependence on imported oil (currently 10 million barrels per day) by 33%, electricity-sector CO_2 emissions by 95%, personal vehicle sector CO_2 emissions by 38% and CO_2 emissions overall by 48%." The costs for this proposal are calculated to be $4.4 trillion (undiscounted dollars) but its savings sum $5.4 trillion, producing $1 trillion of net savings. Google claims that millions of jobs and industries would be created while cutting energy costs individually and nationally. National security would be improved and climate change would aggressively be dealt with. (Greenblatt, 2008)

The so called “green” movement has also prompted certain companies to seize its marketing benefits while failing to offer any substantial environmental advantage. This opportunistic approach, called Greenwash, may eventually backfire. Activist organizations are exposing certain campaigns lacking environmental substance or coherence. General Motors has been exposed by Greenpeace for what it considers a contradictory ad campaign called Gas-Friendly to Gas-Free, which features five ways the company is “greening its fleet”. Greenpeace claims that apart from the inherent incoherence with a manufacturer that still produces “gas-guzzling” SUVs and trucks, the contradiction in GM’s actions go far beyond. The company spent USD $14.56 million in 2007 lobbying the United States congress, the Department of Transportation, the Environmental Protection Agency and the White House to stop mandatory increases in the Corporate Average Fuel Economy standards. Moreover, the company filed a number of lawsuits against state governments that have established carbon caps in CO_2 emissions; ironically, GM joined the USCAP that seeks the exact opposite goal: increasing carbon caps on a national scale. In fact, media criticism to certain USCAP members has increased for the notorious inconsistencies within their individual actions and the group’s mission. Should such media exposure increase, the companies’ reputation as greenwashers could undermine their alleged original intention. (Elgin, 2008; Greenpeace, n.d.)

As evidence of the potential risks that global warming may pose to humanity, societies, organizations and individuals are being faced with the decision of either becoming involved or adopt passiveness towards a global challenge; a challenge that serves as another indicator of how small the world has become. The trend for increasing corporate involvement in tackling the defining business issue of our times is irreversible. Assuming indifference would only evidence a futile attempt to dismiss the inevitable and an attitude of isolation in a world that has never been this connected. Climate change should not cause companies to react with the usual instinctive fear to the advent of regulation and new taxes; it should be viewed as unprecedented opportunity to become part of a promising new economic and social order.

2.3 Problem Reaffirmation.

Figure 2.4 Model for Symptoms, Causes and Consequences of the Identified Problem.



Source: Self-elaborated.

The research presented in the literature review confirms the validity of the problem definition along with the associated symptoms, causes and consequences presented initially. As Ferrey (2008) claims, carbon footprint will be the "meta-environmental measurement of corporate greenness and environmental accountability (p.423)" of the 21st century. Carbon footprint will undoubtedly be the guiding measurement behind any environmental effort in the company; however, reducing the company's ecological footprint should be set as the ultimate goal since some of its pollutant activities are not exclusively carbon emissions generators. In a largely carbon-based global economy, the ecological footprint is directly linked to the carbon footprint and a decrease in the latter results in a decrease for the former as well.