LUISS Guido Carli
LIBERA UNIVERSITÀ INTERNAZIONALE DEGLI STUDI SOCIALI

Department of Political Science

Chair of Political Philosophy

CLIMATE ETHICS: HOW CLIMATE CHANGE AFFECTS THE LEAST WELL-OFF

Supervisor
Prof. Sebastiano Maffettone

Candidate
Chiara Naddeo
076632

Academic Year 2016 – 17

INDEX

INTRODUCTION

On 12 December 2015, 195 nations signed the Paris Agreement and concurred to curtail their greenhouse gas (GHG) emissions in order to halt climate change. Jean-Claude Junker, the president of the European Commission, stated: "Today the world is united in the fight against climate change. Today the world gets a lifeline, a last chance to hand over to future generations a world that is more stable, a healthier planet, fairer societies and more prosperous economies"[1]. The urgent tones of his remark highlight the gravity of the phenomenon, which will bring about irreversible changes to the climate system that will in turn affect the planet and its inhabitants for the worse, unless significant mitigation actions are immediately undertaken at the international level. The Paris Agreement is the last attempt to reach an accord between the world governments after a twenty-five years long debate which officially started in 1992, at the United Nations Conference on Environment and Development. Throughout the years, a series of treaties have been enacted with the purpose of limiting the increase in temperature due to anthropogenic activities, however they all proved to be ineffective and the warming trend kept rising. Even though there is great hope that this last effort will finally decrease the overall amount of GHGs produced by the nations of the world, the agreement has already been criticised because it only envisages voluntary curtailment measures that would still increase emissions even if they were meticulously implemented. Furthermore, on 1 June 2017, the United States – the second GHG emitter in the world – withdrew from the agreement, seriously undermining its success.

The purpose of this dissertation is to evaluate the reasons behind the governments and individuals' failure to face the momentous threat posed by climate change, arguing that the ultimate motivation hinges on the nature of the phenomenon itself. Indeed, other than being a scientific and political challenge, climate change is an ethical issue that the traditional means of problem-solving we usually resort to, namely economic analyses and our value system, are not able to tackle.

The first chapter outlines the features of climate change, its physical nature, the terminology employed to describe it and the international efforts undertaken to

[1] European Commission, "*Historic climate deal in Paris: EU leads global efforts*", accessed September 26, 2017, available at: http://europa.eu/rapid/press-release_IP-15-6308_en.htm

counteract it, from the 1987 Montreal Protocol to the 2016 Paris Agreement. Thereafter, it analyses the causes that impede action, namely scientific uncertainty, the success of the denial industry and the inability of the human nature to recognise and acknowledge the dangers entailed in the structure of our society. It then investigates the efficacy of climate economics, which is not able to produce a reliable cost-benefit analysis because the future effects of climate change are highly unpredictable and by reason of the choice of the social discount rate, which largely falls within the ethical realm. The aim of the second chapter is to illustrate the ethical properties of the climate challenge. First of all, the three main characteristics of the problem – the dispersion of causes and effects, the fragmentation of agency and institutional inadequacy – are described, whereas it is subsequently shown how Rawls' principle of distributive justice has been internationalised and employed as the framework of every environmental agreement. Climate change brings about questions of intergenerational justice, historical responsibility and distribution of the mitigation costs which are all analysed through ethical lenses. The illation is that we need to revise our current value system in that it was established during the Industrial Revolution and thus it is inadequate to face the current situation. The third chapter evaluates the impacts of climate change on the present generation. In fact, even though the future generations will bear the brunt, the world's poor are already suffering the consequences of past emissions, especially women living in developing countries. The Greenhouse Development Rights framework is proposed as the ideal tool to determine the fair allocation of mitigation costs while guaranteeing the sustainable development of the most indigent states. The conclusion sums up the dissertation's purposes and suggests that we may be both the victims and the weavers of moral corruption, by reason of which we conventiently focus on the aspects of climate change that excuse inaction.

CHAPTER ONE

The framing of climate change

1.1 What is climate change?

Throughout Earth's life cycle there have been several glacial advances and retreats caused by small variations in its orbit that have affected the amount of solar energy the planet received and therefore the cooling and warming of its surface as well. We are currently witnessing another increase in temperature, however this warming trend is different from the previous ones in that it is produced by the actions of humankind.

Other than the globe's inclination, the elements that manly contribute to global warming are the so-called "greenhouse gases" (GHGs), gases of the kind of carbon dioxide (CO_2), methane and nitrous oxide whose heat-trapping capability was demonstrated in the 19th century[2]. Once released, these gases can last for centuries in the atmosphere and, while they allow solar radiations from the Sun to pass through the atmosphere and to warm the Earth's surface, they are opaque to the thermal radiations that the planet emits in turn, hence blocking the heat in the atmosphere and causing the world's surface temperature to rise. CO_2 is emitted through natural processes such as volcanic eruptions and respiration, but, most importantly, it is also produced through the burning of fossil fuels such as coal and oil, employed for the functioning of our means of transportation and of the heating systems worldwide, as well as through deforestation, to which we resort in order to make land available for other uses, such as inhabitation or the raising of cattle[3]. In other words, carbon dioxide is generated by anthropogenic activities as well and indeed, from 1970 to 2010, the burning of fossil fuels for industrial activities constituted about 78% of the total greenhouse gases emissions increase[4].

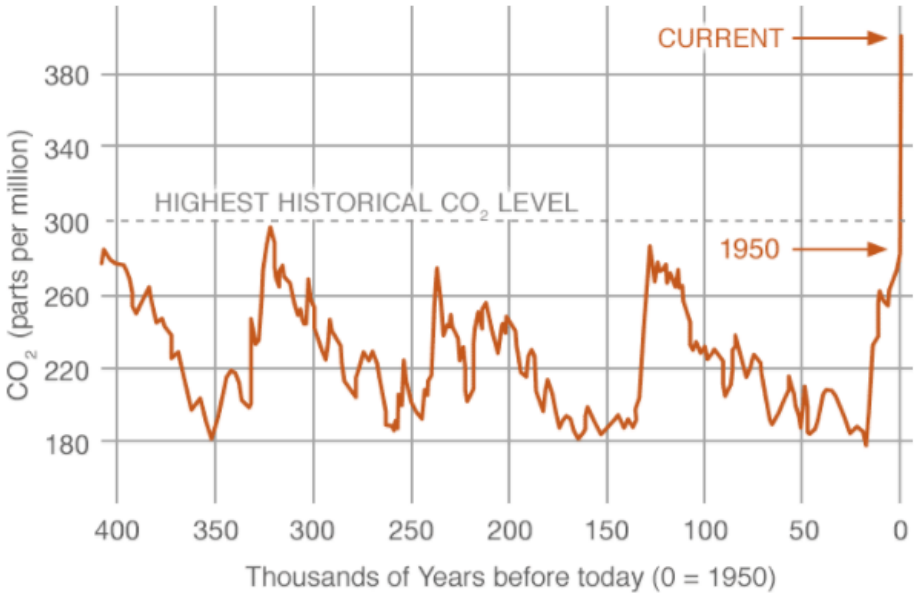
As a consequence of the hike in land surface temperature there will be more evaporation of water and precipitations overall, with significant regional differences. It is very likely that heat waves and extreme precipitation events will occur more frequently, last longer

[2] National Aeronautics and Space Administration (NASA), "*Climate change evidence: how do we know?*", accessed August 12, 2017, available at: https://climate.nasa.gov/evidence/

[3] NASA, "*Carbon dioxide concentration*", accessed August 20, 2017, available at: https://climate.nasa.gov/vital-signs/carbon-dioxide/

[4] Intergovernmental Panel on Climate Change (IPCC), "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 5, 2014, available at: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

and be more intense[5]. Moreover, the melting of glaciers and the warming of ocean water both contribute to the rise of the sea level, which will have in turn catastrophic consequences for coral reefs, polar ecosystems, coastal systems and low-lying areas[6]. Since the 1950s, many of these changes have been unprecedented.



[**Figure 1**, "*Proxy (indirect) measurement*"[7]]

1.2 From "greenhouse effect" to "climate change"

Before being referred to as "climate change", this phenomenon was dubbed "greenhouse effect" at first and later as "global warming". The former definition highlights the nature of the greenhouse gases, which allows solar radiations to pass through the atmosphere but reflects some of the Earth's outgoing radiations back to its surface, increasing its temperature. However, this appellation may signify that the greenhouse effect constitutes an issue per se, which is not true in that it is a natural event without which the planet would not be hospitable for life as we know it; the real obstacle lies in the way the human mass production of these gases interferes with the Earth's natural processes and alters its structure[8].

---

[5] *Ivi*, p. 10
[6] *Ivi*, p. 13
[7] NASA, "*Carbon dioxide concentration*", accessed August 20, 2017, available at: https://climate.nasa.gov/vital-signs/carbon-dioxide/
[8] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 4, 2010

Thenceforth, the proposition "global warming" was introduced, which draws attention to the fact that it is not the physical phenomenon of the "greenhouse effect" to cause trouble, but its consequences. Yet, it only refers to a single aspect of a more complex occurrence, namely the increase in temperature. Considered by itself, a temperature hike would not be an issue, but the implications are frightening: the equilibrium condition between humans, animals and plants would be reshaped and it would take thousands of years to reach a new balance, while existing species are unlikely to adapt quickly. Furthermore, even though it is at present highly implausible, temperatures may go down because of an additional increase in GHGs.

Finally, the ongoing debate has settled on the term "climate change", which better underlines how the difficulty is not contingent on the physical characteristics of the greenhouse gases or on the warming of the planet's surface, but on the fact that human beings are now able to modify the natural dynamics of the Earth's climate[9].

1.3 The international environmental agreements

Climate change is a phenomenon that knows no border: no matter which countries emit the most greenhouse gases, the consequences will concern the entire planet in unpredictable ways and unless the international actors unite to find a global response to the issue, continued emissions will boost the current warming trend and increase the risk of extreme and irreversible impacts for humankind and the Earth's ecosystems[10]. Indeed, once this common threat was recognized, the world governments decided to gather in order to reach an agreement on how to face this emergency, with great difficulty.

1.3.1 First steps

The nations of the world realised that they were able to manipulate climate in the 1950s, when the United States, the Soviet Union and other countries began testing their nuclear weapons in the atmosphere and the adverse effects were being perceived by those living at a considerable distance: the immediate victims suffered from higher cancer rates while the next generations were affected by birth defects, meaning that the polluting

[9] *Ivi*, p. 5
[10] IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 8, 2014

substances could be active for years[11]; consequently, the debate about climate change started.

The field of climate science developed from meteorology. With time, international reunions became more frequent and in 1873 the International Meteorological Organization (IMO) was transformed into the World Meteorological Organization (WMO), a specialized United Nations body which aimed to provide expertise regarding the state of the planet's atmosphere, the climate it produced and its interactions with lands and oceans[12]. In 1988, the WMO and the United Nations Environment Program set up the Intergovernmental Panel on Climate Change (IPCC), a scientific and intergovernmental association with the task of preparing scientific assessment reports regarding climate change and its impacts with a focus on socio-economic factors as well, and to outline possible solutions.

1.3.2 The Montreal Protocol

One of the first environmental international agreements ever ratified is the Montreal Protocol. In the 1970s, scientists discovered that the use of chlorofluorocarbons (CFCs), mainly employed to fabricate refrigerants, propellants and solvents, were damaging the ozone layer, a component of the atmosphere which absorbs much of the sun's ultraviolet radiations (UV), hence protecting all living beings from the UV's adverse effects. Indeed, the deterioration of the ozone layer increases the risk of skin cancer for humans and endangers food supplies by affecting the phytoplankton at the base of the marine food chain. In 1985, the British Antarctic Survey found that a 40% drop in the quantity of ozone present in the atmosphere during springtime had taken place over the Halley Bay in Antarctica from 1977 until 1984, compared to the 1964 levels. Furthermore, this "hole" in the ozone layer, as it was later dubbed, moved northward during summertime and mixed with other masses of air, thus equally distributing its dangers to the whole planet[13].

Consequently, action was called upon by the governments around the world and on 16 September 1987 the Montreal Protocol was signed, ensuing the 1985 Vienna

---

[11] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

[12] World Meteorological Organization (WMO), "*What we do*", accessed August 23, 2017, available at: https://public.wmo.int/en/our-mandate/what-we-do

[13] Murdoch, J. and Sandler, T., "*The voluntary provision of a pure public good: the case of reduced CFC emissions and the Montreal Protocol*" in "*Journal of Public Economics*", volume 63, issue 3, p. 333, 1997

Convention for The Protection of the Ozone Layer. Both treaties are ratified by 197 countries, becoming the first agreements in the history of the United Nations to achieve universal ratification[14]. The developed countries terminated all use of CFCs by 1999 while the developing nations were granted ten years to reach the same goal. The Montreal Protocol represented the first successful instance of international cooperation with regards to environmental problems and it is remarkable how, even in the absence of precise scientific data, these countries were still willing to act.

However, the ban of CFCs was a relatively simple solution to achieve: CFCs are easily replaceable at a rather small cost, hence the signatories to the agreement just stopped producing them altogether, a possibility that is not available for the emissions of CO_2[15]. Furthermore, the agreement only deals with the CFCs which are just one kind of greenhouse gases that impair the ozonosphere, and their main replacements, namely hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), are greenhouse gases as well, even though they are less strong and long-lived than the CFCs[16]; the Montreal Protocol does not address the dangers of GHGs in a broader context.

1.3.3 The Rio Earth Summit

The 1992 Rio Earth Summit, technically known as the United Nations Conference on Environment and Development, was the first major Convention in which the heads of state and government of 108 countries (out of a total of 172 participants) met to discuss climate change. This is noteworthy because at the time there was more scientific uncertainty about the issue than there is now, but they decided to meet no matter the evidence and to acknowledge that human actions were causing the increase in the concentration of greenhouse gases in the atmosphere, following in the footsteps of the Montreal Protocol.

Here, the participants committed themselves to the United Nations Framework Convention on Climate Change (UNFCCC), whose fundamental goal was to stabilize the quantity of greenhouse gases present in the atmosphere "at a level that would

[14] United Nations Environment Programme (UNEP), "*Treaties and Decisions*", accessed August 23, 2017, available at: http://ozone.unep.org/en/treaties-and-decisions

[15] Singer, P., "*One Atmosphere*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 181, 2010

[16] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 22-23, 2010

prevent dangerous anthropogenic interference with the climate system"[17] to be achieved through "common but differentiated responsibilities and respective capabilities"[18]. This meant that the developed nations, gathered under the section "Annex I", recognized their privileged position in comparison with developing countries and thereupon decided to take the lead in the fight against climate change by reducing their own emissions first and by transferring financial aid and technology to the least well-off[19]. The first target was to stabilise their emissions at 1990 levels by 2000, yet since the treaty did not envisage binding, but only voluntary, measures, some countries complied with them, namely the members of the European Union, while many others such as the United States, Canada and Australia, did not follow through, causing the GHG emissions to actually rise.

1.3.4 The Kyoto Protocol

As a result of the increase in emissions, the members of the United Nations Framework Convention on Climate Change decided that a stricter stance needed to be taken. In a meeting that took place in Berlin in 1995, they decided to implement the Convention by introducing binding provisions in order to limit their greenhouse gases emissions and two years later the negotiations of the Kyoto Protocol began. Hither, it was resolved that Annex I nations had to cut their emissions to 5.2% below 1990 levels in the term 2008-2012. In order to compensate for the establishment of binding targets, the agreement conceded flexibility regarding the measures to be adopted to reach the Protocol's objectives and it allowed permit trading, the practice of buying unused capacity from other states in case some country happened to overstep its emissions limit[20].

The Protocol came into force on 16 November 2005, following a series of inconclusive steps: a meeting in The Hague in 2000 where the parties did not manage to reconcile their political differences, the 2001 Bonn-Marrakech gatherings in which more concessions were granted to the parties, and after the United States' withdrawal from the treaty in 2001, decided by the newly elected Bush administration[21]. Even so, the

[17] United Nations (UN), "*United Nations Framework Convention on Climate Change*", p. 4, 1992, available at: https://unfccc.int/resource/docs/convkp/conveng.pdf
[18] *Ibidem*
[19] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014
[20] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 19, 2010
[21] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

Kyoto Protocol was judged as deeply flawed. First of all, it set low targets that were insufficient to halt climate change: among the grants allowed at the Bonn-Marrakech meetings, the target for the reduction of GHG emissions was lowered from the original 5.2% to only approximately 2% of 1990 levels[22] and therefore, with the exception of the decline in emissions owed to the collapse of the Soviet Union, the overall emissions of the protocol signatories had actually increased since 1990[23]. Secondly, the Protocol did not set up any efficient compliance mechanism. Even though during the Bonn-Marrakech gatherings harsh penalties were instituted for those who did not comply with their goals, in the form of suspension of the nations' emission trading capabilities and of stricter targets for the ensuing terms, the structure of the agreement itself allowed the signatories some leeway. As a matter of fact, according to article 18 of the Protocol, the parties had the task of instituting effective and binding measures against non-compliance by means of amendments to the treaty, however article 20 states that such amendments are only binding if they are ratified. This means that, in order to avoid the enforcement mechanisms, the parties could simply refuse to ratify said amendments. Moreover, signatories could leave the UNFCCC and consequently the Kyoto Protocol at any moment after giving a one year notification, starting from three years after the agreement had entered into force[24]. Finally, the division between Annex I countries and the developing world began to falter as emerging economies such as China and India conspicuously increased their emissions, which meant that cuts only for the developed nations were not enough anymore[25]. In particular, China surpassed the United States to become the world's greatest CO_2 emitter in 2006[26].

After the end of the first commitment period in 2012, some of the major players within the Annex I countries, namely Japan, Russia and New Zealand, did not manage to agree on new targets for the next term, leaving the European Union and a few other developed nations to be the only ones bound to reduce their emissions, considering that the United States and Canada had already withdrawn from the Protocol. Hoping to involve more

[22] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 20, 2010

[23] Prins, G. and Rayner, S., "*In Review*" in "*Bulletin of the Atomic Scientists*", 64:1, p. 46, 2008

[24] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 136-137, 2011

[25] Savaresi, A., "*The Paris Agreement: a new beginning?*" in "*Journal of Energy & Natural Resources Law*", 34:1, p. 17, 2016

[26] Tribett, W. et al., "*Paris INDCs*" in "*Paris Climate Agreement: Beacon of Hope*", Springer International Publishing, p. 119, 2017

countries, in 2007 the UNFCCC parties undertook another difficult negotiation process, however the discussion almost fell apart during the 2009 meeting in Copenhagen.

[**Fig. 2**, "*CO_2 emissions (kt), 2013*". The top 5 emitters of CO2 in 2013 were, in order: China, the United States, India, the Russian Federation and Japan.[27]]

1.3.5 The Paris Agreement

The most recent international attempt to curb greenhouse gases emissions is the agreement signed in Paris on 12 December 2015 and entered into force on 4 November 2016. The fundamental element that made negotiations possible after the Copenhagen failure was a renewed political consensus; of particular significance is the bilateral agreement reached on 12 November 2014 by the world's greatest emitters, namely China and the United States, which entailed joint efforts in the reduction of their respective emissions. Moreover, the presence of the governments' ministers to the Paris gatherings was decisive to untangle the different parties' positions, just as having the

[27] The World Bank, "CO_2 emissions (kt)", accessed August 29, 2017, available at: https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?view=map&year_high_desc=false

150 heads of state and government meet at the beginning rather than at the end of the conference facilitated the discussion[28].

The Paris Agreement differs from the Kyoto Protocol in two regards. First of all, it sets a specific global goal to further the implementation of the Convention, that is: "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change"[29], other than increasing the adaptation efforts and financial investments in green development. Secondly and of central relevance is the parties' resolution to abandon the distinction between Annex I countries and the rest of the world, in light of the developing nations' recent economic growth, and the introduction of voluntary targets: each country was invited to submit their unilateral Intended Nationally Determined Contributions (INDCs) to reduce their GHG emissions.

There are two kinds of INDCs: they can be unconditional, which implies a substantial commitment by the party and as such are consequently presented by the developed countries, or conditional, contributions that depend on the transfer of technology or financial aid, usually proposed by the developing nations[30]. This allowed to differentiate in an indirect manner between countries that have the financial means to face climate change and those that do not, acknowledging the growing emissions of the developing states while considering at the same time their disadvantaged position. INDCs are to be proposed every five years[31], with a view towards increasing them over the course of time. Nonetheless, even if the INDCs that each nation submitted would be meticulously implemented, temperatures would actually rise on the order of 3.5°C, well above the 2°C rise envisaged by the treaty. This means that only if the parties strengthen their commitments over time will the Paris Agreement succeed in halting climate change[32].

In addition, on 1 June 2017, President Donald Trump decided to withdraw the United States – the second GHGs emitter in the world – from the agreement, citing unfair conditions and economic disadvantages for the U.S. as the main reasons. While the

---

[28] Savaresi, A., "*The Paris Agreement: a new beginning?*" in "*Journal of Energy & Natural Resources Law*", 34:1, p. 19, 2016

[29] United Nations, "*Paris Agreement*", art. 2(a), p. 2, 2015, available at: http://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

[30] Tribett, W. et al., "*Paris INDCs*" in "*Paris Climate Agreement: Beacon of Hope*", Springer International Publishing, p. 119, 2017

[31] UN, "*Paris Agreement*", art. 4.9, p. 3, 2015

[32] Young, O., "*The Paris Agreement: Destined to Succeed or Doomed to Fail?*" in "*Politics and Governance*", volume 4, issue 3, pp. 124-125, 2016

other parties, in particular the European Union, have condemned this move and reaffirmed their will to stick to their commitments, the U.S. disengagement undermines the success of the agreement.

1.4 The reasons of failure

Notwithstanding the increasing consensus over the fact that anthropogenic action causes global warming, there are certain inherent characteristics of the phenomenon that inhibit humans to react. Even though climate scientists have identified global warming as the most pressing issue of our time, it took more than 20 years for the problem to be discussed in the public sphere[33]. One of the main factors of delay is the scientific uncertainty that surrounds climate change and every other scientific query, which is due to limitations of available measurements in particular regarding rare events, and to the challenge of discerning causation from complex and multi-dimensional events that affect biological and human systems[34]. Other elements that discourage action are the climate change denial lobby, the organized and well-funded organizations that produce doubts about the topic, and the human nature itself.

1.4.1 Scientific uncertainty

Uncertainty is an intrinsic aspect of every scientific question and climate change is no exception. It is impossible to accurately determine in advance the extent of its impacts, scientists can only make assumptions and in order to be clear about their findings gathered in the IPCC assessment reports, they defined a scale of the degrees of uncertainty: if some events are indicated as "very unlikely", it means that there is a 0-10% probability of them occurring, a probability of 0-33% if an occurrence is "unlikely" to happen, of 66-100% if a phenomenon is "likely" to take place and of 90-100% if it is "very likely", a level almost close to certainty[35]. The scale depends upon the "type, amount, quality and consistency of evidence (…) and the degree of agreement"[36].

---

[33] Norgaard, K., "*Climate Denial: Emotion, Psychology, Culture, and Political Economy*", in "*The Oxford Handbook of Climate Change and Society*", edited by Dryzek, J. et al., Oxford University Press, p. 399, 2011

[34] IPCC, "*Climate Change 2014: Synthesis Report*", p. 37, 2014, available at: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_All_Topics.pdf

[35] Mastrandrea, M. et al., "*Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties*", p. 3, 2010, available at: https://www.ipcc.ch/pdf/supporting-material/uncertainty-guidance-note.pdf

[36] IPCC, "*Climate Change 2014: Synthesis Report*", p. 37, 2014

Various concerns about some undetermined aspects of climate change have been brought up during the course of the years. The first was concerned with the gathering of empirical evidence in support of anthropogenic warming, since systematic global temperature records, established upon measurements of air temperature on land and surface-water temperature at sea, were only available from 1860, while satellite-based measurements only from 1979. The argument was that satellite and surface calculations did not match and did not provide evidence of warming, albeit the discrepancy rested on data errors which have now been corrected. Secondly, it was pointed out that the long-term climate record has displayed numerous temperature fluctuations over the centuries, which were naturally caused[37].

Anyhow, as the years went by, technology improved and today 97% of climate scientists agree that the increased warming we have witnessed in the past decades is due to human activities[38]. There is no doubt over the fact that greenhouse gases, carbon dioxide in particular, trap solar radiations within the atmosphere causing this way the warming of the Earth's surface, and that CO_2 is mainly emitted as a result of anthropogenic action, especially through the burning of fossil fuels. According to the IPCC: "Anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century"[39].

In reality, climate change's outstanding uncertainty hinges on human behaviour because its effects and intensity are contingent on how much we will pollute in the next decades, taking into consideration that we are already witnessing the consequences of past emissions. If scientific uncertainties can be overlooked, what are the reasons of our inaction?

[37] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 8, 2010
[38] NASA, "*Climate change evidence: how do we know?*", accessed September 2, 2017
[39] IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 4, 2014

1.4.2 The denial industry: the case of the United States

The United States is the second emitter of carbon dioxide in the world, yet its population seems to be unbothered by the issue and a large part of this negligence is due to the success of the denial industry. Climate change denialism was originated by the fossil fuel corporations which, threatened by government regulations aimed at cutting CO_2 emissions, funded scientists, think-tanks, conservative media outlets and various associations in order to gather deceptive information against the evidence of global warming to mislead the public and obstruct any kind of green policy. These actors recover any uncertainty in the researches carried out by climate scientists and blow them out of proportion, taking advantage of the popular lack of understanding of the scientific language. Indeed, from a scientist's viewpoint, every statement is susceptible to a certain degree of unpredictability but this does not undermine the findings' validity, while in our everyday lives we tend to see uncertainty as a confession of ignorance[40]. As a matter of fact, the United States principally cited the lack of full scientific knowledge as the main reason to object the establishment of mandatory targets, holding that since the science was not yet clear, it would have been unwise to take substantial decisions that might have been regretted later[41]. In 2002, the Environmental Working Group obtained a memo written by Frank Luntz, a political consultant, in which he advised the U.S. Republican party to change its strategy regarding climate change in order to win the upcoming elections: "Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly. Therefore, you need to continue to make the lack of scientific certainty a primary issue in the debate (…) You need to be even more active in recruiting experts who are sympathetic to your view". His statement summarises the climate change deniers' strategy of undermining both the credibility of science and the belief that there is a consensus about the science[42]. This approach seems to be working to this day, given that in 2016 the citizens of the United States elected as their 45th president Donald Trump, a Republican, industrialist and television personality who in 2012 stated that: "The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-

[40] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014
[41] Boykoff, M. and Boykoff, J., "*Balance as Bias: Global Warming and the US Prestige Press*" in "*Global Environmental Change*", volume 14, p. 131, 2004
[42] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

competitive"[43] and that, keeping his electoral campaign promises, withdrew his country from the Paris Agreement in the name of the American coal industry.

Particularly relevant is the role that news outlets play in spreading information, since they are the general public's main sources of scientific knowledge. A study has shown how the press coverage on climate change conducted by the United States' prestige newspapers (the *New York Times*, the *Washington Post*, the *Wall Street Journal* and the *Los Angeles Times*) from 1988 to 2002 has contributed to a considerable departure between the scientific and popular discourses. The journalistic principles of fairness and balance require that during any debate, journalists must take into consideration both the agreeing and dissenting viewpoints, guaranteeing to the two sides equal coverage. However, when this approach is applied to the climate change case, the outcome is actually biased. By granting equal standing to climate scientists and denialists, these journalists disregard on purpose the scientific validity of the IPCC assessment reports, the most renowned and peer-reviewed climate research in history, and amplify the voices of a few sceptics that are most likely remunerated to spread doubt, making the public believe that there actually is something to question. The scientific community agrees on the fact that climate change is caused by anthropogenic activities and that strong action needs to be immediately undertaken, nonetheless in the time period under scrutiny, 52.65% of media outlets hosted debates on whether climate change was caused by mankind and 78.20% of prestige-press articles questioned if high emission cuts would be beneficial or not[44].

1.4.3 Human psychology

As climate research advances over time, it is not possible anymore to maintain that people do not actively counteract climate change because of lack of information and misleading campaigns by the denial industry. The ultimate cause lies within our nature. In some cases, the reasons behind this passivity is structural and therefore beyond one's control: low-income households are not able to invest in solar panels, living in rural areas entails moving mainly by car and living in regions with extreme weather conditions results in high energy usage for the heating systems. Nonetheless, the vast

[43] Trump, D. "*The Concept of Global Warming Was Created by and for the Chinese in Order to Make U.S. Manufacturing Non-Competitive*.", Twitter, 6 November 2012, available at: https://twitter.com/realdonaldtrump/status/265895292191248385

[44] Boykoff, M. and Boykoff, J., "*Balance as Bias: Global Warming and the US Prestige Press*" in "*Global Environmental Change*", volume 14, p. 125-136, 2004

majority of the world population is not constrained by these structural barriers, so why do the other capable individuals not act?[45]

First of all, the human brain fully developed before the advent of agriculture, at a time in which the predominant concern of our ancestors was surviving the day, protecting themselves from immediate threats and looking for exploitable resources[46]. Climate change poses a danger which is temporally and geographically unbounded, where the link between cause and effect is faded. We find it difficult to wrap our heads around the fact that the carbon emissions we produce today will affect future generations and people living on the other side of the planet, because we do not perceive its consequences in our immediate environment[47]. Furthermore, when people are faced with complex and global issues, they feel like their actions have little or no impact at all on the outcome and thus they abstain from intervening[48]. Secondly, humans are social animals. We constantly compare ourselves and our actions with those of others and we derive norms of what we think is the correct behaviour to hold in society from these observations. As shown in a study on energy power usage, social norms can produce detrimental or cooperative attitudes towards climate change: when homeowners were told about the average amount of energy consumption of the members of their community, they tended to change their consumption patterns in order to fit the norm, which could be a positive adjustment in case of low expenditure or negative in case of increased costs[49]. More in general, if we are surrounded by environmentalists who value the protection of nature and the reduction of mindless consumption, we are more likely to follow their example.

Nonetheless, the predominant ideology of our society is capitalism, and while this economic system has allowed the majority of us to conduct a prosperous lifestyle, some of its principles such as the freedom of the commons have led to the worldwide depletion of fisheries and forests[50]. This is the so-called collective action problem: people as individuals would want climate to stabilise, but at the same time they do not

[45] Gifford, R., "*The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation*" in "*American Psychologist*", p. 290, 2011
[46] *Ivi*, p. 291
[47] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014
[48] Gifford, R., "*The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation*" in "*American Psychologist*", p. 293, 2011
[49] *Ivi*, p. 294
[50] *Ivi*, p. 293

want to change their ways of life by renouncing to their greenhouse gases emissions[51], mostly because they consider climate change as an external issue for other people to solve.

1.5 The economics of climate change

As the evidence of anthropogenic climate change became undeniable, many sceptics have turned to economic explanations in order to justify inaction: preventing global warming would pose an unbearable burden on the existing economies. The most prominent example that sustains this theory is the DICE model, an acronym that stands for Dynamic Integrated model of Climate and the Economy, proposed by Yale economist William Nordhaus. It is an integrated assessment model that combines the basic components of biophysical and economic systems to explain how climate and economic policies influence each other[52]. According to the model, the abatement costs would be far more excessive than the benefits and consequently only limited cuts should take place within the next decades in order to delay expensive provisions as long as possible. Nordhaus proposed a "policy ramp", starting with a carbon tax of $27 per ton in 2005 and then increasing it to $90 per ton in 2050 until $200 per ton in 2100. If the tax plan was to be implemented efficiently, it would result in an increase in temperature of 3°C by 2200 from the 1900 baseline[53].

In light of these findings, other proponents suggested that the developed states should focus on adaptation measures to the effects of climate change rather than on the abatement of carbon emissions, also known as mitigation, whereas they held that the funds invested in prevention would be better spent in transfers to the developing world[54]. However, adaptation will inevitably be part of any judicious climate policy because our past emissions have already initiated the warming trend. If we were to adapt to the climate change aftermath without any mitigation effort, chances are we would have to deal with unpredictable, sudden and large-scale impacts that would bear vast and unknown costs. On the contrary, a combination of strategies would hold the most advantageous outcome whereby we would be trading off adaptation to higher tax

[51] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

[52] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 10, 2010

[53] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

[54] Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 10, 2010

rates on CO_2 emissions for gradual and predictable future repercussions, and in addition we could immediately save economic resources by turning to existing technologies such as solar panels[55].

Along this line of thinking, most economists actually believe that the mitigation costs are high but manageable, while they will be even more burdensome when the effects of climate change will fully materialize. The leading study in support of this point of view is the Stern Review. On 19 July 2005, the British Chancellor of the Exchequer Gordon Brown announced that he had asked Nicholas Stern, former Chief Economist and Senior Vice President at the World Bank, to conduct a review of the economics of climate change in order to better understand how to meet from an economic standpoint the threats posed by this phenomenon, in the United Kingdom and globally[56]. The review was published on 29 October 2006 and its main conclusions were that if procedures to reduce climate change such as curtailing GHGs emissions were not immediately executed, 5% of the global gross domestic product (GDP) would be lost each year as a consequence of its adverse repercussions, up to 20% of global GDP if a wider range of risks and impacts was taken in consideration. On the other hand, the costs of mitigation policies initiated at present time would amount to around 1% of world GDP each year[57]. A flow of 1% of GDP for 50-100 years starting now is less expensive than a flow of 4% or so of GDP for a similar span of time but starting 30 years later. This investment would be beneficial even in the very unlikely case in which high CO_2 concentrations in the atmosphere turned out to entail low risks, because we would still have achieved a cleaner and more biodiverse world at a limited cost[58]. Stern favours an immediate carbon tax of $311 per ton, much more substantial than Nordhaus' policy ramp. How come these two economic models have such opposite outcomes?

1.5.1 The social discount rate

Different choices of the social discount rate (SDR) determine the dissimilarities between Stern and Nordhaus' models. Given that climate change's effects will mainly take place in the future, economic theories resort to the SDR in order to determine the

[55] *Ivi*, p. 12

[56] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

[57] Stern, N., "*The Economics of Climate Change: The Stern Review*", Cambridge University Press, p. vi, 2007

[58] Stern, N., "*The Economics of Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 10, 2010

present value of the future costs and benefits that the decisions taken today will bring about. Discounting can be positive or negative: if financial experts assume that the future economic system will be worse than the present one, then the value of a current benefit will be greater in the future; for instance, if a good that is widespread today will be scarce in a decade, then it will be more valuable in ten years[59]. Variations in the SDR lead to very different outcomes. Nordhaus set the SDR at 5.5% for the first half of the 21st century, averaging it out to 4% for the entire century, whereas Stern fixed it at 1.4%. The different SDRs capture their differing outlooks on the issue: while Nordhaus believes that present costs are much more onerous than the greatly discounted future costs, Stern maintains the exact opposite, hence justifying his much stricter stance on carbon taxes[60].

The great limit of climate economics lies within the choice of the SDR, because the discount of future costs and benefits depends on how much we value the wellbeing of future generations, in that it is people who are not yet born who will reap the benefits of today's mitigation policies, given that climate change effects will materialize in the future. How much we consider giving our current privileges up as a cost will depend on our moral standing. In his analysis, Nordhaus takes into consideration the interests of living beings which would be harmed by an increase in taxes, while Stern treats the welfare of present and future generations in the same way.

The implication is that climate change poses a new kind of problem that cannot be analysed through traditional practices: it is global in its origins and consequences, its effects are long-lasting and potentially irreversible, its victims will be the future generations, the least well-off and nature itself. The way we react largely depends on our beliefs and values and these are ethical matters to determine, well beyond the scope of economics.

[59] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

[60] *Ibid.*

CHAPTER TWO

Climate change as an ethical issue

2.1 Ethics and climate action

The IPCC has affirmed that, in order to limit the likelihood of irreversible and devastating climate change impacts, there needs to be a constant and substantial curtailment of greenhouse gas emissions along with adaptation efforts to face the repercussions that are already taking place[61]. However, the policy actions effectively undertaken by the nations around the world chiefly rest upon their citizens' values. When deciding the maximum amount of emissions that countries are allowed to produce in order to limit the increase in temperature, such as the 2°C ceiling above pre-industrial levels imposed by the Paris Agreement, we are balancing the interests of current generations against those of the future ones. Moreover, the amount of emissions granted to each state underneath this cap depends on beliefs about historical responsibility and the role played by energy consumption in our society[62]. Whether we believe that climate change poses a severe threat to the present and future generations or we hold that today's societies would be harmed by stringent green policies, our stance will determine different paths of action. This ethical dimension of the problem is recognized as well in the IPCC's Fifth Assessment Report, where it was stated that: "All current GHG emissions and other forcing agents affect the rate and magnitude of climate change over the next few decades, although long-term warming is mainly driven by CO_2 emissions. (…) The choice of metric to calculate these emissions, and the implications for the emphasis and timing of abatement of the various climate forcers, depends on application and policy context and contains value judgments"[63].

2.2 The tragedy of the commons

The climate challenge is composed of three main elements. The first is the dispersion of causes and effects: each actor contributes to the worsening of the problem through their own fossil fuel emissions, be it by driving a car, taking a train or charging an electronic

[61] IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 8, 2014
[62] Gardiner, S., "*Debating climate ethics*", New York: Oxford University Press, p. 14, 2016
[63] IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 23, 2014

device. No matter where these GHGs are emitted from in the first place, they will enter the atmosphere and alter climate at a global level, so that the impacts will not befall on the source of the emissions but rather on temporally and geographically distant agents.

The second factor is the fragmentation of agency. All of the GHG emitters – individuals, institutions, corporations – are not gathered under a single structure of agency; there is no global authority that controls the world's nations, states have absolute sovereignty over themselves and no other entity can impose its authority upon them. When applied to the environmental question, this international condition is usually described in game-theoretic terms as a prisoner's dilemma, a model formalized by Canadian mathematician Albert Tucker and based on the ides of Merrill Flood and Melvin Dresher, that depicts a scenario in which two men have been accused of committing a crime together. If both confess, they would be condemned to five years of jail each while if neither does, they would get one year each. On the other hand, if one confesses but the other does not, the former would be released while the latter would get ten years. The two men are not allowed to communicate but they know that they have the same set of possibilities. Not knowing what the other will do, they assume that the best strategy is to confess, so that in the worst case scenario they would get a five-year sentence whereas under the best circumstances they would be let out, without risking to spend ten years in jail; both prisoners follow this line of thinking, so they both confess and are condemned for five years. Nonetheless, the optimal outcome for the convicts would have been to cooperate and not confess, so that they would have received a jail sentence of one year. The prisoner's dilemma draws a paradoxical situation because while it is collectively rational to collaborate, as both individuals prefer the cooperative outcome, it is individually rational not to: when individuals are faced with a similar decision, they opt for what looks like the most advantageous path of action for themselves even though they both end up in a worse position. Climate change has been pictured as a tragedy of the commons, a prisoner's dilemma comprising a common resource: while it is collectively wise to restrain our consumption in order to avert the planet's collapse, each individual is better off by exploiting the Earth's natural reserves, so that when deciding how to collectively tackle the issue every state will choose the self-interested option. Modern states have voluntary set up international organisations with the aim of coordinating global efforts in many areas, such as trade and security, albeit the efforts of establishing similar cooperative

structures aimed at the resolution of the environmental challenge have proven to be ineffective.

This leads to the third aspect of the climate change problem: institutional inadequacy. It is widely held that the only efficacious way to face global warming is to bolster the current incentive structure by instituting a system of enforceable sanctions, which is only possible through a global governance arrangement[64]. The need for unity was highlighted by the IPCC as well: "Climate change has the characteristics of a collective action problem at the global scale, because most GHGs accumulate over time and mix globally, and emissions by any agent (e.g., individual, community, company, country) affect other agents. Effective mitigation of the climate change's effects will not be achieved if individual agents advance their own interests independently. Cooperative responses, including international cooperation, are therefore required to effectively mitigate GHG emissions and address other climate change issues"[65]. According to Elinor Ostrom, an American political economist, local communities were able to solve commons problems only if the resources and their usage could be monitored, information could be easily verified, if they had strong social networks and held regular meetings which built trust, group identity and consequently induced rule compliance among the members, if the components monitored progress and finally in case that individuals who did not contribute to the maintenance of the goods could be excluded from their use. All these features are absent from the international scenario: there is weak consensus for emission cuts among the world governments, it is not possible to prevent the non-compliant states from producing GHGs and, overall, emissions are difficult to monitor. Cooperation efforts at the international level usually succeed when there is a nation taking the lead during negotiations, when a common threat is identified and the parties have self-interest in resolving the conflict[66].

Furthermore, the tragedy of the commons analysis overlooks a fundamental aspect of the climate challenge, namely fairness. Indeed, the theory takes into consideration only the future consequences of the lack of global cooperation, neglecting the historical responsibility of the developed nations whose emissions account for the current situation, and at the same time it implies that the same cost-benefit evaluation applies to

[64] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 24-29, 2011

[65] IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 17, 2014

[66] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 116-117, 2011

every country in the same way. This line of reasoning facilitates solutions that are more convenient for the rich nations of the world[67].

2.3 Climate justice

Normative values are of pivotal relevance in climate agreements, in particular fairness and justice: given that the parties have absolute sovereignty over themselves, they would never voluntary ratify a treaty deemed to be unfair. Generally, signatories are more willing to bear greater individual costs for the sake of the collective good when they perceive that a fair allocation of the burdens has been accomplished, while the agreements' coercive powers can only be justified in light of justice[68]. The aim of global climate regimes is to address the exploitation of the Earth's finite resources that has altered the climate system, addressing the distributive justice issue posed by the abuse of these common goods by the developed nations which has impaired the development of the less privileged states. The solution proposed in order to remedy to this injustice is to determine the total amount of emissions that can be produced each year without causing harm to the climate system and to fairly allocate the costs of emission curtailments between the countries of the world, following principles of equity, historical responsibility and capability. To this end, international egalitarianism, a political doctrine based on equality, has provided the conceptual framework necessary to guide climate policy action.

2.3.1 John Rawls' egalitarianism

John Rawls, an American political philosopher of the twentieth century, is most notable for his theory of justice based upon egalitarianism. According to Rawls, justice is the normative principle that constitutes the standard for the evaluation of past events, the current state of affairs and future choices. Starting his analysis from an egalitarian viewpoint and considering justice and equality as complementary concepts, the philosopher holds that every human being was born with equal moral value, meaning that no one's life has greater moral significance than that of other people. Inequalities are justified only when they derive from choices, such as foregoing immediate gratification for the sake of hard work, while differences in welfare and opportunities

[67] *Ivi*, p. 120
[68] Vanderheiden, S., "*Atmospheric justice: a political theory of climate change*", New York, NY: Oxford University Press, p. 59-60, 2008

due to “accidents of birth” that are not contingent on decisions, such as class, race, gender and economic condition, are arbitrary injustices that cannot be tolerated. The author sustains that equality of opportunities must be guaranteed to every agent in the name of their equal moral standing, so that each human being has the same chance to pursue their preferred way of life according to their individual preferences, as long as they do not harm anyone in the process and they can be held fully accountable for their choices. In order to achieve this goal, “primary goods” such as rights, liberties, income and wealth should be equalised, thus establishing an even foundation from which human beings have equal opportunities, while unequal outcomes would be the product of individual paths of action.

Furthering this line of reasoning, Rawls assumes that humans are naturally selfish, hence we are inclined to attribute our privileged position to our efforts rather than to our socioeconomic status, whereas we tend to regard the success of others as the result of luck. Therefore, if we were to determine the allocation of primary goods in society, we would assign the greatest share to people with similar qualities to ourselves and the fewest to those who fit the least our criteria of what constitutes an appropriate lifestyle; however, this allocation would be judged as unfair by society and thus would not be approved by most. In order to overcome this controversy, the philosopher theorised a thought experiment that he dubbed “original position”: in the original position, individuals are asked to determine fair principles of justice regarding the distribution of primary goods within their society, however, they have to do so behind a “veil of ignorance” where they are disrobed of all those factors that bias their judgement. Furthermore, people are assumed to be risk averse, meaning that they would choose allocation principles at the benefit of the least well-off because there is a chance of them falling in that category. The resulting distributive principle is called “maximin” because it maximises the dividends of primary goods allocated to the underprivileged. Under these circumstances, rational actors would not choose an equity-based distribution of primary goods within society if an unequal solution in which everyone was better off than under equal terms existed. This is Rawls’ distributive principle, according to which every member of society is entitled to an equal share of primary goods because of their equivalent moral standing, while inequalities in their distribution are justified only when they benefit the least well-off. Egalitarian justice does not entail continuous economic levelling, in fact individuals who work harder than their counterparts have the right to a

greater share of goods, albeit their benefits must contribute to the wellbeing of society's least advantaged through a fair reallocation undertaken by just social institutions[69].

2.3.2 Cosmopolitan justice

Rawls' theory of justice regarding the distribution of primary goods has been generalised, much to his dismay, to embody the international community. Cosmopolitanism is the ideology according to which the principle of justice is universal, the citizens of the world have equal moral value notwithstanding national borders and enjoy the same rights and obligations towards each other; consequently, no one is entitled to own a greater dividend of public goods because of "accidents of birth". In the global context, the main public good that humankind shares is the atmosphere. In fact, the climate system's stability relies on the atmosphere's capacity to absorb the GHGs emitted by each inhabitant of this planet, which have caused the world's surface temperature to rise. The developed nations have been identified as the culprits of the environment's deterioration because of their significant amount of emissions, compared to their poorer counterparts that paradoxically will have to face the adverse effects of climate change by reason of their unfavourable geographical location in tropical areas and because their economies are heavily dependent on climate-sensitive sectors, most notably agriculture. According to Rawls' principle of distributive justice, every citizen is entitled to the same share of primary resources in the name of their equal moral standing. Given that some parties have exploited and impaired the atmosphere, the paramount common good, more than others, then an unequal distribution of emission caps aimed at remedying to the damage caused is justified, with the exploiters bearing greater costs than other parties in face of their actions. This principle has been endorsed as the fundamental basis of every environmental treaty ratified by the countries of the world; as a matter of fact, the first agreement in the fight against climate change, the UNFCCC, was a non-binding convention that had notable symbolic importance because it set the framework upon which subsequent environmental legislation was developed from. The cornerstone article of the convention, article 3, recognises the international principle of distributive justice as the foundation for action against global warming: "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common

[69] *Ivi*, p. 48-54

but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof"[70].

Even though the cosmopolitan reading of the principle of justice has become widely accepted among the world governments, Rawls had actually explicitly limited its application to bounded political communities. Indeed, his analysis rested upon the contractarian tradition, according to which the members of political communities are bound by rights and obligations that are peculiar to the association itself, they share a sense of identity, solidarity and a common political culture that are essential to the determination of the concept of justice. As claimed by David Miller, a British philosopher, the interactions that take place between the countries of the world, chiefly regarding economic and defence matters, are insufficient to establish an international community because they do not create a sense of belonging to the group that would explain the shared understanding of what constitutes an injustice, and, most importantly, by reason of the fact that there is no common institutional organisation that could justify the redistribution of goods in order to rectify unequal outcomes. The only responsibility that affluent states have towards the least well-off is a "duty of assistance", which is the task of helping other nations in the creation of well-ordered institutions of justice, allocating to them the minimum amount of means necessary to reach this aim.

By contrast, Charles Beitz, an American political theorist, argued in favour of cosmopolitanism by analysing the international allocation of natural resources: these are of crucial relevance for the wealth of a nation, however their distribution is not dependent on personal choices but on mere luck. Because of this, Beitz held that these resources should be equally allocated in the same way that primary social goods are, in order to grant to the inhabitants of disadvantaged lands the same opportunities to pursue their preferred paths of life that the most privileged enjoy, extending this way the principle of justice to the entire international community. One might raise the question of the property rights of natural resources because of their location within the states' borders, howbeit climate is not a conventional common good but rather a pure public good shared by everyone and of critical importance for the development of human life.

As a public good, the atmosphere's capabilities are both non-rivalrous, meaning that the employment of the resource by one agent does not reduce the availability of the good to others, and non-excludable, in that no one can be excluded from its use. Commonly,

[70] UN, "*United Nations Framework Convention on Climate Change*", art. 3.1, p. 4, 1992

these resources are preserved through voluntary donations, albeit people who do not contribute to the expenses can enjoy the goods as well, so causing the free-rider problem: individuals do not have any incentive to spend their resources for the conservation of public goods because the rest of the community is already taking action in this regard. The customary solutions to this issue are the privatisation of the good in question, so that free-riders are excluded from its usage, and state intervention, through which donations for the goods' maintenance become compulsory rather than voluntary. Since the atmosphere cannot be privatised, the countries of the world have adopted the latter option in the form of binding caps on GHG emissions, as endorsed by the UNFCCC. In order to be effective, the agreement between the good's users must provide for a just distribution and, in the climate change case, fair shares are not equal shares, because those who have benefited more from the resource employment owe more than other parties[71].

2.4 Whose responsibility?

Once established that it is the polluters, namely the developed countries, that have the moral obligation to pay for the damage provoked, questions arise on how to interpret their accountability. There are two principal lines of thought regarding the issue. Firstly, it is commonly held that the most advantaged nations have the historical responsibility to rectify the climate change problem because they have caused it through their extensive GHGs emissions ever since the Industrial Revolution, while some believe that they should also compensate the parties that have been harmed in the process: this is the so-called "polluter pays" principle. In the second place, these states are held liable because they have forbidden to other agents fair access to the atmosphere's absorptive capability of GHGs, unjustly depleting this common resource for the sake of their wellbeing. Notwithstanding the amount of scientific evidence gathered through the years in support these assertions, two objections were raised regarding the concept of responsibility[72].

The first criticism holds that because significant levels of emissions have been produced since the 1750s, the polluters responsible for the initial accumulation of GHGs in the atmosphere are not alive anymore and consequently they are not able to remedy to their

[71] Vanderheiden, S., "*Atmospheric justice: a political theory of climate change*", New York, NY: Oxford University Press, p. 49-54, 100-104, 2008

[72] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 415, 2011

wrongdoings. Asking their descendents to bear the mitigation costs would be unfair because they did not cause the harm and could have done nothing to prevent it[73]. The argument presented against this point of view is that the present citizens of the developed nations have benefited of their ancestors' polluting policies and they have not renounced to their consumerist behaviour, so they indeed have to respond for the actions of past inhabitants. Howbeit, by reason of Derek Parfit's "non-identity problem", it is not possible to assert that current generations have profited off industrialisation because their very existence is contingent on those occurrences. Had the citizens of the time undertaken another kind of development process, an entirely different set of human beings would have been born as a consequence, so that individuals are not more fortunate because of the Industrial Revolution but rather they are born because of it. On the other hand, a culprit can be found when instead of taking individual subjects as the unit of analysis, the focus shifts on collective entities such as nations. In fact, asking countries like the United Kingdom or the United States to remedy to the damage caused by their GHG emissions would be indeed to require the polluters to pay, because states' identities remain the same throughout time. Thus, it is not possible to assert that the current inhabitants of the developed nations are better off because of industrialisation, since the Industrial Revolution brought into being different persons than the ones that would have been born had other events taken place. Howbeit, the technological progress did not bring new countries into existence but it did contribute to the flourishing of their economies[74].

The second objection to historical responsibility is ignorance, a position which was quite widespread at the beginning of the environmental debate as highlighted by a statement given by Todd Stern, a U.S. delegate to the Copenhagen meetings, who declared: "I actually completely reject the notion of a debt or reparations or anything of the like. For most of the 200 years since the Industrial Revolution, people were blissfully ignorant of the fact that emissions caused a greenhouse effect. It's a relatively recent phenomenon". Those who agree with this stance hold that when the industrialisation process took off, the inhabitants of the past could not know that they were emitting GHGs which were damaging the atmosphere, hence it would not be fair to blame them for the current circumstances. Nonetheless, there is a notable difference

[73] *Ivi*, p. 418

[74] Caney, S., "*Cosmopolitan Justice, Responsibility, and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 127-130, 2010

between blame and responsibility. It would be unjust to blame some parties for the unintended detrimental effects of their actions, albeit it is of shared understanding that we are accountable for our actions, whether they are intended and not. When we accidentally break something that does not belong to us we cause some harm, even though it was not our intention to damage the object in question, and consequently it is only right to remedy to our wrongdoing instead of leaving the victim alone to pay for our misconduct[75].

2.5 Intergenerational justice

Other than the fair allocation of mitigation costs, the second core ethical issue involving climate change is intergenerational justice, meaning the determination of the duties we have towards future generations. Article 3 of the UNFCCC calls for the protection of the climate system to safeguard "present and future generations of humankind"[76], implying that the planet's current inhabitants are to be held accountable for the effects that their actions will have on future citizens. This problem can be analysed through the three elements that compose the climate question, namely the dispersion of causes and effects, the fragmentation of agency and institutional inadequacy.

From the point of view of the dispersion of causes and effects, climate change is a lagged phenomenon: its main driver is the excessive emission of carbon dioxide, and since one molecule of CO_2 can last in the atmosphere from 5 to 200 years, its adverse impacts will take centuries before fully manifesting. Decades of sustainable policies are necessary in order to eventually stabilise the GHG concentrations in the atmosphere and if action is not immediately undertaken, this upward tendency will be irreversible[77]. We are currently experiencing the brunt of past emissions as the Americas are dealing with the aftermath of devastating hurricanes, dubbed Harvey, Irma, Jose and Maria, while the next generations will suffer from our GHG contributions. The World Meteorological Association has issued a statement on possible linkages between Hurricane Harvey and anthropogenic climate change, which asserts that while there is no clear evidence that global warming is increasing the likelihood of slowly moving land-falling hurricanes in the Houston area, some of Harvey's characteristics are related to changes that have

[75] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 416, 2011
[76] UN, "*United Nations Framework Convention on Climate Change*", art. 3.1, p. 4, 1992
[77] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 32-33, 2011

already taken place. Indeed, the tropical atmosphere is holding more water vapour as the sea surface temperature rises and this leads to higher rainfall rates in hurricanes; in particular, the Gulf of Mexico sea surface temperatures have increased of 0.5°C circa between 1873 and 2005. More in general, hurricanes that take place in warmer regions are likely to become more extreme, while category 4 hurricanes will be more frequent throughout this century[78]. This delay between cause and consequence impairs our motivation to act because we are more reactive to immediate threats, while climate change "must be thought rather than sensed and we are not very good at thinking"[79].

The second aspect of climate change evaluated though intergenerational lenses is the temporal fragmentation of agency. Whereas the spatial fragmentation of agency typical of the allocation of GHG emissions problem could be overcome through the institution of a common political agency, even though difficult to achieve, temporally distant agents cannot come together and cooperate in the name of their mutual advantage because they do not coexist and their interests are divergent. This situation draws an intergenerational collective action problem that, just like the case of the emissions' curtailment, can be depicted as a tragedy of the commons in which while almost every generation prefers the cooperative outcome produced by everyone abstaining from overpolluting, it is individually rational to pollute and to consequently increase their own welfare no matter what other generations do. This temporal tragedy of the commons is worse than its spatial reading in that not every generation favours the cooperative solution: inasmuch as the costs of climate change are significantly delayed in the future, the first generation has no reason to forego its emissions. This means that it would be asked for a pure sacrifice without receiving anything in return, something that is extremely unlikely to happen. However, the entire cooperative scheme hinges on the collaboration of the first generation because in case of its defection, the second generation will have no reason to renounce to its wellbeing when their predecessors did not do the same, leaving them to deal with an endangered climate system. Therefore, the second generation will not reduce overpollution as well, thus iterating the problem. The standard solutions to the tragedy of the commons problems such as the introduction of enforceable sanctions are not available for issues between generations because firstly,

[78] World Meteorological Organization, "*WMO expert team statement on Hurricane Harvey*", accessed September 20, 2017, available at: https://public.wmo.int/en/media/news/wmo-expert-team-statement-hurricane-harvey

[79] Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed -- and what it means for our future*", Oxford University Press, 2014

there can be no reciprocity between them, future generations cannot offer anything in return to the present generation for their sacrifice, and secondly, it is impossible to establish the repeated interactions necessary to build trust and rule compliance[80].

The last characteristic of the intergenerational climate problem is institutional inadequacy. Because the time span of modern democracies is quite short, politicians are interested in winning the next election cycle and in furthering their careers, thus their primary concern is to win the votes of current citizens. Climate change is an issue that unfolds outside of the current political borders, while the benefits of GHG emissions can be immediately accrued; this entails that it would be unpopular for politicians to propose high taxes and investments in order to defend the wellbeing of future inhabitants rather than that of their voters[81]. These circumstances constitute a substantial moral problem revolving around the reasons why we are required to value the lives of future inhabitants by sacrificing our current weal.

2.5.1 Environmental rights

It is widely agreed upon that we need to safeguard the security of future persons, but how can we determine how much we need to sacrifice for their wellbeing and why do we owe them anything in the first place? The distributive justice analysis which constituted the framework for the allocation of primary goods among international actors does not apply to the intergenerational problem. In order to remedy to the moral arbitrariness of societies' level of industrialisation and development, Rawls maintains that agents in the original position are unaware of which generation they belong to but they know that they are contemporaries, so that no one would choose principles of justice that would privilege the wellbeing of a certain generation rather than another. However, being members of the same generation also entails that these actors do not have the obligation to redistribute primary goods across generational temporal borders because they lack the incentives to do so. The philosopher's original position analysis stands on the premise that citizens feel part of the same community of justice and that consequently it is in their interest to favour fair distributive principles. Cooperation within this association relies upon interdependence and reciprocity, which are essential elements for the creation of bonds of solidarity, albeit these two components are not

[80] Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, p. 34-38, 2011

[81] *Ivi*, p. 34

present in the intertemporal relationship between generations. Indeed, interdependence is unattainable because while the policy choices undertaken by the current generation may positively or negatively affect future communities, they cannot have the same influence upon us. Likewise, primary goods cannot be redistributed over time in the same way that they are allocated between contemporaries because the future's least well-off cannot be immediately identified, undermining the justification of an unequal distribution of resources over time. Current citizens would never reallocate their resources unless they could recognise the recipients, make sure that they are more impoverished than they are and ensure that the policy effectively reaches those more in need. Whereas nothing can be done to redress the injustices suffered by the deceased, it is also impracticable to remedy to the misfortune of the future inhabitants of the planet. The only intergenerational obligation that present agents have follows the line of the duty of assistance, according to which each generation must bequeath to their successors enough natural and social resources needed to preserve just institutions albeit without incurring in burdensome costs to themselves.

Moreover, just like it was not possible to assert that present inhabitants have benefited of the Industrial Revolution (even though they can be held responsible of past emissions at a collective level) by reason of Derek Parfit's "non-identity problem", it is unreasonable to think that current generations owe anything to their descendants. Parfit imagines that present human beings are faced by two policy choices dubbed "Conservation" and "Depletion". Under Conservation, citizens would choose to forego part of their welfare by curtailing their GHG emissions in return for a more stable climate system in the future. On the other hand, through the enactment of the Depletion policy they would continue with business as usual, enhancing their prosperity for the next couple of centuries but then having to deal with the detrimental effects of climate change. By choosing the latter option, the life condition of future inhabitants will be much worse compared to the former alternative because of resource impairment and extreme weather events, however the philosopher holds that it is not feasible to assert that they would be harmed by Depletion because had we chosen Conservation they would not have been born at all, considering that every course of action entails different outcomes. Assuming that human life has intrinsic worth, they would actually be better off in a polluted environment compared to not being alive at all. Additionally, the Depletion program would bring about greater overall utility in that more people would be born because of it, since green policies limit population growth.

Howbeit, a solution to the intergenerational problem could be found if the focus of the discussion shifted from distributive justice to the recognition of future citizens' interests. Even though it is not possible to harm the interests and consequently the rights of a person that is not born yet, present paths of action can affect for the better or the worse the environment in which future citizens will live. Because we can reasonably assume that these persons will have the same basic needs as us, such as the need for clean air and water to survive, if we decided to overpollute we would not violate the rights of future people at the time in which the policy is enacted but we would breach the rights of actual people in the future, when the effects will materialise. Assuming that technology will advance enough to halt climate change is too much of a weak speculation to ignore our responsibility to act; this obligation is founded in egalitarianism, the belief that each individual, no matter his or her temporal and geographical location, has equal moral worth and therefore their welfare must be safeguarded. Generally, in order to justify the claim that we are required to restrict our emissions and consequently our wealth to protect our successors, we need to be certain that they will indeed be harmed by our pollution and this circumstance can be easily verified by resorting to our foresight[82]. Today, climate change cannot be questioned anymore, virtually the entire scientific community agrees on the evidence and we are already witnessing its repercussions. Uncertainty is an unacceptable justification for inaction, a concept which is at the basis of the UNFCCC: "The Parties should take precautionary measures to anticipate, prevent or 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"[83].

2.6 A new value system

The most widespread approach employed in the determination of policy action is economics' cost-benefit analysis, according to which policy decisions must be undertaken after an evaluation of the costs and benefits of the different alternatives, and the rational solution is the one in which the benefits overtake the costs; the premise of this account is that human beings are self-interested and that their only purpose is the

[82] Vanderheiden, S., "*Atmospheric justice: a political theory of climate change*", New York, NY: Oxford University Press, p. 114-136, 2008
[83] UN, "*United Nations Framework Convention on Climate Change*", art. 3.3, p. 4, 1992

furthering of their preferences. However, the cost-benefit analysis proved to be inefficient in the study of climate change, a relatively new problem characterised by features that undermine the neoclassical economic theory. First of all, its future impacts are too unpredictable for economics to provide reliable results, as shown by the troublesome choice of the social discount rate. In addition, they will influence social and political systems as well, hence conditioning the human behaviour in unforeseeable ways. Secondly, climate change will affect different regions of the world in disparate forms: the brunt will be suffered by the poorest states, most of which have primitive economic systems that are difficult to study, whereas some other nations may actually profit off other's disgraces. Because these interactions are so complex, it is impossible to determine the proper mathematical function necessary to compound these factors. Moreover, it is not veritable that individuals act only in pursuance of their preferences. The fundamental decisions of life such as choosing a field of study, marrying someone or helping a friend often go against our interests, indeed it is widely held that reasoning on economic grounds in these circumstances is immoral. Each year more people die in wars to safeguard what is perceived to be the common good rather than in criminal endeavours to further their prosperity. Thence, while the economic principle of efficiency has guided the climate change debate thus far, it is not the only value to take in consideration when analysing such a broad and complex issue.

Climate change brings about questions of morality regarding our relationship with nature and what kind of society we strive to establish. Whereas economics provides us with the means to reach our goals, what is deemed to be right or wrong is dictated by the system of values shared by a society. A system of values is a cultural construction that underlies everyday life, the set of values that we take for granted when evaluating the behaviour of other agents. The current value system was constructed during the advance of capitalism and modern science, in an environment that was low-populated and that provided us with seemingly unlimited access to natural resources. Authors of the time expressed this exploitative relation between humankind and nature in their works, notably among them the philosopher John Locke wrote: "the earth and all that is therein is given to men for the support and comfort of their being"[84]. One of the main features of this system of values is the concept of responsibility, according to which causes and effects are bound in space and time and the responsible can be easily

[84] Locke, J., "*The Second Treatise of Civil Government and A Letter Concerning Toleration*", Oxford: Blackwell, 1948

identified. It is clear that the present value structure equips us with insufficient tools to understand and react to the climate challenge, where apparently innocent acts such as lighting up a fire can have catastrophic consequences for the climate system and its inhabitants in another country and in a future period of time. A new value system is necessary in order to convince human beings that each one of us plays a role in the deterioration of the environment and that it is fundamental to urgently intervene before it is too late. Once it is commonly accepted that climate change is an ethical issue, the burden of action shifts to us[85].

[85] Jamieson, D., "*Ethics, Public Policy, and Global Warming*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 79-84, 2010

CHAPTER THREE

Today's victims

3.1 The impacts of climate change

Climate change will undermine the components of the climate system that foster the very existence of human life, namely access to clean air and water, food production and, ultimately, the environment. If we do not decrease our GHG emissions, the Earth's temperature will rise of 2/3°C by the next fifty years, which will bring about adverse consequences for our planet. First of all, global warming will melt the world's glaciers, increasing floods at the outset but later decreasing water supplies, especially in India, China, the Andes and South America, while the collapse of ice sheets will jeopardise coastlands and islands currently inhabited by 1 in every 20 persons: by 2050, 200 million people might be displaced as a result of more extreme floods, droughts and the sea level rise. Furthermore, the increase in temperature will threaten crops yields as well, particularly in Africa, affecting people's ability to produce or buy sufficient amounts of food. A 2/3°C temperature hike will initially benefit crops cultivated at higher latitudes, only to decline as the trend persists, whereas the global food production will be at risk at a 4°C increase. More people will die of malnutrition, heat stress and vector-borne diseases such as malaria and dengue fever. Finally, climate change's pace is too fast for the ecosystem to adapt. Fisheries and marine systems such as corals and plankton will be endangered by the ocean acidification caused by higher carbon dioxide levels in seawater, while at a 2°C rise in temperature 15 to 40% of land species face extinction.

These repercussions will not be evenly distributed among the world's nations, but rather the developing countries will bear the initial brunt because of their geographical location in warmer regions of the globe, where they will be subject to a higher rainfall variability, and by reason of their dependence on agriculture, fishing and pastoralism, economic sectors heavily reliant on climate stability. Moreover, the quality of these states' health care systems and public services is insufficient to allow their citizens to

quickly recover from these changes[86]. On the other hand, even though the developed states will resent from the global warming effects only later in time, their underprivileged inhabitants will be the first to be exposed to climate related diseases because they lack access to clear water and unpolluted air, whereas they are more likely to suffer from heat stress due to the urban heat island effect whereby cities retain heat as a result of human activities[87]. In the United States, the majority of toxic waste facilities tend to be located in working class and minority neighbourhoods, with harmful effects on residents' health, education and property values[88].

3.1.1 The multiplier effect

Climate change intersects with the multiple elements of poverty, which can be socioeconomic, cultural and political, only to worsen the indigents' living conditions. Indeed, the economically and socially disadvantaged and the minority groups are more likely to be vulnerable to climate hazards because they own the least means to buffer against risk, such as access to credit, insurance, weather forecasts and the ability to influence the government's decisions in their support, whereas they often live in the most exposed areas. Because of these reasons, global warming is both a cause and a multiplier of poverty. Transient poverty, the temporary state of destitution in which a household falls when it is unable to maintain its income or consumption levels after an emergency, turns into chronic poverty, the state of persistent deprivation below the poverty line determined by the World Bank to be $1.90 per day[89], as a result of extreme weather events. Even limited modifications in temperature, wind patterns and the seasonality of rainfall can cause the shift from transient to chronic poverty, thus creating new poor. Climate change also contributes to the establishment of poverty traps, the self-reinforcing mechanisms that trap people in poverty. In urban areas, this process is produced by the rise in food prices which imperils the wage workers' financial assets, and by the location of the least advantaged in informal settlements that are easily dismantled by floods and landslides. On the other hand, rural regions' inhabitants fall into poverty traps when they are subject to constant climate change repercussions over

[86] Stern, N., "*The Economics of Climate Change: The Stern Review*", Cambridge University Press, p. vi-vii, 2007
[87] *Ivi*, p. 70
[88] United Nations Development Programme (UNDP), "*Human Development Report 2011, Sustainability and Equity: A Better Future for All*", p. 45, 2011
[89] World Bank, "*FAQs: Global Poverty Line Update*", accessed: September 25, 2017, available at: http://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq

the course of the years and when they are not able to rebuild their properties after these catastrophes[90].

3.1.2 Mitigation and adaptation policies

According to the IPCC, climate change will impair countries' ability to eradicate poverty and to develop in a sustainable way[91]. In attempting to manage its adverse effects, mitigation and adaptation policies were elaborated by governments, non-governmental organisations and communities with the purpose of safeguarding the sustainable development of the least advantaged nations. Howbeit, these policies do not always manage to reach their aim, on the contrary, they can actually have detrimental consequences for poverty reduction. Some of the most notable mitigation schemes are the Clean Development Mechanism (CDM), the Reduction of Emissions from Deforestation and Forest Degradation (REDD+), both established under the UNFCCC, as well as biofuel production. The CDM was designed in order to guarantee the sustainable development of the underprivileged states and thus it required the authorisation of the host country's national authorities. It promoted projects of the kind of low-priced energy services, economical firewood employment and biogas digesters in Africa and Asia, however it was criticised for the lack of monitoring and enforcement mechanisms and because it prioritised carbon offset targets over poverty alleviation. Additionally, it was argued that the program could compete with the informal sector, thus penalising the local economy, whereas a study of 114 CDM projects found that only 10% of them achieved positive outcomes for the least well-off. Similarly, some of REDD+'s projects, the second UNFCCC programme, were accused of endangering the poor and indigenous peoples, of forbidding locals access to the forests and, when distributing the benefits, of discriminating on the basis of ethnicity and gender. Another mitigation strategy is the investment in biofuels, fuels obtained from organic materials such as plants and animal waste which constitute a sustainable alternative to the widely used fossil fuels obtained from coal and petroleum. Nonetheless, the biofuel production has caused a land rush in the least developed nations whereby small landowners were disposed of their properties and relocated to marginal lands more vulnerable to climate

[90] Opondo, L. et al., "*Livelihoods and poverty*" in "*Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*", Cambridge University Press, p. 801, 802, 805, 806, 2014

[91] *Ivi*, p. 800

variability. By the same token, the growth of this sector empowered international enterprises which became more influent in national politics with harmful consequences especially for agricultural policies, whereas the conversion of land use from food to biofuel production led to a rise in food prices that resulted in food insecurity. In order to be efficient, biofuel production should be integrated within development projects.

As it became clearer that climate change's effects were already taking place, adaptation talks joined mitigation efforts in the international scenario. The most common autonomous adaptation schemes entail insurance, migration, saving, food storage and livelihoods diversification. These strategies reduce possible harms resulting from unpredicted weather events, albeit usually the poorest are not able to benefit of them because they lack the means, or the surplus thereof, to purchase these commodities. In some underdeveloped nations, autonomous adaptation strategies may endanger other more vulnerable groups: this is the case of Northern Mali, where men's migration left a considerable burden on the rest of the family, especially on women and children, who are more likely to drop out of school. In particular, insurance schemes are one of the most effective means to shelter oneself from climate risks because they compensate possible damages to assets due to climate catastrophes, thus facilitating the reconstruction process and reducing the danger of falling into poverty. However, insurance mechanisms are usually out of the most indigent's reach because of their elevated costs. Lacking an insurance, these people take up jobs with low risks and revenue that do not allow the accumulation of assets needed to break away from chronic poverty. A solution could be provided by premium-for-work arrangements, whereby farmers provide their labour in exchange of an insurance certificate against the risks of rain failure in the most crucial seasons for their staple crops, but there are still obstacles tied to the contracts' complicated terminology which brings about farmers' scepticism regarding the schemes' benefits[92].

In order for policies of this kind to be successful, the participation of citizens is essential to both guide political action, so that problems can be readily identified and addressed thanks to the accounts of the subjects concerned, as well as to legitimise the policy itself through the support and compliance of the programme's addressees. On their part, governments should promote citizen initiatives, facilitate the communication between the public and private sectors and provide information on how to lead a sustainable lifestyle. Moreover, they should evaluate the impacts that the free market has on the

[92] *Ivi*, 813-816

environment. On one hand, free trade bolsters economic growth and the transfer of technology, but on the other hand its costs might be greater than the benefits because high levels of economic activity bring about irreparable environmental damages that are not internalised by their producers, which generates a vicious cycle of natural resources exploitation. It is important to find the appropriate balance between low trade barriers and environmental regulations, so that the vitality of trade can be safeguarded without impairing the climate system[93].

3.1.3 Gender and climate change

Mitigation and adaptation policies should be elaborated taking in consideration that climate change does not affect everyone in the same way but rather, according to the IPCC: "Climate change will amplify existing risks and create new risks for natural and human systems. Risks are unevenly distributed and are generally greater for disadvantaged people and communities in countries at all levels of development"[94]. Among the most impoverished, particular attention should be paid to the role of gender relations and how these affect women for the worse in a twofold manner, by making them more vulnerable to calamitous weather events and by underestimating their viewpoints and knowledge when it comes to the planning of sustainable policies.

First of all, albeit people living in poverty are disproportionably impacted by climate change's effects no matter where they live, rural women in developing countries are more likely to bear the brunt by reason of their restricted access to political and economic resources and because of conservative socio-cultural norms. These regions of the world are highly dependent on agriculture, the primary sector threatened by global warming and that constitutes the means of survival of thousands of women: 20 to 50% of the agricultural labour force in developing countries is made up by women, while farming is the main source of income for almost 80% of economically active women in the least developing nations. Even though men participate to a great extent in cultivation as well, the paramount difference is that they have access to fundamental resources such as farmland (women in developing countries only own 10-20% of the land), credit and political representation which provide them with the tools necessary to rebuild their assets in case of crop failure and other environmental damages caused by climate

[93] Yoon, J., "*Conditions for successful public policies of sustainable development: institutional capacity, democracy, and free trade*" in "*International Review of Public Administration*", 2014
[94] IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", p. 13, 2014

change[95] whereas the burden of reconstruction usually falls on women as men migrate to look for employment[96]. Additionally, socio-cultural norms impede women from acquiring the information and skills, such as the ability to swim, needed to react in an emergency. Women in rural areas are usually expected to take care of children, the sick and the elderly and follow the lead of their male counterparts in the household decision-making process. This means that in times of trouble they are more likely to wait for an authoritative male figure to impart orders on what to do and to be held back by their responsibilities towards the people they have to look after, which can slow their reaction and endanger their lives. Indeed, 70% of the 2004 Asian tsunami victims were women and children, mostly trapped in their homes[97]. In Bangladesh, social norms according to which women are allowed to leave their habitations only when accompanied by a male relative make them less willing to seek assistance in public cyclone shelters[98].

Climate change exacerbates the world's existing inequalities, impairs the global fight against poverty and threatens the sustainable development of the countries in need. Adaptation and mitigation policies should take into account the different needs of men and women and the distribution of power relation and resources among them because, other than being a fundamental human rights, gender equality would bring about economic as well as environmental gains: if women participated to the same degree as men in the economy, they would increase the annual global GDP by $28 trillion within 2025. Furthermore, women tend to be more committed to environmental causes and countries that have more women in parliament or congress have enacted a greater amount of sustainable policies. The inclusion of women living in developing nations in the elaboration of these policies can only be beneficial, given their expertise in the management of natural resources gained through their agricultural work, while many studies highlighted their risk-managing capabilities after catastrophic weather events[99]. Nonetheless, it is important that sustainable policies aimed at addressing gender inequalities do not put a greater burden on women's shoulders, charging them with the

---

[95] UNDP, "*Gender, climate change and food security*", 2012, available at: http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB4_Africa_Gender-ClimateChange-Food-Security.pdf

[96] Carvajal-Escobar, Y. et al., "*Women's role in adapting to climate change and variability*" in "*Advance in Geosciences*", volume 14, p. 278, 2008

[97] UNDP, "*Overview of linkages between gender and climate change*", 2016, available at: http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/UNDP%20Linkages%20Gender%20and%20CC%20Policy%20Brief%201-WEB.pdf?download

[98] Cannon, T., "*Gender and climate hazards in Bangladesh*", in "*Climate change and gender justice*" edited by Terry, G., Oxfam GB, p. 15, 2009

[99] UNDP, "*Overview of linkages between gender and climate change*", 2016

task of solving poverty issues. Men and women should equally participate to the policy design process but their different social position and the inequalities that come with it must be taken into account[100], particularly focusing on building up women's assets which are essential to guarantee them independence and the ability to withstand climate hazards.

3.2 The Greenhouse Development Rights framework

In light of the unjust dispersion of causes and effects, by reason of which the wealthiest and historically responsible states will suffer the least from the adverse impacts of climate change, Paul Baer, an ecological economist, and his colleagues elaborated a fair burden-sharing solution that they named Greenhouse Development Rights (GDRs) framework. The purpose of the GDRs framework is to implement the UNFCCC principles of "common but differentiated responsibilities and respective capabilities"[101] in the allocation of burdens for the protection of the climate system, while guaranteeing the sustainable development of the indigent states. To reach this aim, the framework employs quantitative estimates of the concepts of "capacity" and "responsibility", calculated in terms of a development threshold in order to overcome the division between least developed and developed countries. The threshold of development, the level of income below which individuals are not required to bear any mitigation cost, was set at US$7500 per capita per year, purchasing power parity (PPP) adjusted. The authors obtained this figure by multiplying by 1.25 the poverty line of US$6000, PPP adjusted, obtained by a study that evaluated the development indicators of health and other elements, while it goes well beyond what is taken to be the standard global poverty line of US$1.90 per day to point out that development should be a priority for many more people than just those living in extreme poverty. Once established the development threshold, the two fundamental components of the GDRs framework are easily identifiable. The first is capacity, defined as the income over the development threshold that is left after the purchase of the commodities necessary to satisfy basic needs, also known as disposable income. People earning an income well above US$7500 per year are expected to participate in the fight against global warming. By the same token, as their assets increase they have the double obligation to contribute

[100] Carvajal-Escobar, Y. et al., "*Women's role in adapting to climate change and variability*" in "*Advance in Geosciences*", volume 14, p. 279, 2008
[101] UN, "*United Nations Framework Convention on Climate Change*", art. 3.1, p. 4, 1992

more to the mitigation efforts and, as the income of those below the development threshold rises as well, to ensure that their advancement unfolds along sustainable lines. The second element is responsibility, the contribution to the climate change problem, calculated on the basis of per capita emission of carbon dioxide from fossil fuel consumption from an indicative starting point taken to be the year 1990, when official knowledge about the dangers of GHG emissions was promulgated for the first time through the publication of the first IPCC Assessment Report. The emissions that match consumption levels below the development threshold are excluded from responsibility. These two factors were combined into a single obligation indicator, the "Responsibility Capacity Index" (RCI) through which countries are ranked depending on their citizens' responsibility and capacity.

GDRs Results for Representative Countries and Groups (per cent shares)

	2010						
	Population (percent of global)	GDP per capita	Capacity (percent of global)	Responsibility (percent of global)	RCI	2020 RCI	2030 RCI
EU 27	7.3	30,472	28.8	22.6	25.7	22.9	19.6
United States	4.5	45,640	29.7	36.4	33.1	29.1	25.5
Japan	1.9	33,422	8.3	7.3	7.8	6.6	5.5
Russia	2.0	15,031	2.7	4.9	3.8	4.3	4.6
China	19.7	5,899	5.8	5.2	5.5	10.4	15.2
India	17.2	2,818	0.7	0.3	0.5	1.2	2.3
Brazil	2.9	9,442	2.3	1.1	1.7	1.7	1.7
South Africa	0.7	10,117	0.6	1.3	1.0	1.1	1.2
Mexico	1.6	12,408	1.8	1.4	1.6	1.5	1.5
LDCs	11.7	1,274	0.1	0.0	0.1	0.1	0.1
Annex 1	18.7	30,924	76	78	77	69	61
Non-Annex 1	81.3	5,096	24	22	23	31	39
World	100%	9,929	100%	100%	100%	100%	100%

[**Fig. 3**, "*Percentage Shares of Total Global Population, GDP, Capacity, Responsibility and RCI for Selected Countries and Groups of Countries (based on projected emissions income for 2010, 2020 and 2030)*"[102]]

According to the GDRs results for 2010, the United States had the greatest RCI (33.1%), followed by the countries of the European Union (25.7%), while China accounted for 5.5% of the total RCI share because of the remarkable size of its population which counterbalanced the modest level of welfare that the nation had

[102] Baer, P. et al, "*The Greenhouse Development Rights Framework: Drawing Attention to Inequality within Nations in the Global Climate Policy Debate*" in "*Development and Change*", volume 40, n. 6, p. 1127, 2009

reached at the time. As China is forecasted to grow economically in the next decades with a resulting increase in both emissions and income of those below the development threshold, its predicted RCI share is expected to almost triple by 2030, up to 15.2%. The RCI could be operationalised in two ways. First, an international fund for mitigation and adaptation could be established where the RCI would provide the criteria to determine the amount of the states' financial contributions. Secondly, it could be implemented in terms of national emissions reduction obligations[103].

This framework proposed a groundbreaking solution to the allocation problem that has characterised the climate change question since the beginning. It was elaborated after the Kyoto Protocol had entered into force and the authors immediately recognised its two main weaknesses. First of all, the agreement's enforcement mechanisms were not adequate to face the problem and, indeed, GHGs emissions continued to rise, whereas, most importantly, the separation between Annex I countries and all the other states overlooked the increased pollution of some developing nations, notably China and India. This division was later waived by the Paris Agreement with the introduction of a system of Intended Nationally Determined Contributions (INDCs), whereby each nation voluntary proposed its reduction targets. However, INDCs are not binding and even if they were fully implemented by all the signatories, the temperature would still increase well above the limit of 2°C above pre-industrial levels set by the agreement.

The innovation proposed by the GDRs framework is to shift the subject of analysis from countries to individuals. This distinction allows to identify the actual polluters and to hold them accountable through the employment of the RCI, by which mitigation and adaptation costs are allocated to the most affluent emitters no matter their place of provenance, since the level of consumption of the poverty-stricken countries' upper classes is comparable to the expenditure level of their counterparts living in the most advantaged states[104]. This framework allows to investigate the income discrepancies within, as well as between, nations.

[103] *Ivi*, p. 1123-1129

[104] Baer, P. at al., "*Greenhouse Development Rights – A Framework for Climate Protection That Is "More Fair" Than Equal Per Capita Emissions Rights*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 218, 2010

CONCLUSION

Climate change is the most pressing issue of our time. The anthropogenic emission of greenhouse gases (GHGs) has provoked the rise in the planet's surface temperature, which will bring about dreadful consequences for the ecosystem, animal and plant species and, ultimately, for their producers themselves: humankind. Indeed, GHGs are the result of the activities that are at the basis of the current capitalist economic systems, such as the burning of fossil fuels to satisfy the energy needs of our society. The world population's standard of living has improved dramatically ever since the Industrial Revolution, through the introduction of the mechanism of mass production, whereby many commodities are manufactured in bulk and sold at affordable prices; consumerism became commonplace because the Earth's natural resources seemed endless and ready at our disposal. Howbeit, it soon became apparent that this prosperity came at a price: in the 1950's, people fell ill after nuclear weapons testing in the atmosphere, while in the 1970's, chlorofluorocarbons were associated to the ozone depletion and were subsequently abolished by means of the 1987 Montreal Protocol. In 1990, IPCC's First Assessment Report was published, the most comprehensive research about climate change ever undertaken, where it was stated for the first time that: "There is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be; emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface"[105]. Over time, the scientific evidence became undeniable and the world governments initiated international talks about how to deal with the issue, considering that some of its adverse effects were already materialising. Economic analyses were called upon to evaluate the costs and benefits of emissions curtailment and eventually various climate treaties were concluded, the last being the 2016 Paris Agreement. However, these agreements were not successful in reducing the global GHG emissions and the planet's surface

[105] IPCC, "*Policymaker Summary of Working Group I (Scientific Assessment of Climate Change)*", p. 63, 1990, available at: http://www.ipcc.ch/ipccreports/1992%20IPCC%20Supplement/IPCC_1990_and_1992_Assessments/English/ipcc_90_92_assessments_far_wg_I_spm.pdf

temperature reached a new historical height. Generally, the majority of the world's citizens seemed to be unbothered by the phenomenon.

There are disparate reasons why the attempts to solve the climate challenge failed: doubts about the scientific data (mostly fuelled by the denial industry), the human nature which is responsive to threats only when they are immediate and, above all, the inadequacy of the traditional tools we employ to evaluate and find solutions to the problems we face, namely our system of values and economic assessments. Our current value system was established during the Industrial Revolution, hence we are not used to the idea that the resources we take for granted, such as tap water and electricity, are scarce goods that we are depleting with our own actions. Moreover, economic analyses are not able to dictate a path of action since the intensity of climate change's future impacts is too uncertain and because the choice of the social discount rate needed to make forecasts about the future hinges on our beliefs about the value of the environment, the lives of the least well-off and of future citizens, who will bear the brunt. Ultimately, we cannot employ our conventional decision-making instruments because climate change is an ethical issue and its characteristics – the dispersion of causes and effects, the fragmentation of agency and institutional inadequacy – can only be tackled by resorting to our moral norms. Indeed, the world governments have employed the cosmopolitan principle of distributive justice to determine how to allocate the sustainable policies' costs among themselves. The principle holds that every citizen has the same right to the atmosphere's absorptive capabilities – the most important common good – no matter their whereabouts, whereas those who have contributed the most to its depletion, namely the developed countries, should cover the damages accordingly; additionally, they have the duty to guarantee the sustainable development of the underprivileged states that are now excluded from taking advantage of the same resources that fostered their wealthy counterparts' economic growth. Furthermore, our morality suggests that we should take into account the interests of future generations when deciding how much to pollute. Even though it is not possible to impair the rights of people who are not born yet, we can reasonably foresee that future citizens will have our same basic necessities and that our actions will negatively impact their quality of life by damaging the environment. These are ethical questions to ponder which are vulnerable to the problem of corruption: policy makers and individuals have, inadvertently or not, taken advantage of climate change's complexity to conveniently focus their attention on its elements that excuse inaction, such as scientific uncertainty

and economic calculations[106]. Today, small changes in our lifestyle can notably decrease our carbon footprint, such as resorting to renewable resources (solar, wind and hydroelectricity) to satisfy our energy needs and employing more sustainable means of transportation to move around. The science is clear, the mitigation costs are manageable and the catastrophic effects of past emissions are already taking place. Inaction is a problem of moral corruption.

[106] Gardiner, S., "*A Perfect Moral Storm – Climate Change, Intergenerational Ethics, and the Problem of Corruption*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, p. 94-95, 2010

BIBLIOGRAPHY

Baer, P. et al, "*The Greenhouse Development Rights Framework: Drawing Attention to Inequality within Nations in the Global Climate Policy Debate*" in "*Development and Change*", volume 40, n. 6, 2009

Baer, P. at al., "*Greenhouse Development Rights – A Framework for Climate Protection That Is "More Fair" Than Equal Per Capita Emissions Rights*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

Boykoff, M. and Boykoff, J., "*Balance as Bias: Global Warming and the US Prestige Press*" in "*Global Environmental Change*", volume 14, 2004

Caney, S., "*Cosmopolitan Justice, Responsibility, and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

Cannon, T., "*Gender and climate hazards in Bangladesh*", in "*Climate change and gender justice*" edited by Terry, G., Oxfam GB, 2009

Carvajal-Escobar, Y. et al., "*Women's role in adapting to climate change and variability*" in "*Advance in Geosciences*", volume 14, 2008

European Commission, "*Historic climate deal in Paris: EU leads global efforts*", accessed September 26, 2017, available at: http://europa.eu/rapid/press-release_IP-15-6308_en.htm

Gardiner, S., "*A Perfect Moral Storm – Climate Change, Intergenerational Ethics, and the Problem of Corruption*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

Gardiner, S., "*Ethics and Global Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

Gardiner, S., "*A perfect moral storm: the ethical tragedy of climate change*", Oxford: Oxford University Press, 2011

Gardiner, S., "*Debating climate ethics*", New York: Oxford University Press, 2016

Gifford, R., "*The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation*" in "*American Psychologist*", 2011

Intergovernmental Panel on Climate Change (IPCC), "*Policymaker Summary of Working Group I (Scientific Assessment of Climate Change)*", 1990, available at: http://www.ipcc.ch/ipccreports/1992%20IPCC%20Supplement/IPCC_1990_and_1992_Assessments/English/ipcc_90_92_assessments_far_wg_I_spm.pdf

IPCC, "*Climate Change 2014: Synthesis Report, Summary for Policymakers*", 2014, available at: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

IPCC, "*Climate Change 2014: Synthesis Report*", 2014, available at: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_All_Topics.pdf

Jamieson, D., "*Ethics, Public Policy, and Global Warming*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

Jamieson, D., "*Reason in a dark time: why the struggle against climate change failed – and what it means for our future*", Oxford University Press, 2014

Locke, J., "*The Second Treatise of Civil Government and A Letter Concerning Toleration*", Oxford: Blackwell, 1948

Mastrandrea, M. et al., "*Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties*", 2010, available at: https://www.ipcc.ch/pdf/supporting-material/uncertainty-guidance-note.pdf

Murdoch, J. and Sandler, T., "*The voluntary provision of a pure public good: the case of reduced CFC emissions and the Montreal Protocol*" in "*Journal of Public Economics*", volume 63, issue 3, 1997

National Aeronautics and Space Administration (NASA), "*Climate change evidence: how do we know?*", accessed August 12, 2017, available at: https://climate.nasa.gov/evidence/

NASA, "*Carbon dioxide concentration*", accessed August 20, 2017, available at: https://climate.nasa.gov/vital-signs/carbon-dioxide/

Norgaard, K., "*Climate Denial: Emotion, Psychology, Culture, and Political Economy*", in "*The Oxford Handbook of Climate Change and Society*", edited by Dryzek, J. et al., Oxford University Press, 2011

Opondo, L. et al., "*Livelihoods and poverty*" in "*Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*", Cambridge University Press, 2014

Prins, G. and Rayner, S., "*In Review*" in "*Bulletin of the Atomic Scientists*", 64:1, 2008

Savaresi, A., "*The Paris Agreement: a new beginning?*" in "*Journal of Energy & Natural Resources Law*", 34:1, 2016

Singer, P., "*One Atmosphere*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

Stern, N., "*The Economics of Climate Change: The Stern Review*", Cambridge University Press, 2007

Stern, N., "*The Economics of Climate Change*" in "*Climate Ethics: essential readings*", edited by Gardiner, S. et al., Oxford University Press, 2010

The World Bank, "CO_2 emissions (kt)", accessed August 29, 2017, available at: https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?view=map&year_high_desc=false

Tribett, W. et al., "*Paris INDCs*" in "*Paris Climate Agreement: Beacon of Hope*", Springer International Publishing, 2017

Trump, D. "*The Concept of Global Warming Was Created by and for the Chinese in Order to Make U.S. Manufacturing Non-Competitive*.", Twitter, 6 November 2012, available at: https://twitter.com/realdonaldtrump/status/265895292191248385

United Nations, "*United Nations Framework Convention on Climate Change*", 1992, available at: https://unfccc.int/resource/docs/convkp/conveng.pdf

UN, "*Paris Agreement*", 2015, available at: http://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

United Nations Development Programme (UNDP), "*Human Development Report 2011, Sustainability and Equity: A Better Future for All*", 2011

UNDP, "*Gender, climate change and food security*", 2012, available at: http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB4_Africa_Gender-ClimateChange-Food-Security.pdf

UNDP, "*Overview of linkages between gender and climate change*", 2016, available at: http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Envir

onment/UNDP%20Linkages%20Gender%20and%20CC%20Policy%20Brief%201-WEB.pdf?download

United Nations Environment Programme (UNEP), "*Treaties and Decisions*", accessed August 23, 2017, available at: http://ozone.unep.org/en/treaties-and-decisions

Vanderheiden, S., "*Atmospheric justice: a political theory of climate change*", New York, NY: Oxford University Press, 2008

World Bank, "*FAQs: Global Poverty Line Update*", accessed: September 25, 2017, available at: http://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq

World Meteorological Organization (WMO), "*What we do*", accessed August 23, 2017, available at: https://public.wmo.int/en/our-mandate/what-we-do

WMO, "*WMO expert team statement on Hurricane Harvey*", accessed September 20, 2017, available at: https://public.wmo.int/en/media/news/wmo-expert-team-statement-hurricane-harvey

Yoon, J., "*Conditions for successful public policies of sustainable development: institutional capacity, democracy, and free trade*" in "*International Review of Public Administration*", 2014

Young, O., "*The Paris Agreement: Destined to Succeed or Doomed to Fail?*" in "*Politics and Governance*", volume 4, issue 3, 2016

ABSTRACT

Il cambiamento climatico è uno dei temi più pressanti di questo secolo. Il 12 dicembre 2015, 195 nazioni hanno firmato l'Accordo di Parigi, il primo trattato universale che impone limiti vincolanti sulle emissioni dei cosiddetti "gas serra", alla base del surriscaldamento globale. L'urgenza di far fronte a questo fenomeno è data dalla gravità della minaccia posta, che causerà cambiamenti irreversibili del sistema climatico con conseguenze catastrofiche per il pianeta ed i suoi abitanti. L'accordo di Parigi è l'ultimo risultato di una discussione internazionale durata venticinque anni, iniziata ufficialmente con il primo Summit della Terra tenutosi a Rio de Janeiro nel 1992. I trattati firmati nel corso di questi anni si sono rivelati inefficienti, i loro obiettivi troppo deboli e conseguentemente le temperature hanno continuato ad innalzarsi. Più in generale, questa minaccia non sembra interessare più di tanto i cittadini del mondo.

Lo scopo di questa dissertazione è analizzare le cause del fallimento degli accordi internazionali sul clima e del disinteresse della maggior parte degli individui nei confronti di questa tematica, sostenendo che la ragione ultima risieda nella natura stessa del fenomeno. Infatti, oltre ad essere un problema scientifico e politico, il cambiamento climatico è soprattutto un dilemma etico, e noi non disponiamo degli strumenti adeguati per affrontarlo.

L'aumento della temperatura terrestre non è un fenomeno inusuale. Le variazioni dell'orbita del pianeta hanno condizionato la quantità di energia solare ricevuta e, di conseguenza, anche il surriscaldamento ed il raffreddamento della superficie terrestre. Ciò che differenzia l'attuale aumento di temperature dagli avvenimenti precedenti è il ruolo ricoperto dall'uomo. Il surriscaldamento globale è principalmente dovuto all'eccessiva emissione dei gas serra – anidride carbonica (CO_2), metano ed ossido di diazoto in primis – che, una volta entrati nell'atmosfera, sono trasparenti alle radiazioni solari che raggiungono la Terra ma assorbono le radiazioni infrarosse emesse a sua volta dalla superficie terrestre, causando così l'innalzamento della temperatura. Questi gas, in

particolare l'anidride carbonica, vengono emessi tramite processi naturali quali eruzioni vulcaniche e la respirazione, ma il contributo maggiore proviene da attività umane come l'uso di combustibili fossili, necessari per l'alimentazione degli odierni mezzi di trasporto e dei sistemi di riscaldamento. Le conseguenze del cambiamento climatico sono catastrofiche: temperature più alte provocano lo scioglimento delle calotte polari e l'innalzamento del livello dei mari; alcune regioni del mondo saranno esposte a precipitazioni più intense e frequenti, mentre altre verranno colpite da lunghi periodi di siccità.

Dal momento che questo fenomeno interesserà tutti i paesi del mondo, conferenze ed incontri internazionali furono indetti per delineare un piano d'azione comune. Il primo accordo ambientale fu stipulato nel 1987 a Montreal, dopo la scoperta della dannosità dei clorofluorocarburi (CFC) per lo strato di ozono presente nell'atmosfera, una componente fondamentale per l'assorbimento dei deleteri raggi ultravioletti emanati dal Sole. L'uso dei CFC fu completamente abbandonato dai paesi sviluppati entro il 1999, determinando così il successo del Protocollo. Tuttavia, i CFC sono sostanze facilmente sostituibili ed i loro principali rimpiazzi, gli idroclorofluorocarburi (HCFC), fanno parte dei gas serra anche se sono meno perniciosi. L'anno successivo, l'Organizzazione Meteorologica Mondiale ed il Programma delle Nazioni Unite per l'Ambiente fondarono il Gruppo Intergovernativo sul Cambiamento Climatico (IPCC), il più autorevole organismo scientifico con il compito di produrre rapporti periodici di valutazione sullo stato del sistema climatico. Il primo significativo traguardo politico fu raggiunto nel 1992 a Rio de Janeiro quando 172 paesi, di cui 108 rappresentati dai propri capi di stato e governo, parteciparono alla prima Conferenza sull'Ambiente e sullo Sviluppo delle Nazioni Unite, anche nota come Summit della Terra. In questa occasione, i partecipanti firmarono la Convenzione quadro delle Nazioni Unite sui cambiamenti climatici, il trattato di riferimento delle susseguenti legislazioni ambientali. La Convenzione si prefiggeva come scopo quello di stabilizzare la quantità di gas serra presenti nell'atmosfera ad un livello tale da non mettere in pericolo il sistema climatico, tenendo conto delle responsabilità comuni ma differenziate dei vari stati. I paesi sviluppati furono raggruppati sotto la sezione "Annex I" e fu loro affidato il compito di assumere il ruolo guida nella lotta contro il cambiamento climatico. Ciò

nonostante, la Convenzione non prefissò un target specifico da raggiungere, indicando genericamente di stabilizzare le emissioni delle parti ai livelli del 1990 entro il 2000. Di conseguenza, le deboli misure volontarie prese dai paesi firmatari causarono un ulteriore innalzamento delle temperature. Per questo motivo nel 1997 iniziarono le negoziazioni del Protocollo di Kyoto, uno strumento richiesto dai partecipanti della Convenzione per determinare obiettivi vincolanti. Il Protocollo entrò in vigore il 16 Novembre 2005, ma due difetti ne indebolirono l'efficacia: per prima cosa, gli obiettivi inizialmente prefissati furono ridimensionati come risultato delle numerose concessioni fatte ai partiti durante il corso della lunga trattativa, mentre vi erano gravi falle nei meccanismi di conformità stabiliti per controllare il progresso dei vari stati, il che consentiva agli inadempienti di non venire sanzionati. Inoltre, le emissioni di molti paesi in via di sviluppo, Cina ed India in particolare, erano notevolmente aumentate in seguito al proprio sviluppo economico, tanto da rivaleggiare con le nazioni più benestanti. L'ultimo tentativo di stabilire un efficiente sistema globale per limitare la produzione di gas serra risale a due anni fa, quando il 12 dicembre 2015 fu firmato l'Accordo di Parigi. Questo trattato differisce dai suoi predecessori in quanto viene abbandonata la distinzione tra paesi in via di sviluppo e quelli sviluppati: ogni parte è invitata a presentare degli obiettivi volontari per diminuire le proprie emissioni di gas serra, con lo scopo di mantenere l'aumento di temperature ben sotto i 2°C. Nonostante vi siano grandi aspettative per la riuscita dell'Accordo, gli obiettivi proposti dalle parti firmatarie sono stati tacciati di non essere sufficienti per frenare il surriscaldamento globale, mentre l'uscita degli Stati Uniti – il secondo emettitore al mondo di gas serra – dall'Accordo il primo Giugno 2017 ha pericolosamente danneggiato le possibilità di successo del trattato.

Le ragioni principali di questo fallimento diplomatico sono tre: l'incertezza scientifica, il successo dell'industria della negazione e la natura umana. Come ogni fenomeno fisico, anche la questione climatica è soggetta a un certo grado d'incertezza. Dal momento che i gas serra hanno la capacità di rimanere nell'atmosfera per secoli, gli effetti delle presenti emissioni si materializzeranno solo nel futuro e dunque i calcoli della scienza sono approssimativi. All'inizio delle trattative internazionali, l'incertezza scientifica era citata come il motivo principale d'inerzia perché si temeva fosse

imprudente investire ingenti somme di denaro nella prevenzione di un fenomeno ancora sconosciuto. Ciò nonostante, al giorno d'oggi la comunità scientifica non ha più dubbi sul fatto che il cambiamento climatico sia una realtà che comporta conseguenze disastrose per il pianeta. Il motivo per cui l'incertezza abbia rallentato così a lungo la reazione del pubblico generale è anche dovuto al successo dell'industria della negazione. Con questo termine s'intende il gruppo di scienziati, organi di stampa e varie associazioni finanziato dalle compagnie petrolifere con lo scopo di seminare dubbi circa la validità scientifica della ricerca sul cambiamento climatico, in modo da evitare tagli nel settore del combustile fossile, la prima fonte di CO_2. Questa lobby, che ha avuto particolare successo negli Stati Uniti, sfrutta l'analfabetismo scientifico delle masse per trasformare le incertezze sui dati scientifici in confessioni d'ignoranza sulla questione. Infine, la nostra natura non è fatta per riconoscere le minacce poste dal cambiamento climatico, lontane nello spazio e nel tempo, mentre, quando veniamo posti dinanzi a questioni globali come la fame nel mondo, tendiamo a non reagire in quanto convinti che le nostre azioni non abbiano alcun impatto sul risultato finale.

Dal momento che le prove scientifiche sono oramai incontrovertibili, molti scettici hanno citato l'analisi economica costi-benefici per giustificare la propria inerzia, sostenendo che prevenire il cambiamento climatico sia troppo gravoso per le esistenti economie mondiali. Il modello economico "Dynamic Integrated model of Climate and the Economy" (DICE) progettato da William Nordhaus avvalora questa supposizione affermando che i costi di mitigazione siano di gran lunga superiori rispetto ai benefici e che dunque debbano essere distribuiti in un periodo di tempo più lungo possibile per non danneggiare eccessivamente gli interessi economici della presente generazione. D'altra parte, Nicholas Stern, un noto economista inglese, sostiene che un investimento immediato nella riduzione delle emissioni di gas serra richiederebbe ogni anno l'1% del prodotto interno lordo (PIL) mondiale, mentre i costi impiegati nel fronteggiare gli impatti non mitigati del cambiamento climatico andrebbero dal 5 al 20% del PIL globale. La divergenza dei risultati di queste due teorie dipende dalla scelta del tasso di sconto sociale (TSS) utilizzato per determinare il valore attuale dei futuri costi e benefici delle decisioni prese nel presente. È proprio da questa scelta che viene alla luce l'inadeguatezza dei modelli economici nell'analisi della questione climatica. Gli effetti

del surriscaldamento globale si manifesteranno principalmente negli anni a venire, dunque la valutazione dei futuri costi e benefici dipende da quanto valore diamo al benessere delle future generazioni poiché saranno loro a godere dei risultati delle politiche di mitigazione attuate nel presente. Questa scelta non può essere dettata da criteri matematici ma solamente dalla nostra levatura morale: il cambiamento climatico è un problema etico.

Le due principali questioni etiche comportate dal cambiamento climatico sono la distribuzione dei costi di mitigazione tra le nazioni del mondo con la conseguente attribuzione di responsabilità ed il problema della giustizia intergenerazionale. Queste tematiche possono essere analizzate alla luce di tre aspetti fondamentali del problema. Il primo è la dispersione delle cause ed effetti, per cui non ha importanza quale sia la fonte delle emissioni di gas serra perché una volta prodotti, questi raggiungeranno l'atmosfera e si combineranno con altri gas precedentemente emessi, alterando indistintamente il sistema climatico. Non è dunque possibile discernere esattamente le singole emissioni dal danno provocato. Il secondo fattore è la frammentazione della rappresentanza. Gli emettitori del mondo non sono riuniti in un'unica organizzazione, non esiste un governo globale che monitori la produzione di gas serra di ogni nazione, in quanto queste hanno sovranità assoluta su loro stesse. Questa condizione internazionale è stata descritta in termini della Tragedia dei Beni Comuni, una situazione in cui mentre è collettivamente preferibile che ogni paese riduca il proprio livello di consumo per salvaguardare l'ecosistema, è individualmente opportuno continuare a sfruttare le risorse naturali del pianeta, incrementando così la propria crescita economica. Questa teoria esplica il terzo elemento della questione climatica, le carenze istituzionali. Il prevalere degli interessi dei singoli stati spiega la disfatta della diplomazia internazionale nel tentativo di raggiungere un efficace accordo globale per decurtare le emissioni di gas serra. Solitamente, ostacoli di questo tipo vengono superati con la creazione di organizzazioni internazionali in cui gli stati cedono volontariamente parte della loro sovranazionalità per raggiungere un obiettivo comune, tuttavia queste non hanno riscosso grande successo nelle tematiche ambientali.

Il primo aspetto che caratterizza la questione climatica riguarda la giustizia nella divisione dei costi di mitigazione degli effetti del cambiamento climatico. Lo scopo principale degli accordi internazionali per l'azione sul clima è rimediare ai danni causati dai paesi sviluppati – la cui prosperità si è basata sullo sfruttamento delle risorse naturali comuni – e di distribuire equamente i costi di mitigazione tra le nazioni del mondo, tenendo in considerazione che se si vuole impedire ai paesi sottosviluppati di uscire dalla povertà impiegando il carbon fossile bisogna finanziare il loro sviluppo sostenibile. Per raggiungere questo obiettivo i leader mondiali si sono basati sulla teoria egualitaria nell'elaborazione degli accordi internazionali sull'ambiente, in particolare sulla teoria della giustizia distributiva formulata da John Rawls. Stando al filosofo politico, la vita di ogni essere umano ha lo stesso valore morale e pertanto tutti godiamo degli stessi diritti. Le disuguaglianze sociali, ossia le differenze nella quantità di risorse sociali ed economiche possedute dalle varie classi, possono essere giustificate solo se derivanti dalle scelte intraprese dai singoli individui e non da fattori accidentali come la classe sociale, il genere o l'etnia. I beni primari quali diritti, libertà e benessere dovrebbero essere distribuiti in modo equo per garantire l'uguaglianza delle opportunità, in modo tale che le disuguaglianze siano solamente frutto delle scelte dei singoli nella gestione di queste risorse. Inoltre, Rawls assume che gli esseri umani siano egoisti per natura, per cui nel determinare la distribuzione di questi beni, essi sceglierebbero di attribuire una maggior quantità a loro stessi ed alle persone aventi simili caratteristiche. Questa ripartizione verrebbe giudicata ingiusta dalla collettività e per superare questa contraddizione il filosofo ricorre ad un espediente rinominato "posizione originaria": a tutti gli esseri umani viene chiesto di determinare i principi di giustizia che governeranno la propria società, ma di farlo dietro un "velo dell'ignoranza" dove vengono spogliati di tutti i fattori che potrebbero influenzare le proprie decisioni. Secondo Rawls, le persone sceglierebbero i principi di distribuzione dei beni primari a favore dei meno abbienti, perché vi sono probabilità che essi rientrino in questa categoria. Per questo motivo, nessuno favorirebbe un'assegnazione equa dei beni se la loro distribuzione ineguale servisse gli interessi dei più svantaggiati. Dal momento che la vita di ogni essere umano ha lo stesso valore, i beni primari dovrebbero essere inizialmente distribuiti allo stesso modo per garantire a tutti le medesime possibilità di realizzare i propri interessi. Ogni persona avrà risultati diversi in base

all'utilizzo di queste risorse, tuttavia le risultanti disuguaglianze, anche se giustificate dalle diverse scelte dei singoli individui, dovrebbero sempre beneficiare i meno fortunati. Nonostante Rawls avesse espressamente delimitato la sua teoria della giustizia a società circoscritte, ritenendo che solamente persone appartenenti alla stessa cultura politica potessero stringere i legami di solidarietà necessari al riconoscimento di un comune principio di giustizia, la sua analisi è stata impiegata come fondamento dei trattati ambientali internazionali, considerando che il cambiamento climatico pone un tipo di minaccia che prescinde dai confini delle nazioni. Nel contesto globale, l'atmosfera è il bene comune più importante per la salvaguardia della vita umana, e questa è stata ingiustamente sfruttata dai paesi più benestanti per favorire il proprio sviluppo. Stando alla teoria della giustizia distributiva, una divisione equa dei costi di mitigazione del cambiamento climatico non sarebbe corretta, dal momento che alcune nazioni hanno abusato sproporzionatamente dell'atmosfera a discapito dei meno abbienti. Di conseguenza, i primi accordi internazionali sul tema hanno indicato i paesi più agiati come principali responsabili del problema, affidando loro l'obbligo di rimediare per primi ai danni causati.

Oltre alla distribuzione dei costi delle politiche ambientali, il cambiamento climatico pone la questione della giustizia intergenerazionale, ossia della determinazione dei nostri doveri nei confronti delle future generazioni, un problema che può essere analizzato ricorrendo ai tre elementi che costituiscono la questione climatica. In primo luogo, la dispersione delle cause ed effetti avviene perché le molecole di gas serra hanno la capacità di rimanere nell'atmosfera per secoli. Questo implica che le conseguenze del cambiamento climatico si materializzeranno solamente nel futuro, colpendo persone che ancora non sono nate. Il secondo aspetto è la frammentazione della rappresentanza. Mentre il problema della distribuzione delle emissioni poteva essere risolto tramite l'istituzione di un organo internazionale incaricato di coordinare gli sforzi delle varie nazioni, nel contesto intergenerazionale la cooperazione tra le parti interessate è resa impossibile dal fatto che esse non siano contemporanee e che i loro interessi siano divergenti. Infatti, ricorrendo all'espediente della Tragedia dei Beni Comuni, mentre quasi ogni generazione preferisce il risultato ottenuto attraverso la salvaguardia dell'ambiente, è nell'interesse delle singole generazioni continuare ad

accrescere il proprio benessere perseverando nelle attività che producono gas serra. La complicazione sta nel fatto che la prima generazione non è incentivata ad agire per il bene dei futuri abitanti del pianeta dal momento che, mentre i benefici delle politiche inquinanti sono immediati, le conseguenze avverse si concretizzeranno solamente nel futuro e non verranno dunque sofferte dai cittadini attuali. La non conformità della prima generazione danneggia l'intera impalcatura collaborativa perché le generazioni future non avranno alcun motivo di rinunciare al proprio sviluppo quando i loro predecessori non hanno fatto lo stesso, lasciando loro un mondo degradato. Infine, le attuali istituzioni prediligono i bisogni dei cittadini esistenti rispetto a quelli dei cittadini futuri. Il tempo della politica è breve e l'interesse principale dei politici è vincere le prossime elezioni, di conseguenza proporre un aumento di tasse per garantire il benessere delle persone non ancora nate sarebbe una mossa impopolare che vincerebbe pochi voti. Nonostante ciò, i nostri doveri nei confronti delle future generazioni scaturiscono dal riconoscimento del fatto che esse avranno le nostre stesse necessità basilari, come il bisogno poter usufruire di acqua potabile e di aria non inquinata. Le nostre azioni minacciano i fattori che permettono la vita su questo pianeta, come l'ecosistema e l'atmosfera.

Il cambiamento climatico mette in dubbio l'attuale sistema di valori adottato dalle nazioni del mondo, ponendo questioni circa il nostro rapporto con la natura e con i nostri successori. Il sistema di valori di una società è l'insieme delle norme e principi culturalmente costruiti che regolano il comportamento degli individui e che funge da criterio di valutazione delle azioni altrui. L'attuale sistema ha preso forma in seguito alla Rivoluzione Industriale ed allo sviluppo del capitalismo, in un periodo in cui le risorse naturali sembravano illimitate ed al nostro servizio. Inoltre, esso è caratterizzato da una concezione di responsabilità per la quale cause ed effetti sono legati nello spazio e nel tempo e dunque il responsabile di un'azione è facilmente identificabile. Questo sistema di valori rende difficile la comprensione di un fenomeno come il surriscaldamento globale, per cui le emissioni che produciamo oggi in seguito ad azioni apparentemente innocue, come guidare un'auto o accendere un fuoco, avranno conseguenze devastanti per persone che non sono ancora nate o che vivono dall'altra regione del pianeta.

Sebbene gli effetti del cambiamento climatico colpiranno tutte le nazioni del mondo, saranno i paesi in via di sviluppo ad affrontare i primi impatti per via della loro posizione geografica nelle zone tropicali, maggiormente esposte a fenomeni meteorologici estremi, e per la loro dipendenza economica sull'agricoltura, uno dei settori che verranno più colpiti. In generale, i meno abbienti sono più vulnerabili indipendentemente dal loro luogo di provenienza perché essi non posseggono i mezzi necessari per proteggersi dalle calamità naturali, come l'accesso ai sistemi assicurativi, di credito o l'abilità di influenzare le politiche dei loro governi. Ciò comporta una ingente difficoltà nel ricostruire con prontezza le proprietà perse o danneggiate durante disastri di questo tipo. Per questo motivo il cambiamento climatico è sia una causa che un'aggravante della povertà, in quanto deteriora i beni delle persone più indigenti e non consente loro di ricostruire i propri averi, spingendoli nelle cosiddette trappole della povertà. Particolare attenzione va prestata alla disparità di genere nei paesi in via di sviluppo. Infatti, le donne che risiedono in queste nazioni possiedono meno ammortizzatori sociali rispetto agli uomini, il che le rende particolarmente esposte agli effetti del cambiamento climatico. Inoltre, i precetti tradizionali riguardo il ruolo della donna nella società impediscono loro di acquisire le informazioni e le abilità indispensabili per reagire agli imprevisti, come saper nuotare oppure il poter agire in modo autonomo senza la direzione di un uomo.

In conclusione, non possiamo ricorrere ai tradizionali strumenti decisionali come l'analisi economica benefici-costi per tentare di risolvere la questione climatica perché si tratta di un problema etico le cui caratteristiche – la dispersione di cause ed effetti, la frammentazione della rappresentanza e le carenze istituzionali – richiedono la riforma del nostro sistema di valori per essere pienamente comprese e risolte. Solamente facendo appello alla nostra moralità possiamo stabilire come distribuire i costi delle politiche di mitigazione tra le varie nazioni e determinare il valore della vita dei futuri abitanti del pianeta. L'inerzia che questa generazione ha dimostrato nel reagire alla minaccia posta dal cambiamento climatico è indice di corruzione morale: politici e singoli individui hanno sfruttato, consapevolmente o meno, la complessità del fenomeno per concentrarsi sugli elementi che rendono l'indolenza giustificabile, come l'incertezza scientifica o calcoli economici. Oramai non ci sono più dubbi sul fatto che

il surriscaldamento globale sia una realtà e che si tratti di un fenomeno provocato dalle azioni degli uomini. Piccoli cambiamenti nel nostro stile di vita possono diminuire notevolmente il nostro impatto ambientale, come ricorrere a fonti di energia rinnovabile per soddisfare il proprio fabbisogno energetico oppure utilizzare i mezzi di trasporto per gli spostamenti. Abbiamo bisogno di un nuovo sistema di valori per superare la corruzione morale ed affrontare adeguatamente questa minaccia.