

THE HAGUE

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APPLIED SCIENCES

GLOBAL CHALLENGES



APPLIED SCIENCES

CLIMATE CHANGE: A RESEARCH BRIEF

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Introduction

The Centre of Expertise of Global Governance project named “Global Challenges in 365 Days” has come to life. This project aims at creating a database about Global Challenges, to be informed about them, know factual background, and find interesting topics for research.

The following briefing provides a historical overview and scientific findings at base level on the global challenge of Climate Change. It also defines the legal grounds of this issue, and finally explores the still unanswered issues that could be of interest for further research.

1. Historical overview

The scientific concern regarding the impact of human activities on global climate kept growing in intensity and information overload over the past 100 years. Climate change has always been part of the human evolution, considering ice ages and changes on the planet. Yet due to numerous factors induced by anthropogenic impacts climate changes are happening unnaturally rapid. From the historical perspective, the development of humankind and our activities are tied to our better understanding, and therefore the increasing concern about the evolution of the climate system.¹ Reflecting upon climate change and its correlation with the human behaviour brought a gradual, but overwhelming amount of international apprehension from governments, organisations, and general public. The great concern was, and still is, manifested among various historical events and developments.

Firstly, the effects of increasing amounts of CO₂ atmospheric concentration were taken under serious consideration starting from 1958², and therefore providing, by the mid- 1970', compact and thorough scientific data analysis on the said issue³.

The following timeline shows the details on how climate change became more and more important in history.

¹ Luterbacher and Sprinz, *International Relations and Global Climate Change* (MIT Press 2001) 4

² Jager and O'Riordan, *Politics of climate change* (Routledge 1996)

³ Lanchberry and Victor, *The Oxford Handbook of Climate Change and Society* (OUP 1995)

1965 → The “birth” of global warming

In a report called "Restoring the Quality of Our Environment" by the US President's Science Advisory Committee, scientists suggested that increasing temperatures in the atmosphere were due to carbon dioxide increasing. The scientists had previously suggested the “greenhouse effect”, but only in 1975 geoscientist Wallace Broecker introduced the term “global warming”⁴.

1970 → First Earth-Day

On 22 April 1970 organizations attempted to raise awareness of global issues, namely pollution and toxic waste. The movement was inspired by a previous anti-war movement, and has since its beginning become a global event.

1972 → UN Conference on the Human Environment

1979 → First World Climate Conference

A scientific gathering that explored how climate change might affect humans and their activities. It called upon governments to “foresee and prevent potential man-made changes in climate”, that might have negative effects on humanity. Plans for the later established World Climate Programme (WCP) were made under the joint responsibility of the World Meteorological Organization (WMO), the United Nations Environment Program (UNEP), and the International Council of Scientific Unions (ICSU).

1980, 1983, 1985 → Villach Conference establishing possible impact of Climate Change

In 1980, 1983, and 1985 the WMO, UNEP, and ICSU held several conferences where it was established that the significant climate change is highly possible, and that the participating states should initiate a global conference on climate Change.

1988 → Toronto Conference on the Changing Atmosphere

Outcome indicating that global CO₂ emissions should be cut by 20% by 2005.

1988 → Launch of Intergovernmental Panel on Climate Change (IPCC)

⁴ <https://www.globalcitizen.org/en/content/important-moments-climate-history-in-photos/>

Launched by the UN, this panel was created with the aim of assessing the developing science on climate change, and provide updated information to the governments. Its reports started to be used in international climate negotiations, giving them a key role in the process of involving countries into agreements to tackle climate change issues.

1990 → Second World Climate Conference in Geneva

The WMO, UNEP, and other international organizations sponsored this conference that included significant negotiations and ministerial-level discussions among 137 states, including the European Community. A final declaration was adopted, which did not specify any international targets to reduce emissions. It played an important role as it supported several principles that were later included in the Climate Change Convention. For example, these principles emphasize climate change as a “common concern of humankind”, the importance of equity, the common but differentiated responsibilities of states at different levels, sustainable development, and the precautionary principle.⁵

Furthermore, it was established that greenhouse gases need to be stabilized, and countries should set themselves targets in order to tackle the issue of greenhouse gases induced by humans.

1992 → Framework Convention on Climate Change

After two years of negotiations, and twenty years after the first foundations established in the Stockholm Declaration, the Earth-Summit became the largest-ever gathering of Heads of States.⁶

1995 → First Conference of Parties (COP)

Delegates from 117 Parties and 53 Observer States participated in the COP-1. It was agreed that the commitments from the previous Convention were inadequate for developed countries. As a result, the “Berlin Mandate” was established, which proposed additional commitments. During

⁵ The Rio Declaration states “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” Meaning that States shall anticipate environmental harm before it occurs and try to avoid it.

⁶ <https://unfccc.int/cop3/fccc/climate/fact17.htm>

this Conference, the first round of national communications was reviewed. The national communications aim at reporting the current situation in the countries such as CO₂ data, but also the implementations that were made to fight climate change and their actual effects. Furthermore, major components of institutional and financial machinery, needed for supporting the Convention in the future, were finalized.

1997 → COP-3 and the Kyoto Protocol

During the third Conference of Parties, the Kyoto Protocol was agreed upon with the aim of setting binding targets for 37 states and the European Community to reduce greenhouse gas emissions.

1998 → COP-4 and the “Buenos Aires Plan of Action”

Along the course of the fourth Conference of Parties, the Buenos Aires Action Plan was created: a 2-year “Plan of Action” to advance the implementation of the Kyoto Protocol, to be completed by 2000.

2009 → COP-15 and the “Copenhagen Accord”

States were still unclear in several key elements, but in the Copenhagen Accord expressed a clear political intent to reduce carbon and react to climate change, with long- and short-term goals. For example the maximum global average temperature increases was defined, developed countries’ promised to fund actions to reduce greenhouse gas emissions as well as the conclusion of an agreement on the measurement, reporting and verification of developing countries.

2015 → COP-21 with the outcome of the “Paris Agreement”

As a legally binding agreement between 196 Parties that was concluded during the 21st Conference of Parties, the Paris Agreement was a landmark in the multilateral fight against climate change. It was a game-changer, since it was the first binding legally agreement bringing together all nations in the common cause of combating climate change and adapting to its effects. The Paris Agreement also lies down a 5-year-cycle of follow up, forcing States to

implement specific changes and report upon them 5 years later, proving their positive influence in regards to less anthropogenic impact on climate change.

2019 → EU Green Deal

Initiated in the European Union, the Green Deal is aligned with the goals of the Paris Agreements and aims to the EU's economy sustainable. The Green Deal is not legally binding legislation, yet it provides an action plan for the Member States of the European Union on how to boost efficient use of resources by moving to clean and circular energy and also restore biodiversity and cutting pollution. With this the EU hopes to achieve the goal of being climate neutral in 2050.

2020 → COP-26

Supposedly the COP-26 was with the aim to review the first concrete implementations based on the Paris Agreement of the COP-21. Due to the pandemic, the COP-26 was postponed until after the pandemic.

2. Scientific facts/basis (including the impact it has)

Increase of the Average temperature of the Earth

Average temperature increases have been showed in the NASA records ^{7[OBJ]}. The World Meteorological Organization supports a widely held view indicating that the average temperature increases are extremely high and unprecedented in a historical context^{8[OBJ]}.

The increase in temperature of the earth is to be seen in the surface temperature, but also through measuring the temperatures in different layers of the ocean. The ocean absorbed most of the climate change, but the effects can be seen all over, through glaciers and ice sheets melting and rising sea levels.

⁷ [http:// data.giss.nasa.gov/gistemp/station_data/](http://data.giss.nasa.gov/gistemp/station_data/)

⁸ IPCC. WG1 Fourth Assessment Report: Climate Change 2007: The Physical Science Basis: Summary for Policymakers. Paris; 2007.

Increase of Greenhouse Gases

Greenhouse gases found within the Earth's atmosphere absorb the heat and play an important role in the chemical reactions that create the weather on earth. Through the increasing impact of humans on the climate, data shows that from the 20th century onwards, several different greenhouse gases (for example, CO₂, CH₄, and N₂O) were unproportionally, unnaturally increased, thus confirming and proofing the impact and drastic change in climate.

Although temperature recordings started only in the 18th century; natural indicators such as ring trees and ice cores, show that the climate change became much more significant at the start of the 20th century with the involvement of human impact.

Rising Sea Levels

Furthermore, due to the increasing atmospheric temperature the oceans expanding, leading to a rising sea level of averagely 3 millimetres per year.

The rising sea levels lead to islands being submerged, as well as the decreasing of habituated spaces surrounded by the sea (for example New York or Jakarta). The Island communities are facing the consequences of the world's climate change first-hand, by losing their homes and having nowhere to move, because their island becomes smaller and smaller as the time passes.

There are certain projects and initiatives fighting for the people and their families living in small islands that lose their living space bit by bit. Examples of this projects include the government of Tuvalu Islands launching a new coastal protection project to fight against the impact of climate change of their island. Further several Island States have publicly expressed their concern and an initiative called "stop Ecocide" is currently trying to include Ecocide as one of the crimes that are treated by the international Criminal Court.

Loss of Biodiversity

The average wildlife populations have dropped by 60 per cent in the past 40 years.⁹ Climate changes within the range of 5 degrees can extinct several animal species, especially vulnerable

⁹ https://wwf.panda.org/knowledge_hub/all_publications/living_planet_report_2018/

varieties such as coral reefs, being affected by a roughly 2-degree temperature increase of the ocean.¹⁰

Extreme Weather conditions and natural disasters

The increase of green gas emissions and temperature, leads to higher weather extremes, causing new drastic variabilities in cold temperatures as well as hot temperatures recorded all over the world, from Barcelona to New York.

Wildfires destroy the habitat of thousands of animals, and eventually contribute to the further rise of greenhouse gases (for example the Wildfires in Australia (2019 – 2020) and Texas (2021)).

Droughts are another extreme condition that recently occur more often and for longer periods of time, the severe consequences of which, fall on the inhabitants of the African continent, already having very limited access to water.

Heatwaves are recorded as extreme weather conditions, and are occurring not only in areas where heatwaves are common, but also in areas such as Central Europe. Heatwaves can be fatal for people who are not able to cope with the heat. For example, in 2019 France, more than 15 000 people died because of the heatwave effects.¹¹

3. Legal grounds

According to the Grantham Research Institute on Climate Change and the Environment there are more than 2430 legislations worldwide concerning climate change. However, these legislations determine small issues, from local productions and sustainable tourism, to big requirements of companies for the reduction of their carbon footprint.

International climate change law focuses on four basic issues:

1. the mitigation of climate change— that is, limiting it or preventing it from happening;
2. the adaptation to climate change, in order to limit its harmful effects;
3. the financial and other means of support for mitigation and adaptation;

¹⁰ <https://www.ipbes.net/news/ipbes-global-assessment-summary-policymakers-pdf>

¹¹ https://www.unisdr.org/files/1145_ewheatwave.en.pdf

4. the international oversight to promote implementation, compliance, and effectiveness.¹²

Paris Agreement

The most famous agreement for Climate Change is the Paris Agreement that is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP-21 in Paris, on 12 December 2015, which entered into force on 4 November 2016.

The challenge with this agreement is that the goals are indeed to limit global warming by decreasing the temperature rise, and achieve a climate neutral world by 2050 yet the enforceability of the agreement is difficult to achieve, due to the goals set in the far future and until now there was no precedent of sanctions against a country because of their failed climate actions.

The agreement determined a 5-year-cycle in which all parties have to report about their changes implemented in their states as well as providing data that proves the positive impact of those changes regarding climate change.

The Paris Agreement also clarified that developed countries should have the lead in providing financial assistance in combating climate change. The Agreement further introduced a “technology framework” that envisions all parties should work on technological developments to achieve climate goals.

4. Actions possible for everyone

Reducing consumption of animal protein by half, may reduce your carbon footprint by 40%

Animal-based foods generally use more resources, and therefore are more impactful on the environment than non-animal-based products. Beef production requires 20 times more land and emits 20 times more greenhouse gas emissions per unit of edible protein than common plant-based protein sources (such as beans, peas, and lentils). Chicken and pork are more resource-

¹² Bodansky and others, *International Climate Change Law* (OUP 2017)

efficient than beef, but still require three times more land, and emit three times more greenhouse gas emissions than beans.¹³

Act small and think big; if 1 million people reduce their meat intake per 1 day a week, they may reduce the meat consumption by roughly 250 000 kg. Therefore, it is important to slowly shift to a less animal-based diet, to let the market adjust to the need of the consumers.

Re-think about your flights

A flight between London and Amsterdam emits 58kg CO₂ per person, compared to the train ride between those two cities that only emits 3kg CO₂ per person. Therefore, through cutting back in travelling and taking the train or bus for short-distance journeys can have a big impact on the overall greenhouse gas emissions.

Less Car Driving

When possible, the switch from a car-ride to taking the bike, walk or take public transport can be very impactful. This reduces not only greenhouse gas emissions, but also air pollution by traffic fumes. Those fumes are a serious threat to human health, such as reportedly the negative effect on the health of unborn babies.¹⁴

Reduce energy use

Energy use may be reduced through little changes such as an extra layer and turning the heating down for a degree or two. Lights and appliances should be turned off when not needed at that very moment; light bulbs may be changed to LED or other low-energy lights.

Reducing shower time by 5 minutes can save between 50 to 80 Liters of water.

Cut consumption – and waste

Every product that is used has a carbon footprint, through its production and delivery. Therefore, through reducing consumption, emissions can be reduced. This can be done through buying 2nd

¹³ <https://www.wri.org/insights/sustainable-diets-what-you-need-know-12-charts>

¹⁴ <https://www.imperial.ac.uk/news/183504/air-pollution-from-london-traffic-affecting/>

hand, assuring that products are used as long as possible and food waste is reduced to a minimum.

Buy local (and sustainable)

By buying local and seasonal food, less energy and therefore greenhouse gases are needed to produce and deliver products.

Reduce (plastic) waste

Making the active choice to use reusable products instead of single use can reduce the impact on the climate in production but also when it becomes waste and has to be recycled, burnt or otherwise eliminated.

Properly throwing away trash instead of dropping it on the street avoids that the waste that ends up in the living space and nutrition of animals. As a result, the biodiversity, which keeps climate change low, can be safeguarded. Sorting trash may also help in that, as less resources need to be used to sort it at a later stage to burn it, or dispose it in the sea.

Talking about the changes you make and inspire others

Often the impact one person might have is overlooked, through talking about changes that one implemented and making others aware may inspire others to also re-think their actions. Every little step is important in the global combat against climate change.

Become Part of an organization/association

In order to take part in more collective action, people may also become participate in organizations that are trying to find and implement solutions. For example the UniC, an international network of students that want to fight climate change together.

5. Uncertainties where more research could be done

Accountability in climate change

Addressing accountability is difficult due to the complex nature of framing a governments' responsibilities for actions against environmental regulations. Therefore, holding an individual/organisation accountable poses as a challenge that should be dealt with.

Enforcement of climate change rules

Using the Paris Agreement as base, another question is, how could climate change agreements be enforced, given the question of accountability is not answered with certainty. For example, in 2015, Royal Dutch Shell was ordered to implement stringent carbon dioxide emissions by Dutch judges, thus setting a general guideline for major European companies.¹⁵

Correlation of international criminal law and climate change

Currently there are campaigns running that "ecocide" should be an international crime included in the jurisdiction of the ICJ. However, it is questionable if this is a realistic possibility.

¹⁵ <https://theconversation.com/shell-ordered-to-cut-its-emissions-why-this-ruling-could-affect-almost-any-major-company-in-the-world-161754>