



LEGAL PROTECTION OF THE ATMOSPHERE IN INTERNATIONAL LAW: ACHIEVEMENTS AND LACUNAS

Motaharehsadat Mahdiansadr

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Legal Protection of the Atmosphere in International Law: Achievements and Lacunae

Motaharehsadat Mahdiansadr



DOCTORAL THESIS

2021

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I STATE that the present study, entitled "Legal Protection of Atmosphere in International Law: Achievements and Lacunas", presented by Motaharehsadat Mahdiansadr for the award of the degree of Doctor, has been carried out under my supervision at the Department of Public Law this university.

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Legal Protection of the Atmosphere in International Law: Achievements and Lacunas

TESIS DOCTORAL

Dirigida por la Dra. Susana Borràs Pentinat

Departamento de Derecho Público



UNIVERSITAT ROVIRA I VIRGILI

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"And We made the sky a protected ceiling, but they, from its signs, are turning away."

-Quran, 21:32

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ABSTRACT

The atmosphere is considered a vital element to the survival of humankind and all life on Earth. Therefore, atmospheric degradation and atmospheric pollution has to be a matter of grave concern to all international community members. For the first time, the UN General Assembly, in its resolution 'Protection of Global Climate Change for Present and Future Generations of Mankind', has considered the degradation of the atmosphere a 'common concern of humankind'. Thereafter, the atmosphere's protection is highlighted by the current negotiations in the context of the UN Framework Convention on Climate Change. However, as of today, as the Earth's largest single natural resource, the atmosphere is not subject to a comprehensive legal regime. Instead, the atmosphere is being regulated by a patchwork of national, regional and international legal instruments.

This doctoral thesis aims 1) to provide an overview of the condition of the atmosphere and the threats leading to its degradation associated with humans; 2) to clarifying the legal status of the atmosphere according to legal measures for the atmospheric protection; 3) to study the gradual development of the atmospheric protection legal frameworks and instruments under international law, such as work of the international law commission on the protection of the atmosphere, and treaties on combating air pollution and climate change; 4) to proposing a new view of the protection of the atmosphere as a common interest rather than the traditional reciprocity approach.

To this end, Part I "Conceptualizing The Protection Law Of The Atmosphere In Light Of Its Gradual Degradation" analyzes the atmospheric degradation and harms to the environment and humans. Also it discusses the legal concept of the atmosphere. Part II "International Legal and Institutional Framework to Protect the Atmosphere" firstly assesses the soft law mechanisms, and later analyzes the important role that customary international law plays in the protection of the atmosphere. It also studies all of the substantial corresponding treaty laws. Part III "Judicial Protection of the Atmosphere" deals with international tribunals' decisions regarding atmospheric issues and proposing the doctrine of "*actio popularis*" as a procedural mechanism, which can promote better protection for the atmosphere; and finally part IV "Evolutions and Innovations in the Legal Protection of the Atmosphere. The Atmosphere as an Intergenerational Right and Obligation, Protection Based on the Human Rights Framework" deals with the theoretical as well as practical discussion of the creation and development of the human right to a healthy and protected atmosphere and its possible role in the protection of the atmosphere.

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List of Abbreviation & Acronyms

AWG	Anthropocene Working Group
ALRI	Acute Lower Respiratory Infections
AOSIS	Alliance of Small Island States
AQG	AIR QUALITY GUIDELINE
AQI	Air Quality Index
ARP	Acid Rain Program
ARSIWA	Articles on Responsibility of States for Internationally Wrongful Acts
ASEAN	Association of Southeast Asian Nations
ASGM	Artisanal And Small-Scale Gold Mining
AWDI	Alternating Wet-Dry Irrigation
BaP	Benzo[a]pyrene
BAT	Best Available Technology
BATEF	Best Available Technology Economically Feasible
BAU	Business as usual
BC	Black Carbon
CAIR	Clean Air Interstate Rule
CBDR	Common but Differentiated Responsibilities
CCAC	Climate and Clean Air Coalition
CCME	Council of Ministers of the Environment
CDM	Clean Development Mechanism
CFCs	Chlorofluorocarbon
CIL	Center for International Law
CL	Critical Loads

CLRTAP	Convention on Long-range Transboundary Air Pollution
CO	Carbon Monoxide
CO₂	Carbon Dioxide
COP	Conference of the Parties
COPD	Chronic Obstructive Pulmonary Disease
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSCE	Conference on Security and Cooperation in Europe
CWS	Canada-wide Standards
EANET	Network in East Asia
EECCA countries	Eastern Europe, the Caucasus and Central Asia
EIA	Environmental Impact Assessment
EIT	Economies in Transition
EMEP	European Monitoring and Evaluation Program
EPA	Environment Protection Agency
ERF	Effective Radiative Force
ET	Emissions Trading
EU28	28 Member States of European Union
HCB	Hexachlorobenzene
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
GATT	General Agreement on Tariffs and Trade
GBD	Global Burden of Diseases
GHG	Greenhouse Gas

GMST	Global Mean Surface Temperature
GMBM	Global Market Based Measure
GWP	low-global Warming Potential
IAEA	International Atomic Energy
IAR	International Assessment and Review
IC	Implementation Committee
ICA	International Consultation and Analysis
ICAO	International Civil Aviation Organization
ICC	International Criminal Court
ICJ	International Court of Justice
IDI	Institute de Droit International
LU	Land Use
LUC	Land Use Change
IHD	Ischemic Heart Disease
IISD	International Institute for Sustainable Development
ILA	International Law Association
ILC	International Law Commission
ILO	International Labour Organization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
LC	Lung Cancer
LRTAP	Long Range Transboundary Air Pollution
LU	Land-use

MOP	Meeting of Parties
MRV	Measurable, Reportable and Verifiable
NDC	Nationally Determined Contribution
NO_x	Nitrogen Oxides
NO₂	Nitrogen Dioxide
nvPM	Non-Volatile Particulate Matters
O₃	Ozone
OECD	Organization for Economic and Co-operation and Development
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCDD/Fs	Polychlorinated Dibenzo-p-Furans
PCIJ	Permanent Court of International Justice
PEMAS	Pollution Emission Management Areas'
PM	Particulate Matter
POPs	Persistent Organic Pollutants
RAINS	Regional Acidification Information System
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RF	Radiative Force
SEE	South East Europe
SLCPs	Short-Lived Climate Pollutants
SNR	Shared Natural Resources
SO₂	Sulphur Dioxide

Special Rapporteur	Special Rapporteur of the UN International Law Commission for “Protection of Atmosphere”
SWB	Subjective Well-Being
TOMAs	Tropospheric Ozone Management Areas
UNCED	United Nations Rio Conference on Environment and Development
UNCLOS	United Nations Convention on Law of the Sea
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
UV	Ultraviolet
UVB	Ultraviolet B
VCLT	Vienna Convention on the Law of Treaties
VOCs	Volatile Organic Compounds
WHO	World Health Organization
WMO	World Meteorological Organization
WTO	World Trade Organization

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INTRODUCTION

The atmosphere is considered a vital element to the survival of humankind and all life on Earth. Therefore, the degradation of the atmosphere's condition and atmospheric pollution has to be a matter of grave concern for all international community members. The atmosphere's protection is highlighted by the current negotiations in the context of the UN Framework Convention on Climate Change (hereinafter, UNFCCC).¹ However, as of today, as the Earth's largest single natural resource, the atmosphere is not subject to a comprehensive legal regime comparable to that of the second-largest resource, namely, the Law of the Sea. Instead, the atmosphere is being regulated by a patchwork of national, regional and international legal instruments.²

Scientific researchers demonstrate that human activities are moving several of Earth's sub-systems outside the range of natural variability typical for the previous 500,000 years. Human activities are causing critical tipping points in the Earth system that might lead to rapid and irreversible change.³ According to the scientific studies provided by the Anthropocene Working Group (hereinafter AWG), there is a wide range of evidence and facts proving that we already have entered the Anthropocene. As AWG clarified, these changes mark the proposed Anthropocene as sufficiently different from the Holocene to constitute a new geological time unit.⁴ Compelling scientific evidence suggests that human activities have pushed the Earth system beyond three of its nine

¹ Peter H Sand and Jonathan B Wiener, 'Towards a New International Law of the Atmosphere?' (2016) 2 *Goettingen Journal of International Law* 195, 196.

² *ibid* 2–3.

³ F Biermann and others, 'Navigating the Anthropocene: Improving Earth System Governance' (2012) 335 *Science* 1306, 1306.

⁴ Jan Zalasiewicz and others, 'The Working Group on the Anthropocene: Summary of Evidence and Interim Recommendations' (2017) 19 *Anthropocene* 55. See also, Pasi Heikkurinen and others, 'The Anthropocene Exit: Reconciling Discursive Tensions on the New Geological Epoch' (2019) 164 *Ecological Economics*.

interlinked biophysical thresholds or 'planetary boundaries'⁵, which is likely to translate into disastrous consequences for humanity in the years to come.⁶

Regarding the atmosphere, in particular, there are three important causes for the degradation and contamination of the atmosphere; first, the release of harmful substances known as air pollution into the troposphere and lower stratosphere that cause changes in atmospheric conditions. Air pollution's major contributing causes are acid nitrous oxide,⁷ suffixes, and hydrocarbon emissions such as carbon dioxide. Second, CFCs and Halons emitted into the upper troposphere and stratosphere cause ozone depletion.⁸ Third, changes in the composition of the troposphere and lower stratosphere cause climate change. The leading cause of human-induced climate change is the emission of gases such as carbon dioxide (CO₂), nitrous oxide, and methane, collectively called greenhouse gases. In recent years, there has been growing scientific evidence that tropospheric ozone and black carbon are the two substances in the atmosphere most directly threatening both air quality and causing climate change.⁹

Considering the atmosphere's unity and cross-border nature, it is vital to recognize the atmosphere's character as a physio-economic unit that cannot be divided by an intersection by various jurisdictional frontiers. Urban air pollution studies have revealed the startling fact that environmental highways within the biosphere cause automobile

⁵ See Johan Rockström and others, 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity' (2009) 14 *Ecology and society*.

⁶ Rakhyun E Kim and Klaus Bosselmann, 'International Environmental Law in the Anthropocene: Towards a Purposive System of Multilateral Environmental Agreements' (2013) 2 *Transnational Environmental Law* 285, 285–286.

⁷ Nitrous oxide is a potent greenhouse gas with a global warming impact 300-fold higher than carbon dioxide. See Sofia R Pauleta, Marta SP Carepo and Isabel Moura, 'Source and Reduction of Nitrous Oxide' (*Coordination Chemistry Reviews*, 2019) 436 <<https://doi.org/10.1016/j.ccr.2019.02.005>> accessed 1 February 2021.

⁸ See Archie McCulloch, 'CFC and Halon Replacements in the Environment' (1999) 100 *Journal of Fluorine Chemistry* 163.

⁹ Shinya Murase, 'Protection of the Atmosphere and Codification and Progressive Development of International Law', (2011) <<http://webtv.un.org/watch/shinya-murase-protection-of-the-atmosphere-and-codification-and-progressive-development-of-international-law/2621179002001/?term=>>> accessed 20 October 2018.

exhaust released in concentrated urban areas to affect agriculture hundreds of miles away.¹⁰

For the first time, the UN General Assembly, in its resolution 'Protection of Global Climate Change for Present and Future Generations of Mankind',¹¹ has considered the degradation of atmospheric conditions as a 'common concern of humankind'. The atmosphere's legal protection as a common concern could be described as one of the main crucial environmental issues that the international community faces and needs collective cooperation to deal with it. Current and future generations have the right to life and breathe on a healthy Earth. The concept of the "common concern of humankind" applies to protecting from the adverse effects of atmospheric degradation and the protection of human rights. It requires a bridge between human rights law and environmental law on these two fundamental concerns.¹² The significance of the concept of common concern of humankind is that the international community collectively has an interest in the global atmosphere and a shared responsibility to seek intergenerational rights, sustainable development and equity. The present research entitled "Legal Protection of the Atmosphere in International Law: Achievements and Lacunas" aims to study the gradual development of the atmospheric protection legal frameworks and instruments under international law and proposing new view to the protection of the atmosphere as a common interest rather than traditional reciprocity approach.

The methodology of this thesis is based on descriptive analysis. This thesis firstly attempts to identify and analyze the basic concepts and perspectives. Its approach is to be taken in connection with the subject to outline the questions the international community must consider with respect to the protection of the atmosphere. It is true that many atmospheric protection measures lie in the national legal regimes. However,

¹⁰ EG Lee, 'International Legal Aspects of Pollution of the Atmosphere' (1971) 21 *The University of Toronto Law Journal* 203, 203–204.

¹¹ UNGA, 'Res 43/53 "Protection of Global Climate for Present and Future Generations of Mankind" (6 December 1988) GAOR 43rd Session Supp 49 Vol 1, 133.'

¹² Laura Horn and Steven Freeland, 'More than Hot Air: Reflections on the Relationship between Climate Change and Human Rights' (2009) 13 *UW Sydney L. Rev.* 101, 134.

as was explained, the atmosphere's very nature as the Earth's largest single natural resource and the transnational uses of the atmosphere beyond national analyze jurisdictions require a firm and comprehensive international legal protection. Despite the formation of several international legal instruments dealing with the atmospheric challenges, including climate change, air pollution and ozone layer depletion in the last few decades, the trends and scientific research show that the international community needs a far more efficient legal regime for the protection of the atmosphere. Therefore, the central question of this research is:

What are the main challenges to the protection of the atmosphere under the existing international law instruments?

This question will be followed by the second question, which is:

How have the recent developments, including the International Law Commission's work, contributed to filling the legal shortcomings on the protection of the atmosphere?

To address the above problems, this thesis, is divided into four main parts and eight chapters. Part I, entitled "Conceptualizing the Protection Law of the Atmosphere in Light of its Gradual Degradation", deals with the atmosphere's protection from a technical point of view to the formation and development of the protection of the atmosphere as a legal concept. This part provides relevant information on the atmospheres' physical characteristics, which will serve as a basis for defining the atmosphere in legal terms. It also provides a broad outline of the various elements comprising the project's general scope, intending to identify the main legal questions to be covered. Chapter 1, entitled "The Atmosphere and its Degradation", intends to provide an overall technical understanding over the atmosphere and the causes and effects of its degradation and pollution. Through the studies gathered in chapter 1, it is expected that the importance of protection of the atmosphere for the current and future generations will be clarified. After this technical analysis, chapter 2, entitled "Conceptualization of the Legal Status of the Atmosphere, " deals with the atmosphere's definition and legal status. There are several views regarding the legal nature of the atmosphere. This chapter discusses

whether the atmosphere shall be considered as a common good, a common concern of humankind or a humankind heritage. It is anticipated that clarifying the key concepts from a legal perspective enables a more disciplined analysis of their legal status, meanings, functions, implications, possibilities and limits within the existing legal regimes will set the stage for a more constructive elaboration and progressive development of international law on the protection of the atmosphere in the future.

Part II provides a chronological study of the historical evolutions of the protection of the atmosphere in international law. It refers to the sources relevant to progressive development and codification of the law on the topic.

Therefore, Part II of the thesis, entitled “International Legal and Institutional Framework to Protect the Atmosphere”, provides a study over almost all the essential international legal mechanisms dealing with the protection of the atmosphere. Chapter 3, entitled “Protection of the Atmosphere, a Review of Soft Law”, first assesses the soft law mechanisms, and Chapter 4 entitled “Protection of the Atmosphere in Light of Customary International Law and Principles of International Law” later analyzes the important rule that customary international law plays in the protection of the atmosphere. Regarding Chapter 4, it is crucial to consider the legal principles and rules on the subject within the framework of general international law. The fundamental issues to be studied by the thesis involve such questions as the fundamental rights and obligations of States, the jurisdiction of States, the implementation of international commitments through the domestic laws of States, the responsibility of States and a review of the international courts’ decisions about corresponding topics, as well as the sources of international law and classic issues for international lawyers in general. In this context, the legal principles and rules applicable to the atmosphere, including the “Preventive Principle” and “Precautionary Principle”, should, as far as possible, be considered in relation to the doctrine and jurisprudence of general international law. Like many other branches of international law, the main question in place regarding the protection of the atmosphere is finding the limitations of the territorial sovereignty where its exercise touches upon the territorial sovereignty and integrity of another State. The thesis further discusses the customary principles of *sic utere tuo ut alienum*

non laedas (you should use your property in such a way as not to cause injury to your neighbor's) as well as by the principle of State responsibility for actions causing transboundary damage, which were at the core of the atmospheric judicial decisions.¹³ In this sense, the thesis provides descriptive research on almost all of the important regional and international legal instruments in place and the customary international law principles.

Chapter 5, as the final chapter of this part entitled "International and Regional Legal Instruments: Main Corresponding Treaties", studies all of the substantial corresponding treaty laws. Regarding the treaty laws, to have a review over the milestone of these instruments, the following initial multilateral mechanisms shall be addressed: the 1979 ECE Convention on Long-Range Transboundary Air Pollution and the protocols thereto; the 1985 Vienna Convention for the Protection of the Ozone Layer; the 1987 Montreal Protocol to the Vienna Convention. These multilateral and regional actions have been followed by the 1991 Canada-US Air Quality Agreement, the 1992 United Nations Framework Convention on Climate Change, the 1997 Kyoto Protocol to the United Nation Framework Convention on Climate Change, the 2002 ASEAN Agreement on Transboundary Haze Pollution and the latest Paris Agreement of 2015. Reviewing this milestone provides an understanding that the atmospheric related instruments are a patchwork of scattered legal instruments. It seems fair enough to call these instruments as scattered because of their geographical coverage and their substantive limits in addressing a particular issue of atmospheric degradation and not all of them.

Part III of the thesis entitled "Judicial Protection of the Atmosphere" deals with international tribunals' decisions regarding atmospheric issues. Chapter 6, entitled "Main International Jurisprudence", provides a study on some of the critical international decisions in the topic and their influence in developing the legal framework for protecting the atmosphere. Later, Chapter 7, "*Actio Popularis* to Protect the

¹³ Nico Schrijver, 'International Environmental Law: Sovereignty versus the Environment' [1997] Sovereignty over Natural Resources Balancing Rights and Duties 219–220.

Atmosphere”, evaluates the doctrines in applying “*actio popularis*” as a procedural mechanism, which can promote better protection for the atmosphere.

Part IV of the thesis entitled “Evolutions and Innovations in the Legal Protection of the Atmosphere. The Atmosphere as an Intergenerational Right and Obligation, Protection Based on the Human Rights Framework” deals with the theoretical as well as practical discussion over the creation and development of the human right to a healthy and protected atmosphere and its possible role in the protection of the atmosphere.

For the realization of the thesis, an exhaustive source gathering has been made on both physical libraries and digital sources. Regarding the libraries, it is worth highlighting the Rovira i Virgili University (Tarragona) and Complutense University (Madrid). Both libraries have provided considerable access to resources. Moreover, an extensive range of digital resources were consulted on the Internet and in different databases, including the Science Direct, HeinOnline, and Cambridge Core. Also, the database of UNDocs has been used for access to the United Nation’s organs’ documents.

From the substantive point of view, an in-depth research has been done on three groups of the important literature dealing with the legal protection of the atmosphere. First, the sources which directly deal with the international legal protection of the atmosphere or one of the significant atmospheric issues like the climate change and the air pollutions. Second, the books that are generally dealing with international environmental law dedicated parts or chapters to the issue of the protection of the atmosphere. Third, the sources dealing with specific international law topics like the transboundary pollutions, common concern of humankind, and international laws of natural resources that substantively include the issue of atmosphere protection. Finally, the UN Documents, specifically the Special Rapporteur reports to the International Law Commission, was one of the primary resources used in elaborating the discussions on different chapters of the thesis.

PART I: CONCEPTUALISING THE PROTECTION LAW OF THE ATMOSPHERE IN LIGHT OF ITS GRADUAL DEGRADATION

Chapter 1: The Atmosphere and its Degradation

This chapter deals with a review of the technical definition of the atmosphere and its pollution and degradation. It is true that the thesis focuses on the legal aspects of the atmospheric protection, however, without having a clear understanding of the technical and scientific issues of the atmosphere, it is impossible to provide a reliable holistic legal study. Both in definition of the atmosphere as well as the issues of its degradation and the pollution, a general understanding of the scientific facts and information are a preamble to acknowledge the corresponding issues which are expected to be regulated by different international legal instruments.

1.1. Definition of the Atmosphere

The definition of the atmosphere could be regarded from a distinct technical or legal point of view. It is important to illustrate the definition and criteria of the atmosphere, which concerned in the scope of the legal protection. In fact, 80 percent of air mass exists in the troposphere and 20 percent in the stratosphere so we are concern only about these two layers in the project which is sometimes called lower atmosphere that is up to 40-50 kilometers above ground. The upper atmosphere (namely, the mesosphere and thermosphere), which comprises approximately 0.0002 percent of the atmosphere's total mass, and outer space are of little concern in view of the environmental problems under consideration.

1.1.1. The historical consideration of the atmosphere

The chemical composition of the atmosphere has changed considerably over the estimated 4.6 billion years of the Earth's existence. The early atmosphere was probably composed mostly of water vapor, carbon dioxide, and nitrogen. Because none of these compounds is able to block the intense ultraviolet (UV) radiation from the sun, the Earth was not hospitable to life in its earliest days. About 3.8 billion years ago, however, primitive, single-celled plants emerged deep enough in the oceans to avoid exposure to the UV radiation. Through the process of photosynthesis, these tiny plants absorbed carbon dioxide from the oceans and released oxygen. This oxygen, in turn, began to accumulate in both the oceans and the atmosphere, where it was available to the animal life that evolved later. Oxygen molecules in the stratosphere are broken apart by intense

solar radiation, it process that frees up individual oxygen atoms so that they can combine with other oxygen molecules to form ozone molecules. The resulting ozone (which is present in concentrations of no more than about 10 parts per million) is the only atmospheric chemical capable of shielding the Earth from the frequencies of UV radiation that are highly damaging or deadly to most life forms. It was this protective ozone layer that made it possible for plant and animal species to begin populating land areas and the shallow pats of the oceans.¹⁴

Before Sixteenth century the word 'atmosphere' was not known and used, and even the conception of atmosphere by itself was not determined. In the seventeenth century, Simon Stevin invented the Dutch term Dampclood which literally means vapor-ball. And Snellius who was invented the Latin neologisms of atmosphaera for dampclood.¹⁵

The Aristotelian doctrine believed that there are three layers below the sphere of fire. The first layer below the sphere of fire is dry and hot, the second layer is cold and wet, and the lowest region is warmer than second region because of reflection of sunlight on the Earth's surface. In case of division of the region of air, Gassendi was the only one who had a different opinion with Aristotelian meteorology, he believed the region of air divides to only two layers not three, which filled by vapors and exhalations layer and other layer of pure air or ether which blanketed the Earth.¹⁶

The mathematic and astronomic scientists have been tried to calculate the uppermost altitude of vapors which develop the phenomenon of the setting and rising sun and moon, as twilight can appearance by denser vapors than simple air. Different scientists such as Ibn Mu'a"hd, Witelo, and Oresme calculated the height of highest vapors between 48-52 miles. They also believed the region above the vapors filled by pure air which potentially is compatible with Aristotelian meteorology.¹⁷ In opposite Robert Hooke found that the atmosphere and its boundary is not firm and stable, according to

¹⁴ Marvin S Soroos, 'Preserving the Atmosphere as a Global Commons' (1998) 40 Environment: Science and Policy for Sustainable Development 6, 8.

¹⁵ Craig Martin and others, 'The Invention of Atmosphere', vol 52 (Elsevier Ltd 2015) 46.

¹⁶ *ibid* 52.

¹⁷ *ibid* 45.

his calculation most of atmosphere is situated below three or four miles above the Earth.¹⁸ Some scientists like Boyle, Hooke, Gassendi, Halley, and Newton believed that the region of air filled by various particles and chemicals compositions from the terrestrial exhalations, which was compatible with Aristotelian meteorology. The conception of the atmosphere after twentieth century is more compatible with Halley and Hook rather than Stevin and Ibn Mu'a'hd. Since density, chemical composition, temperature, and movement define the five layers, and the borders between the layers and between outer space are for the most part fluid rather than fixed.¹⁹

1.1.2. The technical definition of the atmosphere

Most international treaties and documents do not define 'the atmosphere', even though it is the object of protection for the purpose of the application of those treaties. Alternatively, such instruments tend to define the causes and effects of damage to the object of protection. For instance, in the 1979 Convention on Long-range Transboundary Air Pollution and the 1992 United Nations Framework Convention on Climate Change, are defined respectively air pollution and climate change, but not the air or the atmosphere per se.²⁰

The atmosphere could be technically defined as: "The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1 percent volume mixing ratio), oxygen (20.9 percent volume mixing ratio), together with a number of trace gases, such as argon (0.93 percent volume mixing ratio), helium and radioactively active greenhouse gases such as carbon dioxide (0.035 percent volume mixing ratio) and ozone. In addition, the atmosphere contains the greenhouse gas water vapor, whose amounts are highly variable but typically around 1 percent volume mixing ratio. The atmosphere also contains clouds and aerosols."²¹

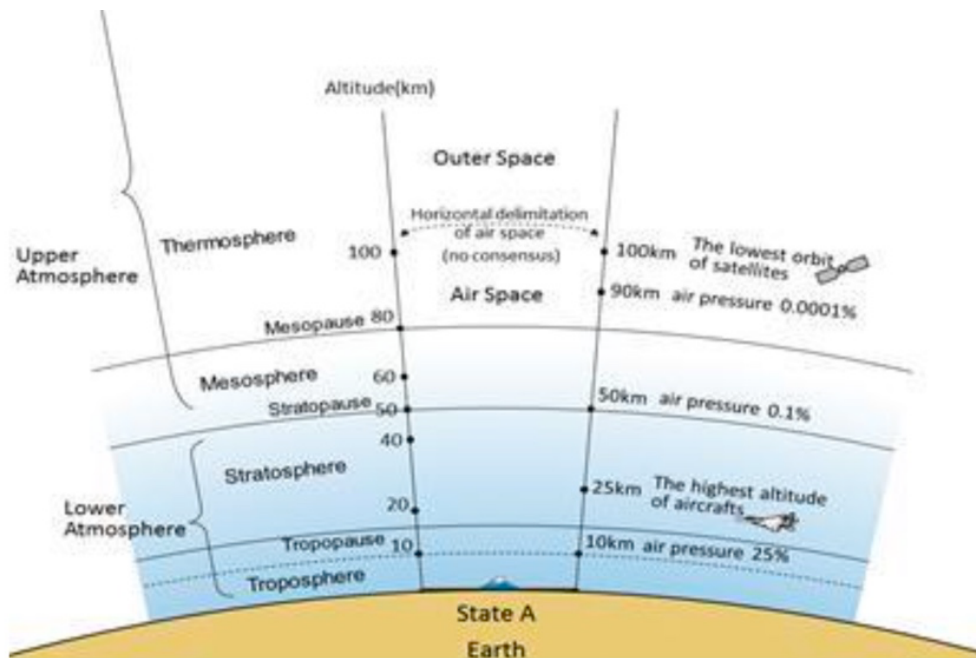
¹⁸ *ibid* 46.

¹⁹ *ibid* 52.

²⁰ Shinya Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' 46.

²¹ IPCC, 'Annex I: Glossary [Matthews, J.B.R. (Ed.)]. In: Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Streng' (2018).

Figure 1. Spheres above the Earth



Source: Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, (n 20)

Accordingly, the legal protection of the atmosphere neither deals with the upper atmosphere and neither to mention outer space. In fact, instantly we still do not know where air space ends and where the outer space begins. Therefore, there is no consensus over that point yet. If one look at the globe from a distance, it is seen a very thin hazy layer covering the Earth and that is the atmosphere, it is a common natural resource, which is indispensable for the survival of human kind and is the subject of legal protection.²²

In the First report by the UN Special Rapporteur, the atmosphere has been defined as:

²² Murase, 'Protection of the Atmosphere and Codification and Progressive Development of International Law', (n 9).

“(...)the layer of gases surrounding the Earth in the troposphere and the stratosphere, within which the transport and dispersion of airborne substances occurs.”²³

Following to the debates in the Sixty-seventh session the word “layer” changed to the word “envelope” in order to eliminate confusion with specific layers of the atmosphere. Consequently, the definition of the atmosphere has been presented as: “The envelope of gases surrounding the Earth”.²⁴

1.2. Threats to the atmosphere and their consequences

The problem of the atmospheric degradation is a multidimensional phenomenon. It has numerous linkages with economic, social, political and health factors. Therefore, there is a pressing need for a comprehensive approach in reaching an effectual solution as far as the quality of life is concerned.

There are three particularly important causes for the degradation of the atmosphere. First, the harmful substances that is air pollution in to the troposphere and lower stratosphere that causes changes in atmospheric conditions. Air pollutant can be defined as “any substance which may harm humans, animals, vegetation or material”.²⁵ The major contributing causes of air pollution are acid nitrous oxide, suffixes and hydrocarbon emissions such as the carbon dioxide. Strong horizontal winds such as jet streams can quickly transport and spread these gases horizontally all over the globe far from the original sources.

Second, CFCs and Halons emitted in to the upper troposphere and stratosphere cause ozone depletion, ozone has same chemical structure miles above at ground level, it can be good or bad depending on its location in atmosphere, the main concentration of

²³ This definition was provided by the Special Rapporteur as the guideline to be taken into account for the drafting committee. Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 47.

²⁴ International Law Commission, ‘Protection of the Atmosphere Texts and Titles of Draft Conclusions 1, 2 and 5, and Preambular Paragraphs Provisionally Adopted by the Drafting Committee on 13, 18, 19 and 20 May 2015, Sixty-Seventh Session, UN Doc A/CN.4/L.851’ (2015) 2.

²⁵ Marilena Kampa and Elias Castanas, ‘Human Health Effects of Air Pollution’ (2008) 151 *Environmental Pollution* 362, 362.

ozone that is good ozone are at altitude of 15 to 40 kilometers above the Earth. The ozone layer filters out ultra violet radiation from the sun which may cause skin cancer and other injuries to life.

Third, changes in the composition of troposphere and lower stratosphere that causes climate change. The main cause of human induced climate change is the emission of substances such as carbon dioxide (CO₂), nitrous oxide, methane which are called climate pollutants. In recent years it has been growing scientific evidence that tropospheric ozone and black carbon as two substances in the atmosphere most directly threatening both air quality and causing climate change.²⁶

Air pollution and climate have been more challenging to be tackled, so this section is devoted to information of the origins, current situation, and effects of these threats.

1.2.1. Air Pollution

In 1950s and 1960s, air pollution used to be known as a local issue. Later in 1970s and 1980s, some of sources to acidification of lakes and forests in northern Europe was recognized in industrial regions of faraway countries. Indeed, air masses moving across polluted regions and into the cleaner regions carried pollutants. The proved long-range impacts showed the significance of international cooperation in scientific researches and monitoring efforts as well as developing conventions.²⁷ Another example is mercury a neurotoxicant, which can travel far from original sources of the emissions on winds and ocean currents. The share of domestic sources to atmospheric mercury deposition varies from more than 65% in Asia to less than 5% in the Arctic and Antarctica.²⁸ The attentions get drew on mercury after Minamata disaster in 1950s, where mysterious

²⁶ Murase, 'Protection of the Atmosphere and Codification, and Progressive Development of International Law', (n 9).

²⁷ R Maas and P Grennfelt, 'Towards Cleaner Air: Scientific Assessment Report 2016' (EMEP Steering Body and Working Group on Effects of the Convention ofn Long ... 2016) iv, 7.

²⁸ AMAP/UN Environment, 'Technical Background Report to the Global Mercury Assessment 2018' (Arctic Monitoring and Assessment Programme, Oslo, Norway ,UN Environment Programme, Chemical and Health Branch, Geneva, Switzerland 2019) 5–1.

neurological disease outbreak. However, it took decades for governments and international authorities to take action against mercury emissions.²⁹

Some of air pollutants and their precursors are known to be largely affected by transboundary and transcontinental transports. Some of particulate matter precursors, ozone and its precursors, mercury, some persistent organic pollutants (POPs e.g. hexachlorobenzene, dioxins, polychlorinated biphenyls) are examples of pollutants required international cooperation to be reduced.³⁰ Indeed, the peak concentrations of them are declined by tackling the problem in local hotspots, but further protection to human health requires to prevent long-term exposure to lower concentrations, which sources are beyond boundaries in northern hemisphere or due to background levels.³¹

The rest of this section is going to classify the major air pollutants, introduce healthy thresholds and target values by World Health Organization (WHO) as well as some countries, describe major sources, and finally report the data for current situation and trends. Therefore, aspects of the problem and how it is involved in various fields will be clearer.

1.2.1.1. Classification of Major Air Pollutants

There are various groups of air pollutants, which some still threatening health and ecosystem in many areas like UNECE regions (United Nations Economic Commission for Europe).³² One famous group of air pollutants is particulate matter (PM), which is a target to many epidemiological studies that explores adverse health effects of air pollution.³³ It usually is defined as “A heterogeneous mixture of tiny solid or liquid particles suspended in the air”. In addition, components of particulate matter can be

²⁹ Rebecca Kessler, ‘The Minamata Convention on Mercury: A First Step toward Protecting Future Generations’ (2013) 121 *Environmental Health Perspectives* A304, A305.

³⁰ Maas and Grennfelt (n 27) 3, 13, 18, 22, 23. To see more information about Transboundary air quality management refer to: Michelle S Bergin and others, ‘Regional Atmospheric Pollution and Transboundary Air Quality Management’ (2005) 30 *Annual Review of Environment and Resources* 1.

³¹ Maas and Grennfelt (n 27) vi, viii.

³² *ibid* iv.

³³ Noah Scovronick, *Reducing Global Health Risks through Mitigation of Short-Lived Climate Pollutants* (World Health Organization 2015) 25.

both biological or chemical constituents, as well as primary or secondary pollutants.³⁴ The components can be emitted from various natural and anthropogenic activities. However, the major components include metals, organic compounds, material of biologic origins, ions, reactive gases, and the particle carbon core.³⁵ One important example is black carbon (BC) which is defined as “an ideally light-absorbing substance composed of carbon”, a primary pollutant and often comprises 5-15 % of fine particles.³⁶ Particulate matter usually is categorized based on the aerodynamic diameter to PM10 (aerodynamic diameter less than 10 µm) and PM2.5 or fine particles (aerodynamic diameter less than 2.5 µm).³⁷ The size of particulate matters is important, as it determines which parts of respiratory tract they deposit. So far, the particulate matter effects cannot be explained by its components, so the size remains the most important factor to elicit the health effects.³⁸

Gaseous pollutants are also one group of air pollutants including sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O₃), and Volatile Organic Compounds (VOCs). VOCs are a class of compounds including organic natural species like benzene.³⁹ Tropospheric (ground-level) ozone is a highly reactive gas product to chemical reactions of its precursors in presence of sunlight.⁴⁰ The ozone precursors include nitrogen oxides, methane, carbon monoxide, and volatile organic compounds (VOCs). Note carbon monoxide, VOCs and nitrogen dioxide are air pollutants of their own.⁴¹

There are also other pollutants categorized in one group due to their persistency usually called persistent pollutants. This group includes heavy metals (e.g. mercury, lead, and

³⁴ *ibid* 1, 24.

³⁵ Kampa and Castanas (n 25) 363.

³⁶ Scovronick (n 33) 26, 29.

³⁷ *ibid* 1, 24.

³⁸ Kampa and Castanas (n 25) 363.

³⁹ *ibid* 362–363.

⁴⁰ Scovronick (n 33) 32.

⁴¹ *ibid* 35.

cadmium) and persistent organic pollutants (POPs), which are toxic and adversely affect human health and environment. Heavy metals are natural elements in the environment, but their concentrations have substantially increased relative to pre-industrial times. POPs are chemicals which are intentional products for special applications (e.g. pesticides and industrial chemicals), as well as unintentional products often from combustion (e.g. polyaromatic hydrocarbons (PAHs), dioxins and furans (PCDD/Fs), and Benzo[a]pyrene (BaP)).⁴² Polychlorinated biphenyls (PCB) and hexachlorobenzene (HCB) are also POPs that both emitted as unintentional product of combustion or because of their wide applications in agriculture and industry during 1990s.⁴³ Note that even low concentrations of POPs in environment can lead to significant exposure over time, as many of them accumulate along food chains and within individuals.⁴⁴

1.2.1.2. Healthy Thresholds and Target Values

The world health organization (WHO) provides air quality guideline for particulate matter level (WHO AQG target). The annual AQG levels are $10 \mu\text{g}/\text{m}^3$ and $20 \mu\text{g}/\text{m}^3$ for PM_{2.5} and PM₁₀, respectively. Moreover, 24 hours mean levels are determined as $25 \mu\text{g}/\text{m}^3$ and $50 \mu\text{g}/\text{m}^3$ respectively for PM_{2.5} and PM₁₀, not to be exceeded more than 3 days per year.⁴⁵ Interim target levels for maximum PM_{2.5} concentration by WHO are 35, 25, and $15 \mu\text{g}/\text{m}^3$ which means in each region the target maximum level is the highest target level lower than maximum level of the region.⁴⁶

Nitrogen dioxide WHO AQG annual and one-hour levels are $40 \mu\text{g}/\text{m}^3$ and $200 \mu\text{g}/\text{m}^3$, respectively.⁴⁷ Sulphur dioxide WHO AQG 24-hour and 10-minute average levels are $20 \mu\text{g}/\text{m}^3$ and $500 \mu\text{g}/\text{m}^3$, respectively. Note the annual level remains low with

⁴² Maas and Grennfelt (n 27) 17.

⁴³ Ole Kenneth Nielsen and others, *EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019: 1.A.1 Energy Industries - Combustion in Energy and Transformation Industries* (European Environment Agency 2019) 3; Jim Webb, Nicholas Hutchings and Barbara Amon, *EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019: 3.D.f, 3.I Agriculture Other Including Use of Pesticides- Use of Pesticides and Limestone 2019* (European Energy Agency 2019) 3, 4.

⁴⁴ Maas and Grennfelt (n 27) 17.

⁴⁵ Scovronick (n 33) 25.

⁴⁶ Joshua S Apte and others, 'Addressing Global Mortality from Ambient PM_{2.5}' (2015) 49 *Environmental science & technology* 8057, 8059(3).

⁴⁷ *Air Quality Guidelines Global Update 2005* (WHO Regional Office for Europe 2006) 175.

compliance with 24-hour AQG level. The interim targets $50 \mu\text{g}/\text{m}^3$ and $125 \mu\text{g}/\text{m}^3$ are also recommended for 24-hour average. Particularly $50 \mu\text{g}/\text{m}^3$ can be a reasonable and feasible achievement in few years in developing countries with significant health improvements.⁴⁸ In case of ozone, a dose threshold, below which exposure does not affect health adversely, is possible due to antioxidant defenses in lung. However, it is not discovered yet and it would be lower than low ambient concentrations.⁴⁹ The WHO advisory guideline value for average ozone measured over an 8 hours period is $100 \mu\text{g}/\text{m}^3$ (50ppb) or less.⁵⁰ The WHO AQG value for carbon monoxide is $30 \text{mg}/\text{m}^3$ averaged over an hour with maximum daily 8-hour mean of $10 \text{mg}/\text{m}^3$.⁵¹

The EU Ambient Air Quality Directive annual average health limit values for $\text{PM}_{2.5}$ and PM_{10} are $25 \mu\text{g}/\text{m}^3$ and $40 \mu\text{g}/\text{m}^3$, respectively. Daily averaged value of PM_{10} is limited at $50 \mu\text{g}/\text{m}^3$ not to be exceeded more than 35 days per year. The directive limit values for nitrogen oxides are the same as WHO AQG. In case of sulphur dioxide hourly limit value of $350 \mu\text{g}/\text{m}^3$ should not be exceeded more than 24 hours per year and daily limit value of $125 \mu\text{g}/\text{m}^3$ should not be exceeded more than 3 days per year. For ozone, considering short-term health risks, a maximum daily 8-hour mean ozone concentration of $120 \mu\text{g}/\text{m}^3$ (60ppb) should not be exceeded more than 25 times per year. The annual limit value of carbon monoxide is also set at $10 \text{mg}/\text{m}^3$.⁵²

In 2015, United States strengthened standards for tropospheric ozone from 75 to 70 ppb. In addition, Canadian authorities established more stringent standard for ozone to be 63 ppb in 2015. Mortality related to long-term ozone exposure are evidenced through epidemiological studies. However, no lower threshold has been established due to absence of effects.⁵³

⁴⁸ *ibid* 175, 415.

⁴⁹ Scovronick (n 33) 33.

⁵⁰ *ibid* 32.

⁵¹ Alberto Gonzalez Ortiz, Cristina Guerreiro and Joana Soares, 'Air Quality in Europe - 2019 Report' (2019) 13.

⁵² *ibid* 12.

⁵³ Maas and Grennfelt (n 27) 12, 13.

Thresholds or safe exposure to heavy metals and POPs are not significant because of growing epidemiological evidence of low-dose effects. However, they are established for some cases measured as content in PM₁₀.⁵⁴ For instance, EU target value for BaP, As, Cd, and Ni are established as 1 ng/m³, 6 ng/m³, 5 ng/m³, 20 ng/m³. Also, the annual limit value of lead is 0.5 µg/m³.⁵⁵

1.2.1.3. Sources

Many pollutants are emitted directly into the air that are called primary pollutants. While secondary pollutants are not emitted directly and are products of chemical reactions in atmosphere.⁵⁶ Burning fossil fuels is the main and huge source of many different air pollutants. Particulate matters, nitrogen oxides, sulphur oxides, carbon monoxide, some heavy metals and POPs are examples of fuel combustion hazardous products.⁵⁷ Electricity, which accounts for roughly 17% of final energy consumption is also important, as the dominant electricity generation mode is still fossil fuel based.⁵⁸ Agriculture is also big source of many air pollutants including particulate matters, methane (which is an important precursor for ozone), some POPs, and ammonia.⁵⁹

a. Source to particulate matters and some of its precursors

Particulate matter is complex mixture that its sources include both anthropogenic and natural origins.⁶⁰ Industries, biomass burning, road traffic, and constructions are the major sources to particulate matters.⁶¹

Generally, combustion is a source to many components of particulate matter whether primary one like black carbon or secondary PM resulted from products like nitrogen dioxide and sulphur dioxide. Combustion can happen in many fields like industries,

⁵⁴ *ibid* 19.

⁵⁵ Ortiz, Guerreiro and Soares (n 51) 12.

⁵⁶ Scovronick (n 33) 15.

⁵⁷ *ibid* 29,33,35,53,68. Maas and Grennfelt (n 37) 22, 30.

⁵⁸ Scovronick (n 33) 84.

⁵⁹ *ibid* 7; Maas and Grennfelt (n 27) 22; Webb, Hutchings and Amon (n 43) 2, 12.

⁶⁰ Scovronick (n 33) 24.

⁶¹ Khusniddin Khamraev, Daniel Cheriyan and Jae-ho Choi, 'A Review on Health Risk Assessment of PM in the Construction Industry – Current Situation and Future Directions' [2020] *Science of The Total Environment* 143716, 1.

transport or even in houses. For example, household air pollution, which is usually produced by fuel used for cooking, lighting, or space heating, considerably contributes to ambient air pollution. It is estimated to account for roughly 12% of global combustion-derived PM_{2.5}.⁶²

Aircraft emissions consist of many types of air pollutants. The aircraft emissions include primary fine particles like non-volatile carbon directly emitted from engine or other exhaust components like sulphuric and nitric acid nuclei, water, and heavier hydrocarbons agglomerate or condense as they cool. Moreover, gaseous emissions such as NO_x, SO₂, and lighter hydrocarbons along with primary PMs lead to atmospheric reactions result in secondary PMs. A study reported that 70% of PM from aviation are due to NO_x emissions, 14% are in form of non-volatile PM, 12% resulted from SO_x emissions, and 4% are formed from hydrocarbons.⁶³

Traditional brick kilns and coke oven are examples of industries that lead to exposure to high levels of particulate matter rich in black carbon for workers and communities near them.⁶⁴ In fact, brick kilns and coke ovens technologies widely vary make them different by order of magnitude in their pollutant emissions. However, in low-income communities, particularly in south Asia, the most commonly used kilns are those with highest pollutant emissions and low technology coke ovens are widespread.⁶⁵

Construction industry is also another source accounting for 70%-80% of overall PM of the atmosphere, which have not attracted enough attentions. It is particularly important as the number of people involved in the industry or exposed to the emissions are high.⁶⁶

Black carbon, which is mostly in form of fine particles, is heavily concentrated in PM_{2.5} emissions from sources like burning diesel, solid biomass (living or currently dead

⁶² Scovronick (n 33) 27.

⁶³ Anuja Mahashabde and others, 'Assessing the Environmental Impacts of Aircraft Noise and Emissions' (2011) 47 Progress in Aerospace Sciences 15, 20.

⁶⁴ Scovronick (n 33) 80.

⁶⁵ *ibid* 81.

⁶⁶ Khamraev, Cheriyan and Choi (n 61) 1.

organic materials⁶⁷), coal, kerosene.⁶⁸ For instance, 75% of particle emissions from old diesel vehicles is black carbon.⁶⁹ It is estimated that biofuel combustion (a fuel, generally in liquid form, produced from biomass, e.g. bioethanol, biodiesel, and black liquor⁷⁰ is globally the largest anthropogenic source of black carbon, as the quantity of its emission per kg of fuel can be high.⁷¹ Diesel vehicles (both on- and off-road) are source to 20% of global black carbon emissions.⁷² Generally, 80% of anthropogenic black carbon is emitted by fuel combustion in residential (responsible for 25% globally) and commercial buildings and transport.⁷³ The data excludes emissions due to open burning like forest fires or agriculture waste, while particle concentrations can be doubled due to biomass burning in burning seasons. Note PM_{2.5} emission from brick kilns and coke ovens are rich in black carbon.⁷⁴

Ammonium-nitrate and ammonium-sulphate are two main particulate matter components human are exposed to, which are secondary pollutants produced in the air from ammonia, sulphur dioxide and nitrogen oxides.⁷⁵ The contribution of agriculture to secondary formation of PM_{2.5} is substantial.⁷⁶ Indeed, over the past decade, necessity to control sulphur emissions changed from being a primary cause of acidification to being a precursor of atmospheric PM_{2.5}.⁷⁷ Nitrogen oxides and ammonia are responsible of significant proportion of PM_{2.5} concentrations in Europe and North America.⁷⁸ Modelling results demonstrate that particulate matter spring peaks in Western Europe can be

⁶⁷ IPCC (n 21) 543.

⁶⁸ Scovronick (n 33) 3.

⁶⁹ *ibid* 6.

⁷⁰ IPCC (n 21) 543.

⁷¹ Scovronick (n 33) 28.

⁷² *ibid* 6.

⁷³ *ibid* 29.

⁷⁴ *ibid* 29, 62, 108.

⁷⁵ Maas and Grennfelt (n 27) 22, 32.

⁷⁶ Scovronick (n 33) 7.

⁷⁷ Maas and Grennfelt (n 27) 10.

⁷⁸ *ibid* 5.

decreased significantly through concerted action in several countries.⁷⁹ The global nitrogen cycle significantly changed over recent decades. In 2016, 51% of the total annual fixation of atmospheric nitrogen of 413 Tg-N (million Tons) is directly emitted from human activities.⁸⁰ As a precursor of PM_{2.5}, guidelines for good agricultural practice and efficient use of nitrogen can lead to 20% less ammonia emission in Europe. The next step is to increase nitrogen use efficiency by less food waste and increasing low- meat diet.⁸¹

b. Source to gaseous pollutants

As precursors to PM some NO_x and SO_x sources are already introduced and some will introduce as ozone precursors. NO_x are products from high temperature, high pressure combustion of hydrocarbon fuels and SO_x are produced from sulphur containing fossil fuels. CO is also emitted from incomplete combustion of fossil fuels. Generally, gaseous pollutants are mainly emitted from fossil fuel combustion.⁸² For example, stationary and mobile combustion sources are the main anthropogenic means of NO_x emissions, usually as NO which rapidly forms NO₂ by reacting to other radicals in atmosphere. The major source of CO is also road transport. Moreover, SO₂ is emitted from natural sources like ores, volcanos, and oceans contribute to ~2% of its total emissions. Finally, fuel combustion especially the ones in energy production and road transport are the major sources for VOCs.⁸³ Unburned hydrocarbons from aircraft engines are also considered as VOCs.⁸⁴

Ozone is formed as a product of its precursors, which are nitrogen oxides, methane, carbon monoxide and volatile organic compounds (VOCs). Nitrogen dioxide and other nitrogen oxides (NO_x) that contribute to ozone formation, are combustion products. Hence, vehicle combustion, particularly in diesel vehicles, and power plants are two of

⁷⁹ *ibid* 23.

⁸⁰ *ibid* 5.

⁸¹ *ibid* 32.

⁸² Mahashabde and others (n 63) 19.

⁸³ Kampa and Castanas (n 25) 363.

⁸⁴ Mahashabde and others (n 63) 19.

important sources.⁸⁵ In addition, livestock is the leading source of nitrogen dioxide.⁸⁶ Globally, main source of anthropogenic methane is agriculture (with two primary contributors: the livestock sector and rice cultivation), waste manager sectors, and fossil fuel industry.⁸⁷ Rice production is estimated to accounts for roughly 10% of global anthropogenic methane emissions through the anaerobic decomposition of organic matter.⁸⁸ Also, the livestock is responsible for about 25% of anthropogenic methane.⁸⁹ Other major sources include extraction and processing of fossil fuels. For instance, environmental benefits of natural gas over coal and oil such as reduced greenhouse gas and PM_{2.5} emissions rise its use, but leakage during extraction and distribution may rise ozone concentrations.⁹⁰

Beside precursor's levels, other variables such as geography and weather affect ozone concentrations, because ozone is formed as a product of chemical reactions in atmosphere. For instance, sunlight and high temperature facilitate reactions that produce ozone, while wind may carry ozone from one region to the other (transboundary ozone) or rains decreases atmospheric ozone via deposition. Moreover, freshly emitted nitrogen oxides by vehicles destroys ozone nearby, however it leads to produce it downwind. Hence, ozone levels are often higher in rural or suburban regions in comparison with urban cores. Furthermore, ozone intrusion from upper layers of atmosphere is also a source that can rise the concentrations in special episodes. In summary, ozone levels depend on many variables, which make it difficult to control it by local mitigation measures.⁹¹

c. Source to persistent pollutants

Heavy metals and POPs are different to the classic air pollutants in several aspects such as sources and long-range atmospheric transport behavior. For instance, studies

⁸⁵ Maas and Grennfelt (n 27) 2, 5, 12, 31.

⁸⁶ Scovronick (n 33) 64.

⁸⁷ *ibid* 58, 80, 90.

⁸⁸ *ibid* 59.

⁸⁹ *ibid* 64.

⁹⁰ *ibid* 85.

⁹¹ *ibid* 33, 34.

estimated that pollution levels for mercury, PCDD/Fs, and PCBs in countries of EMEP (European Monitoring and Evaluation Program) are substantially affected by intercontinental transport.⁹² Transport can be atmospheric, marine, biological as well as transport through goods and e-waste.⁹³ In case of mercury, half the anthropogenic emissions in EMEP countries are within the UNECE region and the other half is due to transport from other regions.⁹⁴ Moreover, it is not possible to determine the contemporary atmospheric burdens are resulted from primary emissions in spite of current abatement measures or are emitted from reservoirs, which had been polluted previously, because many POPs undergo reversible atmospheric deposition.⁹⁵ For example, atmospheric HCB and PCBs levels is usually contributed largely by reemissions, as they cycle between the atmosphere and other environmental compartments over periods of decades.⁹⁶ Hence, atmospheric levels are influenced by anthropogenic emissions, secondary sources, and intercontinental transport.

The key sources of atmospheric levels of three heavy metals (lead, mercury, cadmium) and BaP, which is an important carcinogenic POP, are industrial and non-industrial combustion, as well as energy and metal production. BaP mostly originates from non-industrial combustion in residential heating.⁹⁷ Dioxins are products of incomplete combustion and are emitted when materials containing chlorine like plastics are burned.⁹⁸

Heavy metals which are natural components of the earth's crust may enter the human environment through many sources like waste water discharge, manufacturing facilities, and combustion.⁹⁹ The latter is particularly important for emissions to atmosphere. However, as mentioned above other means also affects the atmospheric deposition

⁹² Maas and Grennfelt (n 27) 17.

⁹³ *ibid* 19.

⁹⁴ *ibid* 18.

⁹⁵ *ibid* 17.

⁹⁶ *ibid* 19.

⁹⁷ *ibid* 17.

⁹⁸ Kampa and Castanas (n 25) 363.

⁹⁹ *ibid*.

through reemissions and the cycle between atmosphere and other environmental compartments.

Mercury emissions to air can occur naturally from volcanoes, weathering of rocks etc., but humankind is responsible for huge amount of mercury release and 20 sectors are known as key sources. Hence, the atmospheric level is above natural levels (those before 1450 CE) by about 450%.¹⁰⁰ Gold mining, fossil fuels, cement and some metals production, and many other industrial processes and productions are known means that release mercury to environment.¹⁰¹

The emissions in 2015 are majorly in Asia (49%), South America (18%), and Sub-Saharan Africa (16%). Artisanal and small-scale gold mining are responsible for about 70% and more than 80% of emissions in South America and Sub-Saharan Africa, respectively. Other major sources are coal burning (21%), non-ferrous metal production (15%), cement production (11%), mercury containing products wastes (7.5%), and ferrous metal production (1.8%).¹⁰² Generally, emissions to atmosphere are substantially based in industrializing Asia with China responsible for a third of global total, while Europe and North America have significantly cut air emissions. However, a modelling study estimated half the mercury pollution in the surface layer of ocean have emitted before 1950 when United States and Europe were playing the main role in the emissions. Methylmercury (the most toxic form of mercury) is a secondary pollutant, which is formed when mercury lands in soils and waterways and is metabolized by microorganisms.¹⁰³ Sediment mercury is one of important sources of methylmercury in aquatic environments, as well as water column methylation occurs in open sources, coastal waters, and large lakes.¹⁰⁴

¹⁰⁰ AMAP/UN Environment (n 38) 2–1.

¹⁰¹ Kessler (n 29) A305, A307.

¹⁰² AMAP/UN Environment (n 28) 3–1.

¹⁰³ Kessler (n 29) A305.

¹⁰⁴ AMAP/UN Environment (n 28) 8–1.

1.2.1.4. Current situation and trends

A consistent and inclusive monitoring over different areas and regions is an important key to assess and understand the current situation and trends of each air pollutant to develop and carry out proper measures in order to protect atmosphere and prevent adverse effects to human and environment.¹⁰⁵

In this section, current concentration and exposure levels, how are the trends and prediction for futures are reported to help having an overview about how serious the problem is.

a. Current concentration and exposure levels of air pollutants

Based on the data received by European Environment Agency (EEA) in 2017 from thousands of stations over more than 30 European countries, PM₁₀ annual limit value were monitored to be above EU limit value in 7% of the stations located in 13 countries (1 out of 343 station in Spain). The WHO AQG annual mean level is exceeded in 51% of stations located in almost all countries. In addition, Annual PM_{2.5} limit value of EU and WHO AQG were exceeded in 7% and 69% of the area.¹⁰⁶ In 2017, 95% of 903 stations in 35 European countries reported ozone concentrations above WHO AQG value for protecting human health.¹⁰⁷

In Spain, annual mean values for PM_{2.5}, nitrogen oxides and ozone were 11.1 $\mu\text{g}/\text{m}^3$, 20 $\mu\text{g}/\text{m}^3$, and 5212 $\mu\text{g}/\text{m}^3 \cdot \text{days}$, respectively.¹⁰⁸

¹⁰⁵ Economic Commission for Europe, 'Effects of Air Pollution on Health, Report by the Joint1 Task Force on the Health Aspects of Air Pollution on Its Nineteenth Meeting' 17, 18.

¹⁰⁶ Ortiz, Guerreiro and Soares (n 51) 26, 29.

¹⁰⁷ *ibid* 35.

¹⁰⁸ *ibid* 68.

Note that annual mean values in many European countries are below the EU or WHO thresholds, while exceeding the thresholds in cities where 72% of the population are located leads to high exposure and high attributable mortality and morbidity.¹⁰⁹

In 2014 In United States, national ambient air quality standards were not met for roughly 18% of people (57 million). Also, 28% of Canadians are exposed to outdoor ground-level ozone higher than air quality standards each year.¹¹⁰

In India, where estimated to have some of the worst air pollution level globally, annual population-weighted mean exposure to ambient particulate PM_{2.5} was 97.1 $\mu\text{g}/\text{m}^3$ in 2019, ranging from 15.8 $\mu\text{g}/\text{m}^3$ to 217.6 $\mu\text{g}/\text{m}^3$ in different states. In case of ambient ozone, the annual population-weighted mean exposure in 2019 was 66.2 ppb, ranging from 47.4 ppb to 76.5 ppb in different states.¹¹¹

In 2017, the annual population-weighted mean exposure level was greater than the level that WHO recommended for India, which was 40 $\mu\text{g}/\text{m}^3$ in most states inhabited by 76.8% of total population in India, which was 1.38 billion at the time. Also, 42.6% of the population were exposed to mean PM_{2.5} greater than 80 $\mu\text{g}/\text{m}^3$. The concentration exceeds to 125.3 $\mu\text{g}/\text{m}^3$ for less developed states based on Socio-demographic Index (SDI \leq 0.53).¹¹²

In china, the average annual population-weighted PM_{2.5} exposure was 52.7 $\mu\text{g}/\text{m}^3$ in 2017. In addition, the annual population-weighted mean exposure to ozone is 68.2 ppb ranging from 43.2 ppb to 91.2 ppb across the country.¹¹³ The PM_{2.5} exposure level

¹⁰⁹ Sasha Khomenko and others, 'Premature Mortality Due to Air Pollution in European Cities: A Health Impact Assessment' (2021) 5196 *The Lancet Planetary Health* 1, 2.

¹¹⁰ Maas and Grennfelt (n 27) vii.

¹¹¹ Anamika Pandey and others, 'Health and Economic Impact of Air Pollution in the States of India: The Global Burden of Disease Study 2019' (2021) 5 *The Lancet Planetary Health* e25, e29.

¹¹² Kalpana Balakrishnan and others, 'The Impact of Air Pollution on Deaths, Disease Burden, and Life Expectancy across the States of India: The Global Burden of Disease Study 2017' (2019) 3 *The Lancet Planetary Health* e26, e26, e27, e29, e30.

¹¹³ Peng Yin and others, 'The Effect of Air Pollution on Deaths, Disease Burden, and Life Expectancy across China and Its Provinces, 1990–2017: An Analysis for the Global Burden of Disease Study 2017' (2020) 4 *The Lancet Planetary Health* e386, e390.

exceeds the WHO AQG level for the entire population of china, 81% of them living in regions with concentrations higher than WHO interim target 1, which is $35 \mu\text{g}/\text{m}^3$.¹¹⁴

There are fewer data for persistent pollutants due to lack of sufficient monitoring. At the first negotiating session toward Minamata convention in 2010, sample hair of participants from 40 countries were tested for mercury, all came back positive with average $1182 \frac{\mu\text{g}}{\text{kg}}$ in poorer countries and $669 \frac{\mu\text{g}}{\text{kg}}$ in wealthier ones, and maximum result exceeded $20000 \frac{\mu\text{g}}{\text{kg}}$.¹¹⁵ The test was in a small scale but good method to show mercury is a global issue.

In UNECE countries as well EMEP countries, long-term risk for human health and environment due to heavy metals and persistent organic pollutants still exists. Still around 16 million people are adversely affected by BaP in EMEP countries. In many countries mercury and lead levels are more than critical loads.¹¹⁶

The necessity to take action is quite clear to reduce the air pollution. For example, 33% less exposure to particulate matter and ozone lead to 43000 less premature deaths, tens of thousands of non-fatal heart attack and respiratory and cardiovascular hospitalizations, and hundreds of thousands acute respiratory symptoms in United States.¹¹⁷

b. Trends of Air pollutants concentration and exposure levels

Between 2000 and 2012, particulate matter concentrations in European Monitoring and Evaluation Program (EMEP) sites decreased by roughly a third, which the average life expectancy increasing about 3.5 months between 2000-2010 in Europe can be the obvious result. In the same period of time, $\text{PM}_{2.5}$ declined in USA and Canada by 33% and 4%, respectively.¹¹⁸ The decline in fine particles emissions is mainly by harmonized

¹¹⁴ *ibid* e386.

¹¹⁵ Kessler (n 29) A306.

¹¹⁶ Maas and Grennfelt (n 27) 19.

¹¹⁷ *ibid* vi.

¹¹⁸ *ibid* 1.

controls on diesel vehicles and engines.¹¹⁹ From 2005 to 2018, exposure to PM₁₀ and PM_{2.5} in European population shows a decreasing trend except for a slight increase in 2011.¹²⁰

In India, between 1990 and 2019 the crude deaths rate per 100000 population attributable to ambient particulate matter pollution increased by 115.3%.¹²¹

In china, PM_{2.5} level increased from 1990 to 2011 levelling off until 2013 and have started to decrease since then. Between 2013 and 2017, annual average PM_{2.5} concentrations decreased by 33.3%, leading to age-standardized death rate due to ambient particulate matter reducing by 8.9%. However, levels remain high enough to result in dipterous effects on public health.¹²²

While more than doubling sulphur emissions were expected, abatement measures about 80% less sulphur emissions reached by flue gas desulphurization and low-sulphur fuels between 1990 and 2016, contributing to reduction in atmospheric particulate matter.¹²³ In Europe, sulphur deposition had decreased by 90% from 1980 to 2010.¹²⁴ The decline between 1990 and 2012 was 92%, 65%, and 73%, respectively for sulphur dioxide, particulate sulphate, and sulphate concentrations in precipitation. In Canada and United States between 1990 and 2014, sulphur dioxide decreased by 63% and 79%, respectively. The results can be observed in recovered lakes and stream from acidification, as well as improved air quality.¹²⁵ In Western Europe, 75% of sulphur dioxide emissions that have decreased between 1960 to 2010 was because of a combination of reduced energy intensity and improved fuel mix.¹²⁶ In North America,

¹¹⁹ *ibid* v.

¹²⁰ Alberto Gonzalez Ortiz, Cristina Guerreiro and Joana Soares, 'Air Quality in Europe - 2020 Report' (2020) 99.

¹²¹ Pandey and others (n 111) e29.

¹²² Yin and others (n 113) e387, e390, e394. For information about long term sulphur deposition in East Asia refer to: Masatoshi Kuribayashi and others, 'Long-Term Trends of Sulfur Deposition in East Asia during 1981-2005' (2012) 59 *Atmospheric Environment* 461.

¹²³ Maas and Grennfelt (n 27) iv.

¹²⁴ *ibid* 7.

¹²⁵ *ibid* 8.

¹²⁶ *ibid* 11.

the achieved reductions are largely attributable to controlling power sector emissions, technological, process changes, and facility closures in the non-ferrous mining and smelting industries, the phase-out of coal-fired electricity generation and better emission control technologies in upstream oil and gas sector.¹²⁷

Achieved sulphur and VOC emissions reduction increased the relative contribution of nitrogen emissions to health adverse effects of particulate matter.¹²⁸ Between 1990-2016, nitrogen oxides emissions decreased about 50% by cleaning flue gas and recruiting catalyst converters in cars.¹²⁹ In Europe between 1990 and 2010, nitrogen oxides and ammonia emissions, which are precursors of particulate matters, decreased by roughly 40% and 30%, respectively. In fact, the nitrogen oxides from combustion sources have reduced by 50% and ammonia emissions from agriculture have decreased by 25% since 1990. In addition, ammonium in air significantly have decreased.¹³⁰ In Canada and United States between 1990 and 2014, nitrogen oxides decreased by 33% and 51%, respectively.¹³¹ However, deposition of nitrogen compounds shows little change in many parts of Europe where levels exceed the critical thresholds. The trends agree with 1999 Gothenburg Protocol and its revision, while ecosystem recovery has not observed yet and it is not clear when ecosystem will start to respond to reduced N-deposition.¹³² Note that nitrogen dioxide abatement is also included by climate policies in agriculture, while ammonia emissions are remained unaffected.¹³³ Between 2013 and 2017 sulphur dioxide emissions decreased in china.¹³⁴

As the precursors of ozone have increased since pre-industrial times (1750), ozone concentrations are estimated to have risen by 150% and may have increased up to five-

¹²⁷ *ibid* 8.

¹²⁸ *ibid* 5.

¹²⁹ *ibid* v, vi.

¹³⁰ *ibid* 4.

¹³¹ *ibid* 8.

¹³² *ibid* 4.

¹³³ *ibid* 32.

¹³⁴ Yin and others (n 113) e396.

fold in some regions.¹³⁵ The levels started to decrease in many regions because of mitigation policies since 1990. Based on data in six coastal, rural and mountain-top sites in Europe, mean annual ozone concentrations increased by 0.3-0.7 ppb per year in much of the 1980s and 1990s, but since 2000, it either levelled off or slightly decreased. In 2012 in EMEP countries, ozone concentrations exceed WHO guideline level in about 20% less days than in 1990. In Canada between 1998 and 2012, peak ozone concentrations declined by 15%, while average ozone concentrations were relatively constant. In the United States, average ozone levels are decreasing by 23% between 1990 and 2014.¹³⁶ Ozone exposure level had a decreasing slope from 2005 to 2014, but started an increasing trend afterward.¹³⁷

However, in most regions average annual ozone concentrations did not clearly decrease due to several reasons. For example, ozone precursor emissions in Asia have been increasing, which contributes to background ozone in Europe and North America. Also, nitrogen oxides abatement as an ozone precursor in downstream prevent them from removing ozone in regions near nitrogen oxides emissions.¹³⁸ Moreover, anthropogenic methane emissions as a precursor have been increased in 2000s after it had been stable through the 1990s.¹³⁹

In India, the crude deaths rate per 100000 population due to ambient ozone pollution increased by 139.2% from 1990 to 2019.¹⁴⁰ Between 2013 and 2017 carbon monoxide emissions decreased in china. However, the ozone exposure level remained stable at 66-68 ppb from 1990 to 2017 and further attempts in reducing nitrogen oxides and VOCs are required for a decreasing trend.¹⁴¹

¹³⁵ Scovronick (n 33) 35.

¹³⁶ Maas and Grennfelt (n 27) 12, 13.

¹³⁷ Ortiz, Guerreiro and Soares (n 120) 99.

¹³⁸ Maas and Grennfelt (n 37) 12.

¹³⁹ *ibid* 25.

¹⁴⁰ Pandey and others (n 111) e25.

¹⁴¹ Yin and others (n 113) e390, e396.

As ozone remains in troposphere for about 20 days, ozone can transport to other northern hemisphere regions.¹⁴² Hence, United States and Canada have committed to reduce nitrogen oxides and VOCs as ozone precursors in defined areas in both countries to address transboundary ozone. Between 2000 and 2012, total nitrogen oxides emissions decreased by 45% in the Canadian areas and by 47% in areas belong to United States. To evaluate the efficiency of the program, note that nitrogen oxides and VOC emissions decreased respectively by 35% and 40% over the same period.¹⁴³ In contrast, the rest of the world have been emitting more ozone precursors (NO_x, VOC, and CO) by 20-30%. The emissions increased by 50% in emerging countries such as China and India.¹⁴⁴

Generally, ozone is still threatening public health, crops and forests. Note that episodes of high tropospheric ozone concentration occur in rural and urban sites throughout Europe as well as eastern North America in summer. In southern and central Europe, EU ozone target values are regularly exceeded, rising concerns of ozone long-term exposure adverse effects.¹⁴⁵

Anthropogenic emissions of heavy metals and persistent organic pollutants (POPs) lead to significantly enriched concentrations in ecosystem in relative to pre-industrial period. Although levels significantly declined since 1990, but few improvements have been noted after 2005. Many POPs and similar pollutants, which are not covered by Convention on Long-range Transboundary Air Pollution (CLRTAP), are not monitored regularly. However, the overall emissions of persistent chemicals seem to be increasing or unchanged.¹⁴⁶

Reductions have occurred significantly in lead emissions by road transport due to catalytic converters in petrol-driven cars. Also, anthropogenic emissions in EMEP

¹⁴² Maas and Grennfelt (n 37) 14.

¹⁴³ *ibid* 13, 14.

¹⁴⁴ *ibid* 25.

¹⁴⁵ *ibid* 12, 13.

¹⁴⁶ *ibid* 17.

countries show significant decrease since 1990. For instances, the reductions are 60% for mercury, 90% for lead, 40% for PAHs and 85% for PCB and HCBs. In north America, the trends are similar in emissions of 187 toxic pollutants including mercury, lead, cadmium and some POPs. In United States, the emissions are reduced by 60% between 1990 and 2011. As consequences, atmospheric levels of lead and cadmium declined in EMEP countries compared with levels in 1990 by up to 90% and up to 70%, respectively.¹⁴⁷ The monitored POPs also show similar trend with reduction by 90% for HCB and 30% for BaP leading to roughly six-fold lower people exposed to BaP exceeding EU target level in EMEP countries. However, reductions are not the same in EMEP countries: reductions in 28 member states of European Union (EU28) are much stronger than average, and EECCA countries (Eastern Europe, the Caucasus and Central Asia) show relatively modest decline. The trends for ambient air pollution are quite the same in North America with 97% concentration level decline for lead between 1990 and 2014.¹⁴⁸

In case of mercury, after an apparent stability between 1990 and 2005, the global atmospheric emissions increase again. A report in 2013 estimated 1960 metric tons of mercury had released to air in 2010. If the emissions had cut in 2015, the atmospheric levels would immediately decrease by 30%, while it would take 85 more years for the atmosphere to reach 50% decline and for ocean-surface to drop by one-third.¹⁴⁹ While hopes in mercury abatements are rising due to the Minamata convention, critics suggests it may change the slope but may not avoid the mercury pollution to increase, because there are still many unsolved issues regarding mercury measure. For example, the mercury emissions per unit of energy produced should be decrease based on the convention, but it is free to build more capacities in the countries, so total emissions will probably increase.¹⁵⁰ Latest estimations for anthropogenic mercury emissions are approximately 2500 tons per year including emissions to the atmosphere (30%), reemissions from deposited mercury in soils and water (60%), and natural sources

¹⁴⁷ *ibid.*

¹⁴⁸ *ibid* 18, 19.

¹⁴⁹ Kessler (n 29) A305.

¹⁵⁰ *ibid* A307.

(10%). Mercury emissions to atmosphere in 2015 are roughly 20% higher than they were in 2010.¹⁵¹

c. Predictions for the future

Predictions for future mostly depend on its assumptions including what conventions, agreements, programs are made in national, regional, and international scale, as well as how much the authorities are committed to previous or future ones. However, predictions based on current trends are prevalent to assess the necessity for more actions or evaluate sufficiency of current ones.

EU countries are expecting 40% decline in life-years lost due to particulate matter between 2005 and 2030, with technically possibility of further 20% reductions.¹⁵² The goal of the Clean Air Program for Europe published in 2013 was to ensure full compliance with existing legislation by 2020 at the latest. It also aims to improve Europe's air quality to decrease the premature deaths due to PM_{2.5} and ozone by 50% in 2030 compared with 2005.¹⁵³

If the 2010 PM_{2.5} level remaining constant until 2030 in polluted regions like India and China results in increasing per capita mortality due to PM_{2.5} by 21% and 23%, respectively.¹⁵⁴

In India, the trend for ambient particulate matter concentration were disappointing, and only household air pollution as a contributor to ambient PM in India is substantially decreasing. Note that climate change is expected to amplify adverse effects of air pollution through atmospheric stagnation, ground-level ozone formation, and PM_{2.5} concentration increases due to temperature, which are predicted to be severe in India. Plans to increase India's economy to \$5.0 trillion by 2024 will be failed, if air pollution is not substantially controlled. 20-30% reduction in PM_{2.5} and PM₁₀ concentrations by 2024 in 102 cities are the targets for National Clean Air Program which was launched in 2019

¹⁵¹ AMAP/UN Environment (n 38) 3–1.

¹⁵² Maas and Grennfelt (n 27) 20.

¹⁵³ Ortiz, Guerreiro and Soares (n 120) 16.

¹⁵⁴ Apte and others (n 46) 8063.

to coordinate air pollution control efforts across sectors and educate the Indian public about health important effects of air pollution.¹⁵⁵ Also, Intended Nationally Determined Contribution reduction target for PM emission by 2030 is 33-35%.¹⁵⁶

In china, a series of national and regional control measures like issuing National Air Pollution Prevention and Control Action Plan in 2013 lead to PM_{2.5} levels having decreased since then. Also, The Chinese government issued the Healthy China Action in 2019 with 15 major areas including healthy environment promotion. However, the recent increase in Chinese coal burning capacity has put the missions in challenge to reduce air pollution levels and resulted disease burden. Moreover, World Urbanization Prospects reported that from 2018 to 2050 China is projected to add more 25 million urban dwellers, which means over 80% of population living in urban areas by 2050. The rapid urbanization may lead to environmental challenge, so the adaptation of an integrated and sustainable urban planning strategy should be prioritized for central and local government officials.¹⁵⁷

The ozone mitigation has not been paid enough attention in china. Hence, current efforts on PM control should be accompanied with nitrogen oxides and VOCs emissions abatement, as well as increasing public awareness about ozone adverse health effects.¹⁵⁸ In fact, comparison of health and economic impacts of PM_{2.5} and ozone in China shows that both impacts are substantially lower for ozone and also more difficult to mitigate. Air pollution control policies which reduce both PM_{2.5} and ozone are recommended to achieve efficient goals.¹⁵⁹

The current commitments for abatement measures related to nitrogen deposition are insufficient to prevent further accumulation and in particular ammonia is required to substantially decrease. Predictions for the period to 2100 indicate that nitrogen will

¹⁵⁵ Pandey and others (n 111) e33.

¹⁵⁶ Balakrishnan and others (n 112) e35.

¹⁵⁷ Yin and others (n 113) e95, e96, e97.

¹⁵⁸ *ibid* e396.

¹⁵⁹ Yang Xie and others, 'Comparison of Health and Economic Impacts of PM_{2.5} and Ozone Pollution in China' (2019) 130 *Environment International* 104881, 1.

increasingly threat human health and ecosystem.¹⁶⁰ For example, ignoring ammonia emissions in climate policies may result in ammonia emissions growth as a consequence of global warming.¹⁶¹

As ozone precursors, the increasing trend for methane show stabilization or a slight decline after 2010 compared to earlier estimates because of China's control efforts. In contrast, several other regions are expected to emit ozone precursors with strong growth. Generally, while north America and Europe contribution to ozone precursors emissions are declining (except for methane emission in North America), contributions of the rest of the world, particularly South and East Asia, are increasing and estimated to be 80% of global emissions by 2050.¹⁶²

By 2035, mercury deposition in North America and Europe is expected to decrease by 25% thanks to internal policy. African mercury deposition would roughly stabilize due to decreasing long-range contribution, while African sources would increase. The predictions for Asia are expecting significant deposition growth by about 20% in East Asia and 100% in South Asia.¹⁶³ The influence of climate change and legacy mercury make the potential future changes assessment difficult.¹⁶⁴

As an evaluation of current situation is important to assess the current situation as well as select target values, monitoring concentration levels are important, while monitoring networks and programs are not sufficient for most persistent pollutants. To support global actions for mercury emission mitigation, existing monitoring networks need to closely cooperate. Long-term monitoring program in both hemispheres should be sustainable. Different monitoring data sets need to be comparable, so the adoption of common methods and standards is required to be promoted. New mercury monitoring methods and technologies are need to be tested to validate them, so better monitoring

¹⁶⁰ Maas and Grennfelt (n 27) 5.

¹⁶¹ *ibid* 32.

¹⁶² *ibid* 26–27.

¹⁶³ *ibid* 29.

¹⁶⁴ AMAP/UN Environment (n 28) 5–1.

will be available. UN cooperation is required to support nations for developing their own monitoring programs by continuous capacity building and transfer knowledge.¹⁶⁵

1.2.2. Adverse effects of air pollutants

To recognize the importance of air pollutants and the necessity for various international actions to tackle the associated adverse effects, rest of this section are devoted to briefly introduce some of important harms and adverse effects of major air pollutants. Although many adverse effects are multi-dimensional, for a better perception of the issues they are categorized based on their association with physical health, psychological health, economy, social problems, and last and not the least environment.

1.2.2.1. Adverse effects on physical health

Many studies target adverse health effects of air pollution and how it contributes to rise in morbidity, mortality, and decrease in life expectancy.¹⁶⁶ For example, it was the primary cause of death in India killing 1.6 million people a year in 2015.¹⁶⁷ In Europe, the primary environmental cause of premature death was air pollution in 2016 which was ten times higher than deaths caused by traffic accidents. In United States, 1 out of 20 premature deaths is due to recent exposure to air pollution. In 2012 in UNECE region (including north America), 576000 premature deaths associated with outdoor air pollution.¹⁶⁸ Hopefully, scientific evidences show health benefits of reducing air pollution will occur relatively quickly like in a year.¹⁶⁹

Particulate matter and gaseous pollutants including ozone, VOCs, carbon monoxide and nitrogen oxides are all well-established as inflammatory stimuli on the respiratory tract. In fact, they enhance T helper lymphocyte type 2 (Th2) and T helper lymphocyte type 17 (Th17) leading to dysregulate anti-viral immune responses. The association of air

¹⁶⁵ *ibid* 4–9.

¹⁶⁶ Daqian Shi and Hongwei Yu, 'Reevaluating the Subjective Welfare Loss of Air Pollution' (2020) 257 *Journal of Cleaner Production* 1.

¹⁶⁷ Jackson G Lu, 'Air Pollution: A Systematic Review of Its Psychological, Economic, and Social Effects' (2020) 32 *Current Opinion in Psychology* 52, 52.

¹⁶⁸ Maas and Grennfelt (n 27) vi.

¹⁶⁹ *ibid* 3.

pollution and exacerbations of asthma and chronic obstructive pulmonary disease (COPD) are consistent with the findings.¹⁷⁰

Particulate matter exposure is correlated to underlying subclinical pathologies of cardiovascular disease, which justify the adverse effects of PM exposure to cardiovascular health. The subclinical pathologies include systemic inflammation and oxidative stress, atherosclerosis, thrombosis, endothelial dysfunction, hypertension, cardiac remodeling, and arrhythmia.¹⁷¹

The strength of associated risks is different among various groups. For instance, populations at increased risks include people with pre-existing respiratory disease, older adults, people with certain genetic polymorphism, people with lack of certain nutrients, as well as people spends more time outdoors. The reason to latter is that indoor ozone concentrations are usually much lower than outdoor levels. Particularly, children are vulnerable to ozone, as they spend more time outdoor, do more physical activities, and have high metabolic rates.¹⁷²

To understand and predict how PM_{2.5} level reduction decreases mortality two points should be taken into accounts: first, in cleaner areas a specific amount of reduction in PM_{2.5} level leads to more avoided deaths per capita due to PM_{2.5} in comparison to more polluted areas. Second, the more PM_{2.5} reduces, the more the reduction benefits in mortality attributable to PM_{2.5} returns to scale would be achieved. It means doubling PM_{2.5} level reduction may result in related mortality decreases more than a factor of 2.¹⁷³ Both resulted from the fact that global concentration- mortality relationship is not

¹⁷⁰ Drew A Glencross and others, 'Air Pollution and Its Effects on the Immune System' (2020) 151 *Free Radical Biology and Medicine* 56, 56.

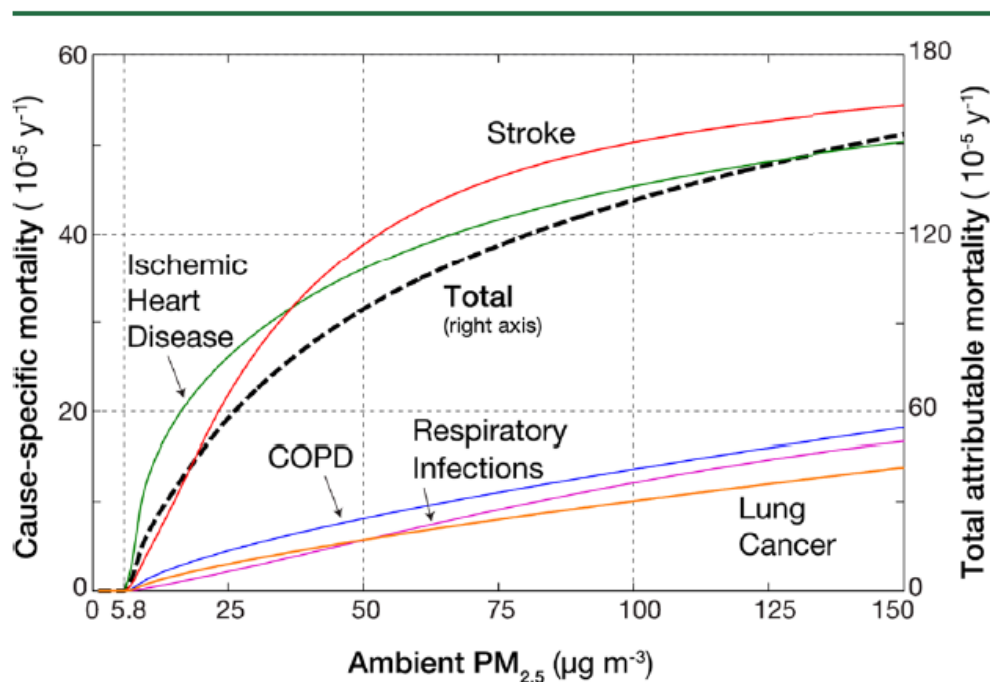
¹⁷¹ Robert B Hamanaka and Gökhan M Mutlu, 'Particulate Matter Air Pollution: Effects on the Cardiovascular System' (2018) 9 *Frontiers in Endocrinology* 680, 4.

¹⁷² Scovronick (n 33) 34. For more information about differences between socioeconomic groups for association of air pollution and natural cause mortality in Denmark refer to: Ole Raaschou-Nielsen and others, 'Long-Term Exposure to Air Pollution and Mortality in the Danish Population a Nationwide Study' (2020) 28 *EclinicalMedicine* 100605.

¹⁷³ Apte and others (n 46) 8061.

linear and is steeper as the $PM_{2.5}$ concentrations are lower based on Figure 2.¹⁷⁴ In fact, there are large potential avoided deaths per capita in polluted areas, but a huge improvement in ambient $PM_{2.5}$ is required.¹⁷⁵

Figure 2. Global concentration-mortality relationships for ambient $PM_{2.5}$ for five individual endpoints¹⁷⁶



Based on this non-linear relationship and assessment of situation in the world, WHO suggested incremental approach in $PM_{2.5}$ level reduction based on next target scenario, which would result in 750000 avoided premature deaths (23% of 3.2 million deaths in 2010). Reaching WHO AQG target which is $10 \mu g/m^3$ globally lead to 2.1 million avoided premature deaths (65% of premature deaths attributable to $PM_{2.5}$ in 2010). Further hypothetical reduction can make substantial health benefits. For example, if in regions

¹⁷⁴ ibid 8058.

¹⁷⁵ ibid 8062.

¹⁷⁶ (solid lines, left axis) based on integrated exposure response curves developed for the GBD studies.¹⁷⁶ Vertical axes indicate per-capita mortality rates attributable to $PM_{2.5}$ for a hypothetical global population uniformly exposed to a given level of $PM_{2.5}$. Plotted data illustrate the relative contribution of individual disease endpoints to total mortality for a typical population exposed at a given concentration by incorporating concentration-response curves and global disease incidence data. Note that adult ischemic heart disease (IHD) and stroke account for ~70% of combined $PM_{2.5}$ -attributable mortality for all five causes. Other causes are chronic obstructive pulmonary disease (COPD) and lung cancer (LC) in adults, and acute lower respiratory infections (ALRI) in children.

with ambient PM_{2.5} concentrations below 16 $\mu\text{g}/\text{m}^3$ (which accounts for 40% of population) reductions reach 8 $\mu\text{g}/\text{m}^3$, 60% of premature deaths attributable to PM_{2.5} in the regions would be avoided (400000 deaths based on data in 2010).¹⁷⁷

a. Risks attributable to fine particles

“Fine” particle usually known as PM_{2.5} is a main category of air pollutants particularly in terms of adverse health impact. WHO review of the health effects of air pollution in 2013 established PM_{2.5} mass concentrations as the most health-relevant particle metric in case of mortality.¹⁷⁸ A significant negative impact of 20.31% on subjective well-being (SWB) is reported due to PM_{2.5} deteriorating physical health.¹⁷⁹

Health risk due to long-term exposure to PM_{2.5} is higher than short-term (even cumulative repeat of short-term) exposure. Some possible biological mechanisms like systemic inflammation and vascular dysfunction can lead to observed results according to toxicological studies and epidemiological evidence. It seems all-cause mortality increases by about 7% for 10 $\mu\text{g}/\text{m}^3$ increase of PM_{2.5} long term exposure. In 2012, it is estimated that outdoor PM_{2.5} takes account for 3.7 million deaths globally, which 88% take place in low to moderate income countries.¹⁸⁰

PM_{2.5} was considered as risk factor for five major disease endpoints in global burden of diseases 2010 (GBD), namely ischemic heart disease (IHD), cerebrovascular disease (strokes), chronic obstructive pulmonary disease (COPD), and lung cancer (LC) all for adults (age>25), as well as acute respiratory lung infection (ALRI) for children under 5. In 2010, these diseases accounted for 20.1 millions of deaths which was about 38% of all-cause-mortality. A spatially resolved model by Joshua et al. estimates 3.24 million world-wide premature deaths were attributable to PM_{2.5} in year 2010 (ranked as sixth largest overall risk factor for global premature mortality). The study concedes within 0.5% the estimate in GBD 2010 which was about 6% of all-cause-mortality.¹⁸¹ In 2016,

¹⁷⁷ Apte and others (n 46) 8062–8063.

¹⁷⁸ Maas and Grennfelt (n 27) 23.

¹⁷⁹ Shi and Yu (n 166) 3.

¹⁸⁰ Scovronick (n 33) 25.

¹⁸¹ Apte and others (n 46) 2,3.

the relationship of PM_{2.5} and the risk of incident diabetes was defined and quantified. Globally, ambient PM_{2.5} is attributable to roughly 3.2 million incident cases of diabetes, about 8.2 million diabetes caused DALYs (disability-adjusted life-years), and 206105 deaths from diabetes.¹⁸²

In GBD 2019, where particulate matter ranked seventh as leading risk factors based on percentages of DALLYs, 12.2% of male deaths and 11.3% of female deaths were attributed to ambient air pollution including both PM and ozone exposure, ranking fourth in top risk factors. Also, particulate matter pollution burden in 2019 was 46% higher than 2017, mainly due to inclusion of low birthweight and short gestation as PM affected risk factors, as well as increase in cardiovascular diseases' relative risk curve.¹⁸³

The mortality attributable to PM_{2.5} does not depend on regional ambient PM_{2.5} exclusively. Size and density of exposed population, baseline disease incidence rate, and the age structure of the population also affect deaths associated with PM_{2.5}.¹⁸⁴ The interaction of high population density, high disease prevalence and high level of PM_{2.5} in Asia lead there to have 72% of mortality attributable to PM_{2.5} in 2010 while 53% of global population live in.¹⁸⁵ In terms of per-capita mortality rates attributable to PM_{2.5}, national averages are not in the same order of magnitudes.¹⁸⁶ In 2010, 20% of global premature deaths from PM_{2.5} happens in areas with ambient level above $70 \frac{\mu g}{m^3}$ which have 8% of world population, while 40% of world population living in areas with PM_{2.5} ambient level below $16 \mu g/m^3$ experience the same global premature deaths.¹⁸⁷

¹⁸² Benjamin Bowe and others, 'The 2016 Global and National Burden of Diabetes Mellitus Attributable to PM 2.5 Air Pollution' (2018) 2 *The Lancet Planetary Health* e301, e301.

¹⁸³ Christopher JL Murray, 'Global Burden of 87 Risk Factors in 204 Countries and Territories , 1990 – 2019 : A Systematic Analysis for the Global Burden of Disease Study 2019' [2020] *Lancet* 1223, 1232, 1233, 1236, 1244.

¹⁸⁴ Apte and others (n 46) 4.

¹⁸⁵ *ibid* 3.

¹⁸⁶ *ibid* 4.

¹⁸⁷ *ibid* 5.

However, magnitude of effect of PM- health relationship differs across studies, which can be attributable to the composition of particulate matters.¹⁸⁸

Black carbon emissions, which are mostly “fine” particles, attracted special attention due to possibility of being the universal carrier of the toxic components of PM_{2.5}. In fact, black carbon particles are combustion products and almost always co-emitted with other particles which may be harmful to health by themselves. The evidence which suggests combustion-related particles are more dangerous than the other types, are supporting this idea. However, more studies are required to identify the role of different particles of PM_{2.5} in recognized health dangers.¹⁸⁹ Black carbon in PM_{2.5} also includes ultrafine category, which are smaller than 100 *nm* and can penetrate deep into the lungs.¹⁹⁰

Loss of life expectancy due to air pollution significantly varies from one region to another. For example, the loss in north America is 50% less than western Europe.¹⁹¹ GBD 2010 data implies that exposure to PM_{2.5} leads to approximately 1.4-year average global life expectancy decrease. Estimates show average global life expectancy decreases 0.5~1 year for US and 3~5 years in polluted areas of China.¹⁹² In 2005 in Europe, the average loss in life expectancy was 8.3 months, note in some cities the loss is significantly higher than the average.¹⁹³ Based on the European Aphekom project, meeting WHO air quality guideline for PM_{2.5} could increase average life expectancy by about 20 months in most highly polluted European cities.¹⁹⁴

In India, 0.98 million deaths were attributable to ambient particulate matter pollutions in 2019.¹⁹⁵ The estimations based on GBD 2017 show loss of about 1 year life expectancy

¹⁸⁸ Scovronick (n 33) 26.

¹⁸⁹ *ibid* 3.

¹⁹⁰ *ibid* 26.

¹⁹¹ Maas and Grennfelt (n 37) vi.

¹⁹² Apte and others (n 46) 3.

¹⁹³ Maas and Grennfelt (n 27) 1.

¹⁹⁴ *ibid* 2.

¹⁹⁵ Pandey and others (n 111) e25.

due to ambient particulate matter in India. DALYs per 100000 population attributable to air pollution is estimated to be 2802 (1546 for ambient particulate matter).¹⁹⁶

Besides, PM_{2.5} have contributed to visibility impairment in north America, namely in southern Ontario, Quebec, Montana and Midwest of USA.¹⁹⁷

b. Risks attributable to gaseous pollutants

Short-term ozone exposure (few hours) has been linked to various adverse health impacts which may lead to premature mortality and morbidity.¹⁹⁸ Deaths attributable to ozone, which are from respiratory conditions, roughly estimated to be 150000 cases annually based on GBD 2010. Adverse respiratory effects of ozone are strongly evidenced by epidemiological and toxicological studies reviewed by US Environment Protection Agency (EPA) and WHO. The effects include lung function change, increasing incidence of asthma and also premature mortality. The possibility of casual association with cardiovascular effects and total mortality is also present. Some evidence suggests links with central nervous system and reproductive and developmental effects for long-term exposure.¹⁹⁹

Toxicological and clinical studies of ozone exposure have consistently showed decrease in lung function, inflammatory responses, and increase in airway reactivity. Toxicological and clinical studies of association between ozone short-term exposure and cardiovascular effects report results such as heart-rate variability, systemic inflammation, and oxidative stress. Also, epidemiological studies of short-term exposure find that for every 80 $\mu\text{g}/\text{m}^3$ rise in the 1-hour maximum ozone concentration, respiratory hospital admissions and total non-accidental mortality increase by 1-6% and up to about 4%, respectively. Moreover, deaths from both cardiovascular and respiratory problems are related to long-term ozone exposure, but including PM_{2.5} in

¹⁹⁶ Balakrishnan and others (n 112) e31, e32, e34.

¹⁹⁷ Maas and Grennfelt (n 27) 1.

¹⁹⁸ *ibid* 12.

¹⁹⁹ Scovronick (n 33) 32–33.

the model only respiratory causes remain significant leading to 4% rise in related-mortality for $20 \mu\text{g}/\text{m}^3$ growth of ozone.²⁰⁰

Furthermore, Methane abatement measures develop health benefits not only by preventing ozone formation, but also through promoting healthier diets associated by certain mitigation actions.²⁰¹ For example, diets high in red and processed meats (a major source of methane) are associated with certain cancers and diabetes.²⁰² Moreover, globally 800 million undernourished people estimated by the Food and Agriculture Organization, which means ozone adverse impacts on corps are also a health threat. Note that growth or/and nutrient is responsible for 45% of child deaths.²⁰³

Besides nitrogen compounds role in formation of ozone and $\text{PM}_{2.5}$, nitrogen deposition exceeding critical loads may change environment in favor of some plants and insects which could cause allergies and other diseases.²⁰⁴ Also, nitrogen dioxide leads to respiratory and cardiovascular adverse health effects. Nitrogen dioxide health impacts are increasingly concerning and may figure prominently alongside of $\text{PM}_{2.5}$ and ozone in assessments of air pollutions effects on health.²⁰⁵

c. Risks attributable to persistent pollutants

Heavy metals and persistent organic pollutants are recognized toxic. As they can be accumulated along food chains, even low concentrations can lead to considerable exposure in long-term. Hence, health and environmental risks exist in many countries. Health adverse effects of heavy metals and POPs include carcinogenicity, mutagenicity, reproduction toxicity, and endocrine disruption.²⁰⁶ One example is different forms of mercury, which concerning level of exposures are highly prevalent in seafood consumers. Higher exposures can lead to neurological symptoms like tremors, dizziness,

²⁰⁰ *ibid.*

²⁰¹ *ibid* 4.

²⁰² *ibid* 63.

²⁰³ *ibid* 4.

²⁰⁴ Maas and Grennfelt (n 27) vii.

²⁰⁵ Scovronick (n 33) 4.

²⁰⁶ Maas and Grennfelt (n 27) 17.

headaches, memory loss, and hearing problems. More severe cases include developmental disabilities, cognitive and motor dysfunction, and physical abnormalities. Methylmercury is documented to have developmental toxicity. Women with few symptoms of its exposure may pass devastating doses to their unborn children.²⁰⁷

1.2.2.2. Adverse psychological effects

Researchers examine air pollution effects on different psychological aspects such as decreasing happiness and life satisfaction as well as increasing annoyance, anxiety, mental disorders, self-harm, and suicide. Moreover, air pollution affects cognitive functioning negatively, which explains other studies that shows air pollution impairs the decision-making quality.²⁰⁸

a. Happiness and life satisfaction

The lower happiness and life satisfaction have been mostly studied via self-report measures. However, more recent studies recruit indirect means like analyzing unobtrusive social media data and comparing number of emergency department visits for depression. The significant lower happiness and life satisfaction reported in studies in UK and china due to PM_{2.5}.²⁰⁹ Individual subjective welfare includes fewer observable losses like mental health status, depressive symptoms, life satisfaction and hedonic happiness and evaluative happiness.²¹⁰ For example, a study in 2020 finds the individual subjective well-being (SWB) will decrease 0.448 units on average, if PM_{2.5} concentration increases 1 $\mu\text{g}/\text{m}^3$ each year.²¹¹ In terms of long term individual subjective welfare, the study concludes PM_{2.5} has 10.41 % negative effect on SWB due to aggravation of mental health.²¹² PM₁₀ contribution to significant lower happiness and life satisfaction seems to be more prevalent in studies in different countries e.g. China, USA, Australia, Estonia,

²⁰⁷ Kessler (n 29) A305–A306.

²⁰⁸ Lu (n 167) 52–59.

²⁰⁹ *ibid* 52, 53, 58.

²¹⁰ Shi and Yu (n 166) 1.

²¹¹ *ibid* 2.

²¹² *ibid* 3.

Switzerland, and Ireland.²¹³ PM₁₀ easier perception by people seems to lead in higher contribution to how people feel living in pollutant areas.²¹⁴ Sulphur oxides were reported as a significant cause of lower happiness and life satisfaction in studies in China, Canada, and many European countries. Nitrogen oxides mostly considered as a significant harm to happiness and life satisfaction in studies in European countries. Reports in fewer countries like UK and Switzerland shows significant impact of pollutant gasses like carbon monoxide and ozone, which are not easily perceived in air.²¹⁵

b. Annoyance and anxiety, mental disorders, substance abuse, self-harm and suicide

Annoyance and anxiety increase as people are exposed to air pollutants particularly PM_{2.5} and nitrogen dioxides which can be a physiological reaction. Moreover, perceived air pollution can increase anxiety as it may concern people about their health and future.²¹⁶ Increased mental disorders, as well as substance abuse, self-harm and suicide reported as an effect for gas pollutants as well as both PM_{2.5} and PM₁₀ in studies in different countries like Canada, USA, China, South Korea.²¹⁷

c. Cognitive functioning and decision making

Besides, cognitive functioning studies show it is adversely affected by air pollutants in all human life stages from prenatal development to old ages.²¹⁸ However, in prenatal, childhood and youth the impairments due to PAH (Polycyclic aromatic hydrocarbon) are more prevalent.²¹⁹ The harmed functions include visuo-construction, memory, math ability, reading comprehension, verbal intelligence, and non-verbal intelligence. Furthermore, cognitive disorders like dementia and attention deficit hyperactivity are reported to be increased in polluted areas. Studies focused on impaired decision making

²¹³ Lu (n 167) 53.

²¹⁴ *ibid* 60.

²¹⁵ *ibid* 53.

²¹⁶ *ibid* 52–55, 58.

²¹⁷ *ibid* 54, 55, 58.

²¹⁸ *ibid* 58.

²¹⁹ *ibid* 54–55.

due to air pollution also concedes the association between air pollution and cognitive functioning.²²⁰ Low dose exposure of mercury in utero can lead to various neuropsychological problems. One example is increased risk of behaviors related to attention deficit/hyperactivity disorder for children aged 8, who were born to mothers with hair mercury amount of $1000 \frac{\mu g}{kg}$. One study calculated annual loss of 600000 IQ points in at least 1.8 million children born with elevated methylmercury exposure within European Union.²²¹

1.2.2.3. Adverse economic effects

In the past, air pollution was increasing as economic was growing. Hopefully, economic growth and pollutants emission trends have been decoupled mainly thank to environmental measures, energy policy and general technological progress. Between 1970 and 2014, Clean Air Act in USA leads to 69% emission decline in carbon monoxide, lead, nitrogen oxides, volatile organic compounds, particulate matter, and sulphur dioxide, while GDP, vehicle miles travelled, energy consumption, and population increased by 238%, 172%, 45%, and 56%, respectively. In Canada during 1990 to 2014, despite 75% growth in GDP and 25% more population, remarkable decline in PM_{2.5} (57%, excluding open sources), sulphur dioxide (63%) and nitrogen oxide (33%) have been recorded. If the trends never have been decoupled, reaching the current economic growth would lead to 30 times more exceedance of critical load for acidification and 3 times higher nitrogen in European lakes, 3 times higher health impact of PM_{2.5} with 600000 more premature deaths, 70% more higher health impact and 30% more corps damage due to ozone level.²²²

How air pollution affects economy is important, as it helps to persuade decision makers like governments and business owners to spend money to avoid it. It also helps to decide where is more efficient to invest money, for example, based on a study of Organization for Economic and Co-operation and Development (OECD) countries, 50% of the

²²⁰ *ibid* 58.

²²¹ Kessler (n 29) A306.

²²² Maas and Grennfelt (n 27) v.

economic costs of outdoor air pollution are because of road transport, which can encourage decision makers to pay especial attentions to the sector.²²³

There are various means that economy is threatened by air pollution. It requires researches, technologies, and devices to avoid more pollutant or vanish the current hazardous amount of them in environment which means it is necessary to invest in the field and devote financial resources to it. However, the costs to control air pollution are significantly lower than the damage to health and environment. The assessment of mitigation actions efficiency is also complicated as it depends on various parameters which decision makers should note. For example, however actual costs of reducing health impacts of air pollution are much lower in EECCA countries than EU or North America, costs to meet a comparable level of ambition for health protection is so higher as a percentage of GDP.²²⁴

Note that the harm to environment is hard to monetize. Indeed, the abatement measure on national income and employment remain neutral in many countries, as employment is created to produce required technologies.²²⁵ In Europe, some ammonia abatement measures benefit economy by increasing efficiency of use of nutrients in agriculture.²²⁶

Besides health and environment, there are various harms to economy (corps, buildings, work productivity, etc.) if air pollution exceeds healthy limits. For example, the association of economy and air pollution can be observed in stock market based on studies in countries like Turkey, China.²²⁷

Premature mortality and morbidity due to air pollution can lead to great economic costs including costs to society from premature deaths, healthcare costs for illnesses, as well as loss of productivity due to sickness-related absence from work. The costs of

²²³ Scovronick (n 33) 50.

²²⁴ Maas and Grennfelt (n 27) xiii.

²²⁵ *ibid* v, vii.

²²⁶ *ibid* xii.

²²⁷ Lu (n 167) 59.

premature deaths and diseases due to air pollution in 53 countries in WHO European Region was USD 1.6 in 2010.²²⁸ In European UNECE region, the total economic costs of premature deaths because of air pollution are EUR 1 trillion with the illness costs also adding another 10%. For half of the countries in the region, the total health costs of air pollution exceed 10% of GDP.²²⁹ In the United States, annual economic costs due to premature deaths, heart attacks, hospital admissions, emergency department visits, and missed school work is more than USD 1 trillion. In Canada the health costs due to air pollution exceed CAD 8 billion. On the other hand, the direct costs of additional measures required to reach the goal of revised Gothenburg protocol is negligible (less than 0.01% of Europeans GDP). Also, the costs of air pollution abatement can be decreased by almost 60% in 2030 if a successful climate and energy policy is implemented.²³⁰

Work productivity can be affected either as a result of decreasing workers presence or by decreasing how efficient present workers are.²³¹ In 2014, roughly 6% decrease in worker productivity is measured in California for a $10 \mu\text{g}/\text{m}^3$ increase in $\text{PM}_{2.5}$, considering no significant effect on working hours.²³² Later in 2015, a study in china examining workers in fabric factory measured roughly 0.9% loss of mean output (4.3 m in 509 m/worker-8hour shift) for every $10\mu\text{g}/\text{m}^3$ increase in $\text{PM}_{2.5}$ concentration. The study also suggests that the productivity could rise by 3.8%, if the concentrations never exceed $25 \mu\text{g}/\text{m}^3$.²³³ A study of productivity of outdoor crop harvest workers shows 5.5% reduction due to 10-ppb ozone increase.²³⁴ In 2012 study of berries and grapes harvest shows 4% reduction for the same amount of 10 ppb ozone increase.²³⁵ In terms of workers presence, generally 5-10% of sickness-related absence are associated with

²²⁸ Maas and Grennfelt (n 27) 20.

²²⁹ *ibid* vii.

²³⁰ *ibid* 20.

²³¹ Lu (n 167) 59.

²³² Teng Li, Haoming Liu and Alberto Salvo, 'Severe Air Pollution and Labor Productivity' [2015] IZA Discussion Papers 1, 2.

²³³ *ibid* 6.

²³⁴ Lu (n 167) 59.

²³⁵ Li, Liu and Salvo (n 232) 2.

air pollution. Therefore, it is claimed that for the EU28, air pollution abatement costs are less than absence related cost-saving resulted by emission reduction proposed by European in 2013 Commission.²³⁶ Closing a refinery in Mexico City leads to 4% more weekly working hours for workers living within 5 kilometers radius of the refinery.²³⁷ Note that the benefits are immediately effective. In a larger scale, economic productivity can be decreased because of IQ points have lost in children who were exposed to air pollutants in utero. For instance, the loss calculated \$ 11.9 billion for 600000 IQ points annual loss by methylmercury exposure in European Union. In addition, methylmercury threatens fish stock health, which is a main food supply for human and animals.²³⁸

Economy is also being threaten by how air pollution affects human products. Reduced yields due to ozone or black carbon have direct adverse impact on farmer's economy. Moreover, the reduced food production leads to higher food prices, affecting food and nutrient intakes in both high- and low- income countries, which may result in growth faltering.²³⁹ The ground-level ozone concentrations result in up to 15% reduction in crops and wood that is produced in Europe. Wheat production loss is valued EUR 4.6 billion per year in Europe. More damage to agriculture through decline in pollination by ozone is expected in future.²⁴⁰

Built in environment and cultural heritage is also damaged by air pollution. Estimations are more than EUR 2 billion per year in Europe.²⁴¹

In addition, welfare losses due to air pollution can be economically measured for public policy makers. For example, decreased SWB due to 1 $\mu\text{g}/\text{m}^3$ rise in $\text{PM}_{2.5}$ concentration each year is equivalent to 7.7% of household disposable income.²⁴² Moreover, air

²³⁶ Maas and Grennfelt (n 27) vii.

²³⁷ Li, Liu and Salvo (n 232) 5,6.

²³⁸ Kessler (n 29) A306.

²³⁹ Lu (n 167) 39.

²⁴⁰ Maas and Grennfelt (n 27) vii.

²⁴¹ *ibid.*

²⁴² Shi and Yu (n 166) 2.

pollution increases defensive expenditure like costs of facemask, air purifiers, and health insurance. For example, in China 100 points increase in AQI (Air Quality Index) level resulted in increase of using all masks and anti-PM_{2.5} by 54.5% and 70.6%, respectively. Based on transaction level data of one Chinese insurance company, one-standard-deviation increase of air pollution increases number of health insurance contracts by 7.2% in a day, while the same amount of decrease of air pollution from purchase date increases the probability of cancellation in cost-free period by 4%.²⁴³

1.2.2.4. Adverse social effects

Air pollution play an effective role in social issues that is predictable as we already discussed how it associates with psychological disorders. Unethical behaviors, as well as, both violent crimes and property crimes are shown to associate with air pollution. Furthermore, citizens are more likely to perceive the governments as corrupt in highly polluted days, because governments possess an important role in air pollution control.²⁴⁴ In 2016, a survey claimed that air pollution was the number one environmental concern for public, which can explain why cost-benefit analysis of abatement policies shows substantially higher societal benefits than costs to some sectors.²⁴⁵

1.2.2.5. Adverse effect on the environment

As mentioned earlier, acidification of soils, fresh water and ecosystem as a result of high concentrations of sulphur and nitrogen is still an environmental issue in many areas. However, the significant decrease in sulphur dioxide since 1980 lead to lower deposition and recovered some forests and lakes. Exceeded nitrogen deposition also changes plant communities dominating some species over others. Consequences include vanishing of butterflies, other insects and birds, as well as increase in algal blooms.²⁴⁶ In Europe, nitrogen deposition increased mainly due to nitrogen oxides and ammonia emissions lead to changing European ecosystems during 20th century. For example, low fertility

²⁴³ Lu (n 167) 59.

²⁴⁴ *ibid.*

²⁴⁵ Maas and Grennfelt (n 27) vi, x.

²⁴⁶ *ibid.* vii.

heathlands home for rare plant species adapted to low nitrogen availability were converted to grasslands. In large parts of Europe, especially where livestock density and thus ammonia deposition is high, loss of biodiversity is still continuing. Annual 30 *kg/ha* N-deposition in Atlantic region of Europe results in 50% decline in species richness.²⁴⁷

As available sunlight for photosynthesis is reduced by black carbon and ozone is toxic to many plants, plants are also threatened by ozone and black carbon that leads to decline in agricultural yields and food insecurity.²⁴⁸ Ozone adverse effects on vegetation occur during growing season when the concentrations are 30 ppb or even below under environmental conditions conducive to high ozone uptake. Drawbacks include visible leaf-injury, increased or pre-mature die-back and decreased seed production and growth of sensitive species such as trees, (semi-)natural vegetation, and some important crop species.²⁴⁹ Stable crops (wheat, soybeans, rice and maize) yields are globally decreased by 3-16% depending on crop and modelling assumptions due to current ozone levels.²⁵⁰ One ozone flux-based estimates, which take into account the environmental conditions effect on ozone uptake, shows yield loss of 13.2% in EMEP region, 14.6% in EU28 including Switzerland and Norway, 10.7% in countries of South East Europe, and 12% in EECCA countries.²⁵¹

1.2.3. Climate Change

Climate change refers to changes in mean and/or variability of climate properties (e.g., temperature, precipitation, or wind), which persist for an extended period (decades or longer).²⁵² Climate change have been associated with two decades of global scientific

²⁴⁷ *ibid* 4.

²⁴⁸ Scovronick (n 33) 38.

²⁴⁹ Maas and Grennfelt (n 27) 14. For air pollution effects on tree and forest decline in East Asia refer to: Masamichi Takahashi and others, 'Air Pollution Monitoring and Tree and Forest Decline in East Asia: A Review' (2020) 742 *Science of the Total Environment* 140288.

²⁵⁰ Scovronick (n 33) 4.

²⁵¹ Maas and Grennfelt (n 27) 15.

²⁵² IPCC (n 21) 544; Muhammad Nda and others, 'A Review on the Causes, Effects and Mitigation of Climate Changes on the Environmental Aspects' (2018) 10 *International Journal of Integrated Engineering* 169, 169.

and political debate, known as the leading environmental challenge today, as investigations shows it has affected extreme events like drought and floods.²⁵³

Climate is changed due to natural factors like solar cycle variation, volcanic eruption, or slow changes in the earth's orbit around the sun, as well as natural processes within the climate system ('the highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the lithosphere, and the biosphere and the interactions between them'²⁵⁴) such as change in ocean circulation and change in radiative transfer due to anthropogenic change in atmosphere composition.²⁵⁵

Global warming usually refers to estimated increase in global mean surface temperature (GMST) averaged over a 30 years period, mostly relative to pre-industrial levels.²⁵⁶ Hence, it usually refers to the warming due to emissions from human activities.²⁵⁷ More than half of the increase in GMST from 1951 to 2010 is estimated to be due to anthropogenic causes.²⁵⁸

Any gas or particle which affects the climate by changing the Earth energy balance, is a climate forcer.²⁵⁹ In the next two sections some of most important anthropogenic climate forcers, their sources, as well as current status and trend of them are introduced.

1.2.3.1 Anthropogenic climate forcers and their mechanism of impact

Greenhouse gasses (GHG) are both natural and anthropogenic components of atmosphere that absorb and emit some terrestrial radiation emitted by the Earth's surface, clouds, and the atmosphere itself. The process known as greenhouse effect

²⁵³ Nda and others (n 252) 169, 170.

²⁵⁴ IPCC (n 21) 545, 546.

²⁵⁵ Nda and others (n 252) 169.

²⁵⁶ IPCC (n 21) 550.

²⁵⁷ Nda and others (n 252) 169.

²⁵⁸ Gabriele C Hegerl and others, 'Causes of Climate Change over the Historical Record' (2019) 14 *Environmental Research Letters* 1, 1.

²⁵⁹ Scovronick (n 33) 15.

leads to change in radiative forcing (a measure of the difference in energy that the Earth or the atmosphere receive from sun and the energy which is radiated back to the space²⁶⁰), and keep energy inside the atmosphere. GHGs include water vapor, carbon dioxide, nitrous oxide, methane, and ozone as primary GHGs in the atmosphere, as well as entirely human-made GHGs like halocarbons. ²⁶¹ GHGs are recognized as the primary human-induced climate forcers with carbon dioxide as the dominant component.²⁶²

Carbon dioxide accounts for 75% of the total global emissions of GHG. Carbon dioxide is absorbed and released onto the surface of the earth by plants and animals in a constant exchange between oceans and the environment. Up to half of the emissions can be reabsorbed by oceans and plants growing faster in the air, but an annual accumulation happens resulting in 0.4% rise in the concentration of carbon dioxide. Since 1800, the carbon dioxide concentration has increased from 270 ppm to 370 ppm exceeding the levels at any time in the past 20 million years. This is why it is considered as the number one concern in climate change.²⁶³

Methane is the second most significant GHG emission to the atmosphere for the climate change with 20 times higher radiative force potential than carbon dioxide.²⁶⁴ It is also a precursor for ozone. Ozone is a GHG which presence in troposphere prevents infrared radiation exits the atmosphere. It is also an air pollutant that is harmful to human and plants. Moreover, it avoids carbon dioxide absorption from atmosphere by plants, because it inhibits photosynthesis and plant growth. Note that ozone in stratosphere plays a beneficial role by filtering out dangerous UV radiation.²⁶⁵

Aerosols ('a suspension of airborne solid or liquid particles that reside in atmosphere for at least several hours') either from natural or anthropogenic origins can affect climate through interactions that scatter and/or absorb radiation, through interactions with

²⁶⁰ *ibid.*

²⁶¹ IPCC (n 21) 550, 551.

²⁶² Nda and others (n 252) 170.

²⁶³ *ibid* 172.

²⁶⁴ *ibid.*

²⁶⁵ Scovronick (n 33) 35, 36.

clouds, or by altering the albedo ('the fraction of solar radiation reflected by a surface or object') of surfaces where they are deposited (e.g., snow- or ice-covered surfaces).²⁶⁶

Model simulation and attribution results show a key role in shaping regional climate for aerosols. However, it is difficult to quantify, because of uncertainties in magnitude of aerosol-cloud interactions represented in models, as well as aerosol loading from biomass burning and natural sources. Besides regional effects, relevant impacts are suggested by models simulating the global heterogeneous patterns of temperature change.²⁶⁷

Important anthropogenic aerosol species include sulphate, black carbon, organic carbon, biomass burning, secondary organic aerosol, and nitrate. Over period 1750-2000, the annually and globally averaged estimate of anthropogenic aerosol instantaneous radiative force (RF) due to aerosol-radiation interactions was negative representing cooling effect on climate ($-0.35 \pm 0.5 \text{ W m}^{-2}$). In fact, only black carbon has positive RF due to aerosol-radiation interactions among above named aerosol species. As RF due to aerosol-cloud interactions is very uncertain, effective radiative force (ERF: the sum of RF and its fast adjustments) has estimated, which was also negative, with high uncertainty ranging from -1.2 to 0 W m^{-2} . The ERF from aerosol-snow interactions, which decrease surface albedo, was estimated to be positive but below 0.1 W m^{-2} . The total aerosol ERF is estimated to be -0.9 (-1.9 to -0.1) W m^{-2} .²⁶⁸

Black carbon is an important aerosol due to its anthropogenic warming effect on climate. Black carbon affects climate through several mechanisms. First, BC particles absorb solar radiation and re-emit the energy as heat. It is very important as the dark colour make it absorbs about a million times more energy per unit mass than carbon dioxide. Second, it darkens surfaces reducing their reflectivity and rising heat absorption. This mechanism is so effective on ice and snow making arctic and glaciated

²⁶⁶ IPCC (n 21) 542.

²⁶⁷ Hegerl and others (n 258) 9.

²⁶⁸ N Bellouin, *Aerosols: Role in Climate Change*, vol 1 (Second Edi, Elsevier 2015) 78, 79, 80, 81.

area vulnerable. It also affects cloud formation and rainfall, though the net impact of these effects is still uncertain. BC has been one of major contributors to the radiative forcing in past 250 years behind carbon dioxide and probably methane.²⁶⁹

A set of well-mixed GHGs with long atmospheric lifetimes are carbon dioxide, nitrous oxide, and some fluorinated gasses, which are referred as long-lived climate forcers (LLCF). They have warming effect on climate and accumulate in the atmosphere for decades and centuries. Hence, their warming effects also persist for decades and centuries.²⁷⁰ Particularly carbon dioxide attracts attentions, which emissions has increased substantially since pre-industrial (75% of GHGs emission), and persists in the atmosphere for centuries.²⁷¹

Short-lived climate pollutants (SLCPs) such as methane, black carbon, ozone and hydrofluorocarbons (HFCs) are a group of climate pollutants usually with radiative forcing higher than carbon dioxide but persist in the atmosphere from days to about a decade. The characteristics of SLCPs make them very effective in near-term climate. For instance, SLCPs mitigation policies are interesting as it contributes to many health benefits. Note that HFCs and methane current concentrations are not a direct source of health problems by themselves. Moreover, both health and climate benefits can be reached soon after emissions reduction and near where the mitigation actions take place. As long-term climate change largely depends on carbon dioxide emissions, SLCPs abatement measures should be considered as complementary to carbon dioxide mitigation.²⁷²

1.2.3.2. Anthropogenic sources of climate forcers

Climate forcers contributing to global warming can be increased either by increasing emissions or by decreasing of the amounts they are absorbed. For example, deforestation increases the carbon dioxide in the atmosphere by decreasing its

²⁶⁹ Scovronick (n 33) 29, 30.

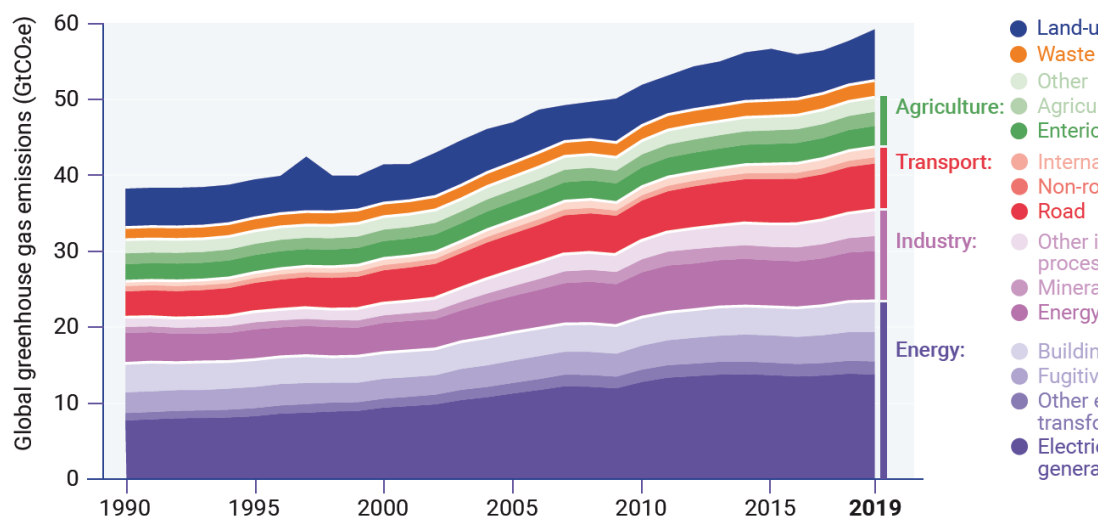
²⁷⁰ IPCC (n 21) 553.

²⁷¹ Scovronick (n 33) 18.

²⁷² *ibid* 18, 19, 20, 44.

consumption. The most important climate forcer and GHG is carbon dioxide. Generally, carbon dioxide is a combustion product, which involves many sectors such as industry, transport, and energy.²⁷³ The Figure 3 shows GHG emissions at the sectoral level.

Figure 3. GHG emissions at the sectoral level



Source: Monica CRIPPA and others, *Fossil CO₂ Emissions of All World Countries - 2020 Report* (Publications Office of the European Union 2020).²⁷⁴

Electricity and heat generation are responsible for 24% of total GHG emissions in the last decade. Other energy transformation and fugitive emissions also lead to 10% of total GHG emissions. Energy use in building and other sectors like agriculture and fishing are source to 7% of emissions. Industry contributes to GHG emissions by 11% through energy use and by 9% from industrial processes from mineral products.²⁷⁵

One major sector source to GHG is agriculture including forestry and land use, estimated to accounts for 24% of global GHG emissions. For example, deforestation due to pasture demand emits short- and long-lived climate pollutants into the atmosphere, as well as

²⁷³ The United Nations Environment Programme (UNEP), *Emissions Gap Report 2020* (2020) 8.

²⁷⁴ Monica CRIPPA and others, *Fossil CO₂ Emissions of All World Countries - 2020 Report* (Publications Office of the European Union 2020).

²⁷⁵ The United Nations Environment Programme (UNEP) (n 273) 7.

decreasing forests potential to absorb carbon dioxide.²⁷⁶ The inclusion of methane and nitrous oxide emissions make agriculture sector more important based on current trends.²⁷⁷

Land-use (LU) refers to the total of arrangements, activities and inputs in a certain land cover type. Land use change (LUC) from one category to another affects climate by changing surface albedo, changing climate forcers emissions, and/or changing carbon dioxide absorb.²⁷⁸ In 2019, LUC was responsible for 6.3 GtCO₂e emission of carbon dioxide and 0.5 GtCO₂e emission of methane and nitrogen dioxide, which was roughly 11% of total GHG emissions.²⁷⁹

Transport sector accounts for 14% of global GHG emissions and roughly 23% of total energy-related carbon dioxides emissions, mostly originated from developed countries with high incomes.²⁸⁰ In 2019, fossil fuel emissions produced 38 GtCO₂e of carbon dioxide.²⁸¹ The transport sector also includes shipping and aviation. Shipping was responsible for 1 GtCO₂ and small additional emission of methane and nitrous oxide, as well as 100000 tons of black carbon in 2018. Also, global aviation carbon dioxide emissions in 2018 were 1 Gt increasing by 27% in last five years. Aviation accounts for 3.5% of all drivers of climate force through CO₂ emissions and related non-CO₂ emissions like water vapor, nitrous oxides and black carbon.²⁸²

As urban areas are responsible for between 66% and 75% of total energy use and so similar level of carbon dioxide emissions, many mitigation actions can target good planning of cities to reduce climate forces. The policies may involve in regulating high air quality standards, using modern technologies in waste management sectors,

²⁷⁶ Scovronick (n 33) 50, 64.

²⁷⁷ The United Nations Environment Programme (UNEP) (n 273) 7.

²⁷⁸ IPCC (n 21) 553.

²⁷⁹ The United Nations Environment Programme (UNEP) (n 273) 5.

²⁸⁰ Scovronick (n 33) 50; The United Nations Environment Programme (UNEP) (n 273) 7.

²⁸¹ Scovronick (n 33) 50, 64.

²⁸² The United Nations Environment Programme (UNEP) (n 273) 52, 53, 54.

designing proper green space and efficient residential and commercial buildings, and managing city to minimize necessary transport as well as providing the transport means with the least emissions.²⁸³

As air pollutants, sources to ozone, black carbon, nitrous oxide, and methane are previously introduced and discussed. In 2019, 9.8 GtCO₂e of methane, 2.8 GtCO₂e of nitrogen dioxide, and 1.7 GtCO₂e of fluorinated gases were emitted.²⁸⁴ However, from the climate change perspective, some considerations should be taken into account. For example, BC emissions from industries like brick kilns and coke ovens are adversely affecting climate in higher magnitudes, because many of those located in Asia such as Himalayas and at higher latitudes.²⁸⁵

As a major producer of many climate forcers, fuel combustion is very important target for mitigation policies. Note during combustion, BC is co-emitted with other pollutants like organic carbon that may have cooling effect. Hence, the mitigation policies should consider the ratio of BC reductions relative to other co-varying cooling agents. For instance, diesel emissions have a high concentration of BC relative to cooling agents, so it is a favorable mitigation target from a climate perspective.²⁸⁶

Since ozone is a secondary pollutant, there are various sources of its precursors to target as mitigation policies. In climate aspect, methane is especially attractive, because it is itself an important SLCP and GHG.²⁸⁷ However, methane abatement measures are not necessarily the most influential method to decrease ozone adverse impacts to climate, health and environment.²⁸⁸

^ADScovronick (n 33) 96–101.

²⁸⁴ The United Nations Environment Programme (UNEP) (n 273) 5.

²⁸⁵ Scovronick (n 33) 9.

²⁸⁶ *ibid* 3, 20, 107.

²⁸⁷ *ibid* 4.

²⁸⁸ *ibid* 35.

As climate mitigation target, waste management is not very attractive, as the contribution to total global GHG emissions is estimated at roughly 5%. But considering SLCPs abatement and near-term climate, the sector is an important target as a major source to methane. Also, the emissions of this sector limitedly include carbon dioxide, nitrogen dioxide and possible HFC.²⁸⁹

1.2.3.3. Current status and trend for climate forcings

Anthropogenic global warming is estimated to be 1.0°C above pre-industrial levels and is expected to reach 1.5°C between 2030 and 2052 if it increases with current rate. Past and ongoing emissions lead to increase estimated anthropogenic global warming at 0.2°C per decade.²⁹⁰ Although global warming effects already appear, potentially disastrous outcomes are predicted by research and development for global warming more than 2°C.²⁹¹

Since 2010, averaged emission growth for fossil carbon dioxide, methane, nitrous oxide, and fluorinated gases (without LUC) was 1.3%, 1.2%, 1.1%, and 4.7, respectively. These growths are in line with trends over the last decades except for fossil carbon dioxide.²⁹²

In transport sector, global GHG emissions have increased by 150% between 1970 and 2010. Also, transport demand per capita is estimated to increase in future more rapidly, because developing and emerging economics lead to higher incomes and more investments in infrastructures.²⁹³

Averaged growth rate in GHG emissions from 2000 to 2009 was 2.4% per year, which is reduced to 1.4% per year from 2010. Note health crisis due to COVID-19 leads to measures that affects global economy and change the emissions in 2020. Studies usually estimate carbon dioxide emissions based on energy use. Approximately 7% reduction in

²⁸⁹ *ibid* 90.

²⁹⁰ IPCC, *Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways* (World Meteorological Organization 2018) 4.

²⁹¹ Nda and others (n 252) 4.

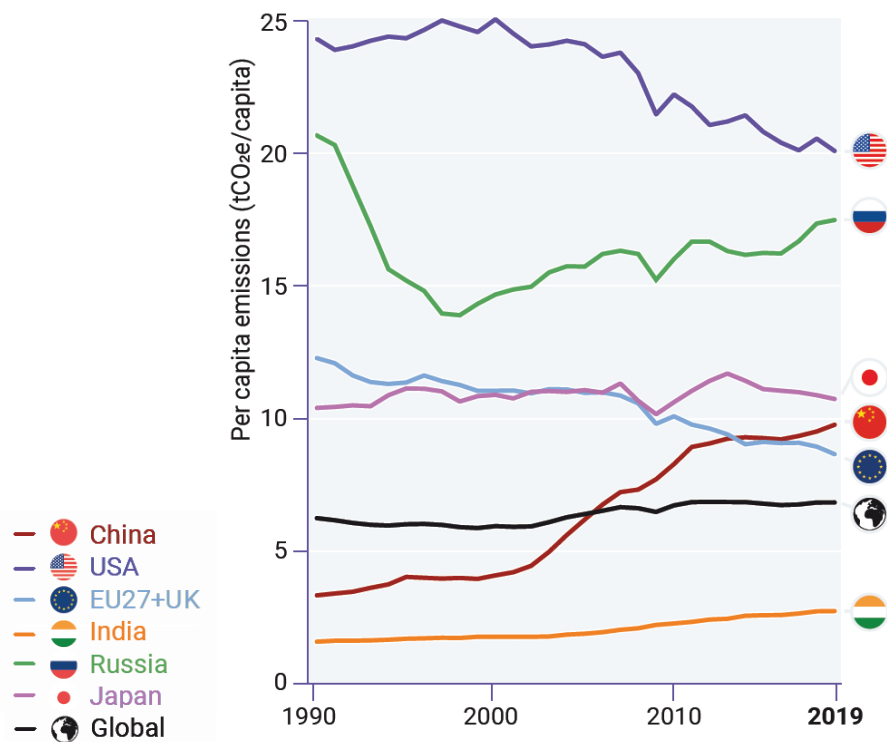
²⁹² The United Nations Environment Programme (UNEP) (n 273) 5.

²⁹³ Scovronick (n 33) 50.

emissions are estimated in 2020 based on available data and studies. The most effective change was in transport sector and due to restrictions for COVID-19.²⁹⁴

In regional aspect, the top four emitters to GHG without LUC (China, United States of America, EU27+UK, and India) have contributed to 55% of the emissions over the last decade.²⁹⁵ Figure 4 demonstrates per capita GHG emissions (excluding LUC emissions) of the top six emitters and global average from 1990 to 2019.

Figure 4. Per capita GHG emissions of the top six emitters and global average



Source: Monica CRIPPA and others, Fossil CO₂ Emissions of All World Countries - 2020 Report (Publications Office of the European Union 2020).²⁹⁶

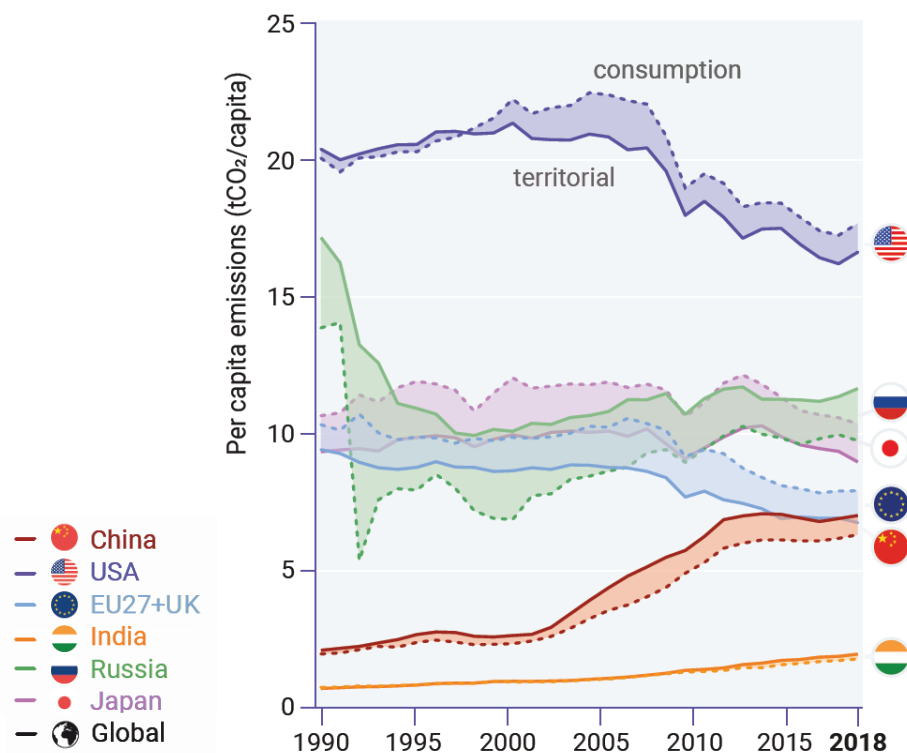
²⁹⁴ The United Nations Environment Programme (UNEP) (n 273) 9.

²⁹⁵ *ibid* 6.

²⁹⁶ CRIPPA and others (n 274).

However, where emissions occur is not the only important point, but who and where goods and services are consumed is also associated to emissions and should be considered. Consumption-based emissions can help to refine climate policies.²⁹⁷ Figure 5 shows consumption-based and territorial-based per capita carbon dioxide emissions for top six emitters.

Figure 5. Consumption-based (dotted line) compared with territorial-based (solid line) Per capita CO₂ emissions of the top six emitters.



Source: Pierre Friedlingstein and others, 'Global Carbon Budget 2019' (2019) 11 Earth System Science Data 1783²⁹⁸

In another point of view, emissions are correlated to income. The studies estimated that top 10% of income earners contribute to 36%-49% of total global emissions, while

²⁹⁷ The United Nations Environment Programme (UNEP) (n 273) 6, 7.

²⁹⁸ Pierre Friedlingstein and others, 'Global Carbon Budget 2019' (2019) 11 Earth System Science Data 1783.

lowest 50% of income earners are responsible for 7%-17% of the emissions. Hence, equitable targeting of mitigation measures should be noted by policy makers.²⁹⁹

To reach the long-term temperature goals of the Paris Agreement, which is limiting global warming below 2°C and pursuing 1.5°C by the end of the century, mitigation actions by 2030 is very important. The median estimate of level consistent with 2°C goal is reaching 41 GtCO₂e GHG emissions in 2030 and the level for 1.5°C goal is 25 GtCO₂e. While continuing current policies will lead to near 58 GtCO₂e of GHG emissions in 2030. If nationally determined contributions (hereinafter, NDC) are fully implemented by 2030 including both conditional and unconditional ones result in 53 GtCO₂e of GHG emissions in 2030. Which shows the current situation and policies are not sufficient for limiting global warming below neither 1.5°C nor 2°C by the end of the century.³⁰⁰

1.2.4. Adverse effects of climate forces

The climate change has already led to effects like melting sea ice, glaciers disappearing, shifting precipitation patterns and season changing. More frequent extreme events, sea levels rise, and species extinction are other examples of current adverse effects of climate change. The effects and their consequences are already estimated to be responsible for over deaths of over 300000 people annually and destroying the ecosystem. Outcomes due to more than 2°C rise in global temperature are predicted to be disastrous like repeated flooding, more drought and famine, increasing vulnerability to diseases, increasing possibility of war, substantial increase of refugees, and annihilation of entire ecosystem and species.³⁰¹ Some climate change adverse effects are explained in this section.

1.2.4.1 Weather extreme

Temperature extremes on land are higher than GMST. The number of hot days is projected to increase in most land areas and tropics are expecting highest increases. For global warming temperature of 1.5°C and 2°C, hot days in mid-latitudes warm by up to

²⁹⁹ The United Nations Environment Programme (UNEP) (n 273) 62.

³⁰⁰ *ibid* 27.

³⁰¹ Nda and others (n 252) 172.

about 3°C and 4°C and extreme cold nights in high latitudes warm by up to 4.5°C and 6°C, respectively.³⁰²

Temperature itself is substantially associated with mortality and morbidity based on studies showing that high and low temperatures increase health risks. The risks are not only due to extreme temperature, but also as a result of short-term changes in ambient temperature, which are common. Although the relationship varies in different regions possibly due to adaptation, it is u-shaped in most cities.³⁰³ Increase in frequency and intensity of heat waves due to climate change results in health risks (heat stroke, cardiovascular and respiratory disorders) particularly in the elderly, people with preexisting cardiorespiratory diseases, and urban poor. In 1995, heat wave led to 514 deaths in United States and 619 cases in United Kingdom. Also, climate change can make extreme winter colds, which is associated with mortality. Deaths rates in winter is 10-25% higher than summers mostly caused by cardiovascular, cerebrovascular, circulatory, and respiratory diseases.³⁰⁴

1.2.4.2 Extreme events

Natural hazards become disasters because of vulnerability of target population. More frequent disasters due to climate change affect health and well-being by injuries and drowning, as well as indirect means like loss of infrastructure, disrupted livelihoods, displacement, and mental health effects. Disasters also threatens economy through various means such as health impacts, loss of infrastructure, and compromising water supplies. According to the UN Office for Disaster Risk Reduction, nearly 2 trillion dollars have been lost between 2000 and 2012 due to damages caused by disasters.³⁰⁵

Climate change causes more floods and droughts. In several northern hemisphere high-latitude and/or high-elevation regions, eastern Asia, and eastern North America, risks

³⁰² IPCC (n 290) 7.

³⁰³ Scovronick (n 33) 39.

³⁰⁴ Ali Sayigh (ed.), *Renewable Energy and Sustainable Buildings* (2020) 82, 83.

³⁰⁵ Scovronick (n 33) 40.

due to heavy precipitation are predicted to be higher for 2°C compared to 1.5°C of global warming.³⁰⁶

Floods health risks are due to contamination of public water supplies with bacteria and parasites and resulted diseases, injuries and deaths due to drowning and being swept against hard objects and other means like damaged infrastructures. Floods also causes psychological morbidity. Primary care attendance increased by 53% following flooding in Bristol, UK. Droughts also increase concentration of pathogen in limited water supplies and lead to many diseases. Droughts cause lack of food production and resulted malnutrition and lower hygiene which increase risks to many diseases.³⁰⁷

SLCPs contribute to more natural disasters particularly flooding by glacial and snow melt or changing rainfall patterns. A study based on Southwest China supports the conclusion that aerosol emissions like BC can increase risk of rainfall extremes and catastrophic flooding.³⁰⁸

1.2.4.3. Risks to biodiversity and ecosystems

There are risks to terrestrial, freshwater and coastal ecosystems and they may lose their services to humans. 2°C of global warming results in transformation of ecosystems from one type to another in 13% of global terrestrial land area. Also, 105000 species were studied, which 6% of insects, 8% of plants and 4% of vertebrates are predicted to lose more than 50% of their climatically determined geographic range for 1.5°C of global warming. 2°C of global warming increases the projections to 18%, 16%, and 8%, respectively. Impacts due to biodiversity-related risks like forest fires and the spread of invasive species are lower at global warming of 1.5°C than 2°C.³⁰⁹ Forest fires directly affect human health through burn and smoke inhalation. Also, resulted air pollution

³⁰⁶ IPCC (n 290) 7.

³⁰⁷ Sayigh (n 304) 84, 85, 86.

³⁰⁸ Scovronick (n 33) 40.

³⁰⁹ IPCC (n 290) 8.

leads to increase of mortality and morbidity in susceptible people. Forest fires also lead to loss of vegetations on slopes which can increase risk of land-slides and soil erosion.³¹⁰

Climate change also increases ocean temperature leading to increase in ocean acidity and decrease in ocean oxygen concentration. Targets to the associated projected risks include marine biodiversity, fisheries, and ecosystems, as well as their functions and services to humans. Loss of coastal resources and reduction of productivity of fisheries and aquaculture are expected, particularly in lower latitudes, because of climate change impacts on the physiology, survivorship, habitat, reproduction, disease incidence, and risk of invasive species. Ecosystems are expected to be changed due to marine species shifted to higher latitudes. For global warming of 1.5°C and 2°C, coral reefs are predicted to decline by 70-80% and more than 99%, respectively. Ocean acidification is projected to adverse effects for many species from algae to fish.³¹¹

1.2.4.4 Sea level Rise

Sea level rise can increase risk of flooding and storm and their adverse effects to health and economy. There are risks due to intrusion of saltwater into fresh water of ground water basins and well water, which result in reduction of crop yields and safe drinking water, as well as increase in the risk of vector-borne disease. Rise in sea level adversely affects coastal tourisms and related economy. In California, 260000 people and 50 billion USD are now at risk for 100-year flood, which is expected to be doubled by 2100.³¹²

Model-based projections of global sea level rise predict an indicative range of 0.26 to 0.77 m for 1.5°C of global warming by 2100 and 0.1m more for 2°C. 0.1m less global sea level rise means up to 10 million fewer people will be at associated risks, considering population in 2010 and no adaptation. Even if global warming is limited to 1.5°C in the 21th century, marine ice sheet instabilities in Antarctica and/or irreversible loss of Greenland ice sheet will lead to multi-meter rise in sea level over hundreds to thousands of years. However, the slower rate of sea level rise at 1.5°C of global warming let greater

³¹⁰ Sayigh (n 304) 86.

³¹¹ IPCC (n 290) 8, 9.

³¹² Sayigh (n 304) 87.

adaptation opportunities reduce the associated risks for small islands, low lying coastal regions and deltas.³¹³

1.2.4.5 Food insecurity and associated risks

Weather and climate change both in near- and long-term lead to harvest losses, which may lead to food insecurity and under nutrition attributable to mortality especially in children. Wheat yield decreased in India by 36% in 2010 as a result of climate and air pollution, which major cause recognized to be SLCPs.³¹⁴ The above risks like weather extremes, extreme events, sea level rise, ecosystem change are all associated to risks to food security through various means including harvest loss, drought, loss in fisheries.

The risks associated with climate change cannot be covered and discussed precisely and inclusively in this thesis as they are targeting many areas and can be discussed in many aspects.³¹⁵

1.2.5. Association between climate and air pollution abatement measures and co-benefits mitigation policies

Air pollution policies are closely linked to climate change. Some air pollution abatement measures have co-benefits for climate changes, while others may lead to warmer climate. Abatement measures, which focus on increasing energy efficiency and using less fossil have significant effect to reduce carbon dioxide emission. Conversely, some technical methods to reduce air pollutants like flue gas desulphurization have led to more carbon dioxide emissions. Besides, most air pollutants affect climate, which is a net cooling effect now. Air pollution abatement may change the balance and lead to increase temperature. To avoid contribution of air pollution control to global warming,

³¹³ IPCC (n 290) 7, 8. For more information about climate change impacts on coastal regions refer to: Duncan M FitzGerald and others, 'Coastal Impacts Due to Sea-Level Rise' (2008) 36 Annual Review of Earth and Planetary Sciences 601.

³¹⁴ Scovronick (n 33) 38.

³¹⁵ For instance, climate change impacts and policies can be viewed from gender equity perspective as in: Joshua Eastin, 'Climate Change and Gender Equality in Developing States' (2018) 107 World Development 289; Seema Arora-Jonsson, 'Virtue and Vulnerability: Discourses on Women, Gender and Climate Change' (2011) 21 Global environmental change 744.

the policies should focus on abatement of pollutants with warming effect like ozone precursors including methane, and black carbon.³¹⁶

Moreover, climate policies that aim fossil fuels are those contributing to air pollution abatement by preventing products like nitrogen oxides, sulphur dioxides, volatile organic compounds, and fine particles to be emitted. Also, the fewer fine particles are produced, the lower exposure to some heavy metals and persistent organic pollutants is. Moreover, less use of coal will lead to decreasing mercury and combustion related persistent organic pollutants.³¹⁷ Avoiding global warming also prevent more emissions in many air pollutants by itself. For example, climate change can complicate situation for mercury levels, if it leads to thawing northern tundra and releasing long-stored mercury into circulations.³¹⁸ On the other hand, climate change measures which suggest wood stoves, diesel cars, and biofuel result in reducing air quality. Diesel cars still produces more air pollutants especially nitrogen oxides than petrol cars. Air pollution due to biofuel transport and biomass power generation is also seriously concerning.³¹⁹ Increasing biomass production leads to increasing land use and biogenic volatile organic compounds indirectly. In case of nitrogen compounds in agriculture, climate policies, which have limited nitrous oxide and methane from agriculture, neglected ammonia. The ammonia emission from agriculture and natural sources will increases by global warming.³²⁰

The need to reconsider these climate policies can be more persuasive taking to account the heavy concentrations of black carbon in PM_{2.5} emissions from burning diesel, biomass, so identified as among the priority sources which should be reduced to avoid near-term climate change. Neglecting the health aspect, black carbon of other sources such as coal-fired power plants may co-emitted with other pollutants with cooling effect to climate, so the mitigation may have less impact in short-term climate warming. However, the obvious health impacts of latter sources mitigation, as well as the

³¹⁶ Maas and Grennfelt (n 27) 30.

³¹⁷ *ibid* xii, 30.

³¹⁸ Kessler (n 29) A305.

³¹⁹ Maas and Grennfelt (n 27) xii, 31.

³²⁰ *ibid* 31, 32.

probable reduction in carbon dioxide and the resulted long-term climate impact cannot be neglected.³²¹

Benefits of integrated approach can be understood in ozone example. Ozone solely enhances warming and increases atmospheric CO₂. Warmer climate also contributes to ozone formation and its biogenic precursors release. Reducing ozone precursors is both benefits air pollution control and climate change.³²²

Another effective co-benefits approach is reducing short-lived climate pollutants (SLCPs) including black carbon (BC), methane (the second most important contributor to radiative forcing behind carbon dioxide),³²³ ozone and hydrofluorocarbons (HFCs). SLCPs have strong warming effects (usually higher than carbon dioxide in terms of radiative force per unit mass) but they persist in the atmosphere from days to decades, which prevent policy makers to pay enough attention to them so far. However, there are various reasons reducing SLCPs emissions is an excellent co-beneficial approach for climate and air pollution as many SLCPs are also harmful air pollutants. In fact, important role of carbon dioxide and other long-lived climate pollutants in long-term climate warming should not be neglected, but SLCPs abatement measures should be considered as complementary actions. Note that policies in many sectors are available to reduce SLCPs, as well as carbon dioxide, which means they can also lead to improvements in health. Furthermore, SLCPs measures are interesting as the gains and benefits mostly occur near where the emission reduction take place, which means the people within the decision-making jurisdictions are main target of benefits. This makes the policies attractive which is important characteristic for a policy to be feasible and frequently applied.³²⁴

³²¹ Scovronick (n 33) 3.

³²² Maas and Grennfelt (n 27) 30. For review a case of integrated air quality and climate policies in South Africa refer to: Tirusha Thambiran and Roseanne D Diab, 'The Case for Integrated Air Quality and Climate Change Policies' (2011) 14 *Environmental science & policy* 1008.

³²³ Scovronick (n 33) 4.

³²⁴ *ibid* 1, 2, 18, 19.

Reducing SLCPs emissions contributes to prevent global warming, particularly in short-term, as well as providing health benefits in three key ways. First, most SLCPs are either an air pollutant by themselves or precursor to other air pollutants, so the adverse health effects of them decreases. Secondly, indirect adverse impacts of black carbon and ozone on extreme weather and agricultural productions leading to less health threats through food insecurity and weather disasters. Thirdly, certain policies to reduce SLCPs are associated with some health benefits such as improved diets and increased physical activity.³²⁵

Chapter 2. Conceptualization of the Legal Status of the Atmosphere

John F. Kennedy at American University's commencement in June of 1963, nearly a half century ago, had a historical speech in which he announced his support for the Nuclear Test Ban Treaty,³²⁶ known as the Moscow Treaty, which was actually signed soon after the World War, said "So, let us not be blind to our differences--but let us also direct attention to our common interests and to the means by which those differences can be resolved. And if we cannot end now our differences, at least we can help make the world safe for diversity. For, in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's future. And we are all mortal".³²⁷

The current and future generation have the right to life and breathe on a healthy Earth. We have to identify the qualitative status of the Earth and try to keep it healthy, as described in the first principle of the Stockholm Declaration, that "Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future

³²⁵ *ibid* 19, 38, 141.

³²⁶ Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water, 5 August 1963, 480 UNTS 43, (Entered into force 10 October 1963),[PTBT].

³²⁷ John F. Kennedy, 'COMMENCEMENT ADDRESS AT AMERICAN UNIVERSITY, WASHINGTON, D.C., JUNE 10, 1963' <<https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/american-university-19630610>> accessed 20 December 2018.

generations”.³²⁸ Furthermore, Principle 1 of the Rio Declaration on Environment and Development emphasized, that “Human beings are the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.”³²⁹

Despite some atmospheric cases such as *Trail Smelter*³³⁰, the orthodox approach to air law was equivalent to aviation law without considering other aspects of the atmosphere.³³¹ In contrast with the traditional approach to air law which was limiting the airspace regulations to civil and military flights, the 1970 environmental revolution has introduced a paradigm shift of airspace law from a single use oriented doctrine to a resource-oriented approach³³², especially after the controversial 2011 judgment of the European Court of Justice in the case of the *Air Transport Association of America and others v. Secretary of State for Energy and Climate Change*.³³³

The phenomenon of transboundary air pollution in Scandinavian countries was detected in the early 1950s, and its increase has contributed large amounts of transboundary atmospheric pollutants especially sulphur oxide, which cause problems such as acid rain. For example, in Norway, 90 percent of the sulphur in the atmosphere originated from other countries in Europe. The Swedish delegation in the 1972 Conference of the Human Environment in Stockholm focused international attention on the problem of lake acidification from airborne pollutants. Also, finally the Act of the Helsinki Conference on

³²⁸ UN General Assembly, ‘United Nations Conference on the Human Environment (Stockholm Declaration), A/RES/2994, 15 December 1972’ <<https://undocs.org/en/A/CONF.48/14/Rev.1>> accessed 20 November 2019.

³²⁹ United Nations, ‘1992 Rio Declaration on Environment and Development, UN Doc. A/CONF.151/26 (Vol. I), 31 ILM 874 (1992), 14/06/1992’.

³³⁰ *Trail Smelter case (United States of America v Canada)*, *United Nations publication, Sales No 1949V2 III* 1907 ff.

³³¹ Peter H Sand, ‘The Discourse on “Protection of the Atmosphere” in the International Law Commission’ (2017) 26 *Review of European, Comparative and International Environmental Law* 201, 202.

³³² Sand and Wiener (n 1) 199.

³³³ *Air Transport Association of America and Others v [UK] Secretary of State for Energy and Climate Change*, Case C-366/10, Judgment of 21 December 2011. See chapter 6.5

Security and Cooperation in Europe (hereinafter, CSCE) in 1975 decided to on a multilateral solution on air pollutants.³³⁴

Since 1979, numerous treaties and other international instruments have addressed the protection of the atmosphere, nevertheless until today there is no comprehensive legal regime for the largest single natural resource of the Earth. Although there is no atmospheric equivalent to the 1982 UN Convention on the Law of the Sea (hereinafter, UNCLOS).³³⁵ International legal instruments have been adopted at the regional and global level which address a range of issues regarding atmospheric pollution and atmospheric degradation, including: transboundary pollution by sulphur dioxide, nitrogen oxide and volatile organic compounds; the protection of the ozone layer; the prevention of climate change; and the protection of the environment of outer space. The precedents set by treaties relating to the protection of other environmental sectors, in particular the marine environment, have contributed to the development of these rules.³³⁶

The International Civil Aviation Organization (hereinafter, ICAO), under Annex 16 of the Chicago Convention on International Civil Aviation,³³⁷ established 1971 global technical standards for aircraft noise emission. Moreover, Annex 16, volume II was expanded in 1981 to gaseous pollutant emissions standards from aircraft engines. Regarding air pollution, the standard covers aircraft engine emissions such NO_x, HC, CO, and non-volatile particulate matters (nvPM).³³⁸ Also, Annex 16, Volume III covers airplane CO₂

³³⁴ 'The Law and Politics of Transboundary Air Pollution, The European Experience' 103.

³³⁵ United Nations Convention on the Law of the Sea, 1833 UNTS 397, (10 December 1982), (entered into force 16 November 1994),[UNCLOS].

³³⁶ Philippe Sands and others, *Principle of International Environmental Law* (4th editio, Cambridge University Press 2018) 253.

³³⁷ See chapter 5.4 for more information on Convention on International Civil Aviation (adopted 7 December 1944), (entered into force 4 April 1947) 15 UNTS 295 (Chicago Convention).

³³⁸ International Civil and Aviation Organization, 'ICAO Annex 16: Environmental Protection, Volume II -- Aircraft Engine Emissions'.

emissions.³³⁹ More recently, Annex 16, Volume IV³⁴⁰ was allocated to the Carbon Offsetting and Reduction Scheme for International Aviation (hereinafter, CORSIA).³⁴¹

In 1977, ambient air quality criteria and guidelines were issued by the WHO. The WHO Air Quality Guidelines (hereinafter, AQGs) inform policymakers about the health impacts of air pollutants and provide appropriate targets for safe air quality. Countries can select among a broad range of policy options for the most appropriate methods to improve air quality and better protect peoples' health. The global update of the 2005 Guidelines sets targets for outdoor concentrations of particulate matter (PM), nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and ozone (O₃) that would protect the large majority of individuals from the ill effects of air pollution on health. The guidelines have been helpful in some countries like Ireland and Hong Kong in reducing air pollutants, which led to reductions in deaths related to cardiovascular and respiratory diseases. In the United States, life expectancy increased 15 percent between 1980 and 2000 regarding implementation of the air quality regulations.³⁴²

The International Labour Organization (hereinafter, ILO) adopted a Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration. The Convention was adopted in 1977 in Geneva and went into effect in 1979. The Convention applies to all branches of economic activity, except where special problems of a substantial nature exist (art. 1). Parties may accept the obligations of this Convention separately in respect of air pollution, noise and vibration (art. 2). The term 'air pollution' covers all air contaminated by substances, whatever their physical state, which are harmful to health or otherwise dangerous (art.3). Measures have to be taken to control and protect against occupational hazards in the work environment related to air pollution, noise, and vibration and shall be prescribed by national laws and regulations (art. 4). According to

³³⁹ International Civil and Aviation Organization, 'ICAO Annex 16 Environmental Protection, Volumn III CO2 Certification Requirement'.

³⁴⁰ International Civil and Aviation Organization, 'ICAO Annex 16 Environmental Protection, Volume IV - Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)'.

³⁴¹ ICAO, '50 Years of Annex 16-the Special Meeting on Aircraft Noise in the Vicinity of Airports' 39, 42.

³⁴² *Air Quality Guidelines Global Update 2005* (n 47).

article 4, criteria for determining the hazards of exposure to air pollution, noise, and vibration in the work environment – and exposure limits on the basis of these criteria – shall be established by a competent authority.³⁴³

Basic standards for protection against atmospheric nuclear radiation had already been set since 1961 by the International Atomic Energy Agency (IAEA),³⁴⁴ and consolidated in its 1994 Convention on Nuclear Safety,³⁴⁵ complementing the 1963 and 1986 Conventions on Liability for Nuclear Damage and on Transboundary Notification of Nuclear Accidents.³⁴⁶ This was supplemented by the independent global monitoring work of the United Nations Scientific Committee on the Effects of Atomic Radiation (hereinafter, UNSCEAR),³⁴⁷ which was founded in 1955 to assess and report levels and effects of exposure to ionizing radiation.³⁴⁸ Governments and organizations throughout the world rely on the Committee's estimates as the scientific basis for evaluating radiation risk and for establishing protective measures.³⁴⁹

Since 1997, the International Maritime Organization (hereinafter, IMO) regulated Annex VI as a protocol on the Prevention of Air Pollution from Ships³⁵⁰ to the 1973/1978 MARPOL Convention.³⁵¹ The Annex VI, with 88 Parties, was amended several times to adopt emission control limits of certain pollutants including sulphur oxides (SO_x),

³⁴³ Convention No 148 Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration, 1977, 1141 UNTS 106.

³⁴⁴ See International Atomic Energy Agency (IAEA), 'Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards' (2014). See also Paul C Szasz, 'The IAEA and Nuclear Safety, Review of European Community and International Environmental Law' (1992) 1 165.

³⁴⁵ Convention on Nuclear Safety, 20 September 1994, 1963 UNTS 293.

³⁴⁶ Vienna Convention on Civil Liability for Nuclear Damage, 21 May 1963, 1063 UNTS 265.

³⁴⁷ 'GA Res. 913 (X), UN Scientific Committee on the Effects of Atomic Radiation, UN Doc A/RES/913(X), (3 December 1955)'.

³⁴⁸ Sand and Wiener (n 1) 201.

³⁴⁹ 'United Nation Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)' (1955) <https://www.unscear.org/unscear/about_us/history.html> accessed 20 June 2019.

³⁵⁰ INTERNATIONAL MARITIME ORGANIZATION, 'MARPOL Annex VI on the Prevention of Air Pollution from Ships, Adopted 26 September 1997, MEPC 53/4/4, (Entered into Force 19 May 2005)'.

³⁵¹ 'International Convention for the Prevention of Pollution from Ships (Adopted 2 November 1973, Entered into Force, as Modified by the Protocol of 1978, 2 October 1983) 1340 UNTS 184 (MARPOL)'.

nitrogen oxides (NOx), particulate matter (PM) and volatile organic compounds (VOCs) also greenhouse gas (GHG) emissions from international shipping.³⁵²

Air pollutant emissions from motor vehicles have been regulated since 1958 by uniform transnational standards initially adopted under a regional agreement of the United Nations Economic Commission for Europe (hereinafter, UNECE)³⁵³, and since 1998 by worldwide technical regulations.³⁵⁴ Following the 1977 ENMOD Treaty on the prohibiting of hostile environmental modification techniques,³⁵⁵ provisions for cooperation between States on weather modification adopted under auspices of the United Nations Environment Program (hereinafter, UNEP) in 1980.³⁵⁶ Those steps were followed by several binding global instruments covering atmospheric releases of hazardous chemicals, including ozone-depleting substances in 1985/1987, persistent organic pollutants in 2001 and mercury in 2013.

Pollutant discharges to the oceans 'from or through the air' was addressed by Articles 212(3) and 222 of the 1982 UNCLOS.³⁵⁷ These regulations are the subject of the 1985 UNEP guidelines, a related 1995 global program for the protection of the marine environment against pollution from land-based sources, and a series of UNEP-sponsored conventions and protocols for twelve marine regions of the world.³⁵⁸

³⁵² For tracing the international legal framework for the reduction of air pollution from international shipping and the measures adopted by the International Maritime Organization see Sophia Kopela, 'Making Ships Cleaner: Reducing Air Pollution from International Shipping' (2017) 26 *Review of European, Comparative & International Environmental Law* 231.

³⁵³ Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicles Equipment and Parts, 20 March 1958, 335 UNTS 211 (rev. 1995).

³⁵⁴ Agreement Concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts Which Can Be Fitted and/or Be Used on Wheeled Vehicles, 25 June 1998, 2119 UNTS 129 1998.

³⁵⁵ Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, 10 December 1976, 1108 UNTS 151.

³⁵⁶ United Nations Environment Programme., 'Provisions for Co-Operation between States in Weather Modification: Decision 8/7/A of the Governing Council of UNEP, of 29 April 1980.' 2 p.

³⁵⁷ United Nations Convention on the Law of the Sea, 1833 UNTS 397, (10 December 1982), (entered into force 16 November 1994), [UNCLOS] (n 335).

³⁵⁸ For example see Montreal Guidelines, 'Protection of the Marine Environment against Pollution from Land-Based Sources' (1985) 14 *Environmental Policy and Law* 77, 77,78.

The World Meteorological Organization (hereinafter, WMO) and the United Nations Environment Program established the IPCC in 1988. The IPCC does not itself conduct research but assesses scientific, technical and socio-economic publications that are relevant to understanding climate change.³⁵⁹ The first IPCC report in 1990 served as the basis of discussion in the 1992 UNFCCC.³⁶⁰ The next report in 1995 had a significant impact on regulating the 1997 Kyoto Protocol,³⁶¹ and the IPCC fourth and fifth reports of 2007 and 2014 led to adoption of the 2015 Paris Agreement³⁶² which is the ultimate global agreement on the control of greenhouse gases.³⁶³

At the regional level, despite resistance by the United Kingdom and Germany to any binding limitation on and reduction of emissions,³⁶⁴ the 1979 UNECE Convention on Long Range Transboundary Air Pollution (hereinafter, LRTAP Convention) was formulated under the auspices of the UNECE in the form of a framework agreement to meet the concerns about acid rain and other pollutant substances in Europe and North America. The LRTAP Convention with eight implementing protocols has since been followed by corresponding instruments in Asia and Africa.³⁶⁵

As was seen above, international law on transboundary air pollution is formed as a patchwork of a wide range of instruments, which are rather fragmented.³⁶⁶ There are

³⁵⁹ Tora Skodvin and Knut H Alfsen, 'The Intergovernmental Panel on Climate Change (IPCC): Outline of an Assessment' (2010) 1 Policy Note 1.

³⁶⁰ General Assembly United Nations, United Nations Framework Convention on Climate Change, 9 May 1992, S. Treaty Doc No. 102-38, 1771 UNTS 107, [UNFCCC].

³⁶¹ Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 11 December 1997, entered into force 16 February 2005) 2303 UNTS 148.

³⁶² Paris Agreement in UNFCCC, COP 21, (12 December 2015), (entered into force 4 November 2016) 55 ILM 740.

³⁶³ James Crawford and others, *The International Legal Order: Current Needs and Possible Responses: Essays in Honour of Djamchid Momtaz* (BRILL 2017) 41.

³⁶⁴ 'Franciszek Longchamps de Berier, Role of International Dispute Resolution in Transboundary Air Pollution Law, *The*, 21 *Polish Y.B. Int'l L.* 249 (1994)' 250.

³⁶⁵ See chapter 5.1 for more information on Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

³⁶⁶ Yulia Yamineva and Seita Romppanen, 'Is Law Failing to Address Air Pollution? Reflections on International and EU Developments' (2017) 26 *Review of European, comparative & international environmental law* 189, 191.

different views on the atmosphere “regime complex” and its affects. According to Karen J. Alter and Kal Raustiala “A regime complex is an array of partially overlapping and non-hierarchical institutions that includes more than one international agreement or authority”.³⁶⁷ Some scholars believe that the proliferation and fragmentation of international law-making is an unavoidable aspect of globalization and an emergence of technically specialized demands due to multidimensional problems.³⁶⁸ Since a global scope of new preferences goes beyond national boundaries and is difficult to regulate through traditional international law, this regime complex has been shaped in the absence of a comprehensive regime.³⁶⁹ Moreover, some academics believes that fragmentation is a low risk system, which promotes evaluation of public international law and it could be a “beneficial prologue to a pluralistic community”.³⁷⁰ In response to those scholars who raise concerns over the authority of international law, it is argued that fragmentation does not threaten the authority of international law and in fact can augment accountability through effective debates on legal rules.³⁷¹

It has been argued that a lack of hierarchy and overlapping authority among institutions and rules characterize politics within a regime complex.³⁷² Other scholars believe that the fragmentation systematically works in favor of the powerful countries, as their satisfaction is important and essential for the functioning of the global system.³⁷³ Whereas the powerful and wealthier countries are able to hire lawyers and experts in international meetings towards their interests.³⁷⁴

³⁶⁷ Karen J Alter and Kal Raustiala, ‘The Rise of International Regime Complexity’ (2018) 14 Annual Review of Law and Social Science 329, 333.

³⁶⁸ Sand and Wiener (n 1) 205.

³⁶⁹ Martti Koskeniemi, ‘International Law Commission, Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law, Fifty-Eighth Session, 1 May-9 June and 3 July-11 August 2006, UN Doc A/CN.4/L.682’ 244.

³⁷⁰ Sand and Wiener (n 1) 205.

³⁷¹ Alter and Raustiala (n 367) 341.

³⁷² *ibid* 332.

³⁷³ Sand and Wiener (n 1) 205. See By Richard B Stewart, ‘Remedying Disregard in Global Regulatory Governance’: 211.

³⁷⁴ Alter and Raustiala (n 367) 340.

Benvenisti & Downs have argued that “by creating a multitude of competing institutions with overlapping responsibilities, fragmentation provides powerful states with the opportunity to abandon---or threaten to abandon-any given venue for a more sympathetic venue if their demands are not met”. Subsequently, the weaker States isolate and do not enjoy the same advantages of meetings and institutional competitions.³⁷⁵

The other negative point of fragmentation is the possibility of creating a large number of specific and narrowly focused agreements instead of a small number of broad agreements, which induce adverse side effects, especially afflicting weaker or disenfranchised community members due to their ‘omitted voices’.³⁷⁶ This strategy has more advantage for powerful States by creating a mazy world legal regulations and narrow agreements that would be exceedingly costly for vulnerable communities and weaker States.³⁷⁷

The “middle of the road” doctrines have accepted among most of the commentators who believe in the necessity of unity and multiplicity in international law.³⁷⁸ This approach could be sufficient and applicable for a multifaceted topic like the atmosphere. Sand and Weiner have argued neither piecemeal fragmentation nor unified centralization is an optimal approach for regulating the atmosphere. Despite all critical analysis about fragmentation, there are advantages through specialization in skills and knowledge.³⁷⁹ Further, merging and centralizing institutions might cause new

³⁷⁵ Eyal Benvenisti and George W Downs, ‘The Empire’s New Clothes: Political Economy and the Fragmentation of International Law’ (2007) 60 *Stanford Law Review* 595, 597.

³⁷⁶ Sand and Wiener (n 1) 205.

³⁷⁷ Benvenisti and Downs (n 375). Supporting this view Krisch analyzed the multiple ways in which dominant states interact with international law and argued the legal order arising in situations of hegemony thus bears a structure quite dissimilar to that typically ascribed to international law: constantly under pressure, it tends to become softer and more hierarchical, and probably more fragmented. Nico Krisch, ‘International Law in Times of Hegemony: Unequal Power and the Shaping of the International Legal Order’ (2005) 16 *European Journal of International Law* 369, 407.

³⁷⁸ Mario Prost, ‘Unity and Diversity in International Law : Proceedings of an International Symposium of the Kiel Walther Schücking Institute of International Law’ (2006) 19 *Revue québécoise de droit international* 375, 375.

³⁷⁹ For the same view see David G Victor and Robert O Keohane, ‘The Regime Complex for Climate Change’, APSA 2010 Annual Meeting Paper (2010). They argue in settings of high uncertainty and policy flux, regime

challenges, such as slowing down information flow and decision making, magnifying the costs of errors, forgoing the learning that arises from variation, and vesting too much power in centralized authority.³⁸⁰

To reach a useful and functional mechanism for future law-making on protection of the atmosphere, Sand and Weiner have suggested an example mechanism that needs coordinating among the multiple specialized institutional actors to consider all the voices, as:

- “1. Giving notice of each body’s deliberations and actions to other relevant bodies, so that diverse voices can be heard on pending decisions and can be aware of potential impacts on their domains;
2. Holding periodic joint meetings of key bodies, so that they can deliberate together on matters of shared interest;
3. Assembling a comprehensive system of monitoring and data collection to assess the status and trends of atmospheric resources;
4. Creating an atmosphere policy oversight or coordination body, authorized to assess the field broadly, and to review impact assessments prepared by the various specialized bodies, so that interactions, gaps, countervailing risks, co-benefits, and cumulative effects can be assessed and managed in concert, trade-offs among regime components can be resolved, synergies can be pursued, priorities for future action can be charted, and learning can be shared across domains”.³⁸¹

In addition to the several regulations and instruments on the protection of the atmosphere noted above, there have been other attempts with the aim of moving towards a more integral regime and prevailing excessive fragmentation in this field.

complexes are not just politically more realistic but they also offer some significant advantages such as flexibility in substantive content and scope.

³⁸⁰ Sand and Wiener (n 1) 219.

³⁸¹ *ibid.*

In 1966, the Seventh International Congress of Comparative Law in Uppsala reviewed the reports on 'protection of the atmosphere in international law', which sought to identify common elements in available case law and State practice.³⁸² In 1974, the Council of the Organization for Economic Cooperation and Development (hereinafter, OECD) recommended a set of 'principles concerning trans-frontier pollution',³⁸³ later followed by recommendations on equal rights of access in trans-frontier pollution disputes.³⁸⁴ In 1978, the UNEP Governing Council adopted its 'shared natural resources' principles, endorsed by UN General Assembly Resolution 34/186 of 18 December 1979.³⁸⁵ In 1982, the Governing Council called for the preparation of a "global code of conduct with respect to transboundary air pollution, drawing upon existing regional and bilateral experiences".³⁸⁶ That recommendation was never followed up, however, in the in Chapter 9 of its Agenda 21, "to encourage the establishment of new and the implementation of existing regional agreements for limiting transboundary air pollution", with a focus on developing countries in particular.³⁸⁷ As a result, UNEP's revised 1993 Montevideo Program for the Development and Periodic Review of Environmental Law reoriented the organization's work towards replicating the LRTAP Convention model in other regions and sub-regions.³⁸⁸

The International Law Association (hereinafter, ILA), when adopting its 1982 Montreal Rules of International Law Applicable to Trans-Frontier Pollution, deferred the legal aspects of long-distance air pollution to subsequent work by a different committee.

³⁸² See William B Stern, 'VIIth International Congress of Comparative Law, Uppsala, Sweden' (1966) 18 Int'l Ass'n L. Libr. Bull. 23.

³⁸³ OECD, 'Principles Concerning Transfrontier Pollution, OECD Doc C(74)224 Annex (1974), 14 ILM 242'.

³⁸⁴ The Recommendation aimed to establish an equal right of access, which would facilitate the prevention and the solution of many trans-frontier pollution problems, without prejudice to other means available. This constituted one of the suitable channels for giving effect to the principle of non-discrimination. OECD

³⁸⁵ UNEP, Principles of Conduct in the Field of the Environment for the Guidance of States in the Conservation and Harmonious Utilization of Natural Resources Shared by Two or More States, 17 ILM 1097 1978.

³⁸⁶ UNEP, Governing Council Decision 10/21, UN Doc A/37/25 1982 108.

³⁸⁷ United Nations, 'Report of the United Nations Conference on Environment and Development (Rio de Janeiro, 3–14 June 1992)' UN Doc A/CONF.151/26/Rev.1, Vol I (1993)' para 9.27.

³⁸⁸ Sand and Wiener (n 1) 207.

After several preliminary/interim reports between 1984 and 1994, the committee was dissolved in 1996 without conclusions.³⁸⁹

In 1987, the Cairo session of the Institute de Droit International adopted a Resolution on Transboundary Air Pollution.³⁹⁰ In 1989, an International Legal Meeting of Legal and Policy Experts at Ottawa adopted a statement on 'protection of the atmosphere' recommending an international convention or conventions with appropriate protocols on the topic.³⁹¹ The last global attempt was in 2013, when the ILC decided to address the topic of 'Protection of the atmosphere' in its program of work.³⁹²

Also, the 1991 Canada US Air Quality Agreement,³⁹³ and the ASEAN Agreement on transboundary haze pollution was signed in 2002 and went into effect on the 25th of November in 2003³⁹⁴ are the most important regional agreements in this issue. The 1985 Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol established in 1987,³⁹⁵ along with the UN Framework Convention on Climate Change of 1992,³⁹⁶ the Kyoto Protocol of 1997³⁹⁷ and the Paris Agreement on Climate Change³⁹⁸ enshrine measures influencing the protection of the atmosphere on a global level.

Considering the number of relevant conventions, they have remained merely as patchwork of instruments leaving substantial gaps and shortcomings, as well as overlaps from the viewpoint of "geographical coverage, regulated activities, regulated

³⁸⁹ Sand (n 331) 204.

³⁹⁰ *Annuaire de l'Institut de Droit International*, 'Session of Cairo, Transboundary Air Pollution, Volume 62 (I)' (1987) <https://www.idi-iiil.org/app/uploads/2017/06/1987_caire_03_en.pdf> accessed 16 July 2019.

³⁹¹ International Meeting of Legal and Policy Experts, 'Ottawa Statement on Protection of the Atmosphere, 22 February 1989, Reprinted in 5 *American University Journal of International Law and Policy* (1990) 2'.

³⁹² see chapter 3.2.3

³⁹³ See chapter 5.2

³⁹⁴ See chapter 5.3

³⁹⁵ See chapter 5.6

³⁹⁶ See chapter 5.7.1

³⁹⁷ See chapter 5.7.2

³⁹⁸ See chapter 5.7.3

substances and most importantly the applicable principles and rules” for the environmental protection of the transboundary and global atmosphere.³⁹⁹

Orsini has analysed the evolution of the climate change regime complex towards greater integration of international issues. He concludes that actors are likely to mean evolution in terms of governance structures, lead to a decentralised governance system based on pragmatism.⁴⁰⁰ In such a situation, regimes grow more complex and develop these characteristics. The terms of cooperation become less clear, and the likelihood increases that States will follow distinct sets of rules that suit their individual interests while ignoring those that do not. Since global governance requires the convergence of actors’ expectations, regime complexity may undermine its effectiveness.⁴⁰¹

On the other hand, Bodansky believes the evolutionary path of climate change regimes gives a period of flexibility and experimentation to States that may be make them ready to integrate the different pieces of a regime into a single framework, as they did in moving from the GATT a la carte approach to the single, integrated agreement that established the WTO.⁴⁰²

Atmospheric protection had not been considered as a specific legal concept until 1979, when the Convention on Long Range Transboundary Air Pollution⁴⁰³ was passed to control and prevent atmospheric damages caused by States. Until this point in time, some treaties sought general preventive strategies according to the ‘principle of general international law’ and ‘customary rule’.⁴⁰⁴

³⁹⁹ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 7.

⁴⁰⁰ Amandine Orsini, ‘Climate Change Regime Complex’ (2017) 18 *Academic Foresights* 209.

⁴⁰¹ Gorana Draguljić, ‘The Climate Change Regime Complex: Path Dependence amidst Institutional Change’ (2019) 25 *Global Governance: A Review of Multilateralism and International Organizations* 476, 477.

⁴⁰² Daniel Bodansky and Elliot Diringer, *The Evolution of Multilateral Regimes: Implications for Climate Change* (Pew Center on Global Climate Change Arlington, VA 2010) 20.

⁴⁰³ Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

⁴⁰⁴ Sands and others (n 336) 225.

Also, the *Trail Smelter*⁴⁰⁵ and *Nuclear Testing* cases⁴⁰⁶ demonstrated the importance of rules, and the urgency to create a new category of international regulations that considered air pollution, transboundary pollution, and other atmospheric damages caused by anthropogenic or industrialized activities.

Legal protection of the atmosphere requires determination of its legal status in current international law. This would be helpful in finding already existing legal frameworks which suit its protection. What is clear about the nature of the atmosphere is that the atmosphere cannot be appropriated privately by any State nor can any State claim exclusive sovereignty over it, as it serves the lives of all present and future generations. Thus, Prislán and Schrijver considered it a shared and common resource burden; the duty of its conservation, harmonious and equitable utilization, and the prevention of atmospheric problems – especially in the case of bilateral or regional transboundary air pollution – is a cooperative one among States.⁴⁰⁷ In fact, the nature of the atmosphere leads to different conclusions with regard to its legal concepts and its status in international law. Whether the atmosphere is a common concern of humankind or relates to other concepts such as common goods, global common, and common heritage of humankind can be attained by the legal protection of the atmosphere in international law. In addition, the ILC work on the protection of the atmosphere remains extremely vague about what exactly the status of the atmosphere is under international law.⁴⁰⁸ Thus, this chapter is devoted to shedding some light on the status of the atmosphere in international law.

To answer that question and to clarify the legal stature of the atmosphere in international law, the meaning of concepts similar to the atmosphere will be briefly examined and compared against that of the global atmosphere. The draft guideline 1(a)

⁴⁰⁵ *Trail Smelter case (United States of America v. Canada)*, United Nations publication, Sales No. 1949.V.2 (n 330).

⁴⁰⁶ *Nuclear Tests, Australia v France, Judgment on Admissibility*, [1974] ICJ Rep 253, General List No 58, 20th December 1974.

⁴⁰⁷ Vid Prislán and Nico Schrijver, 'From Mare Liberum to the Global Commons: Building on the Grotian Heritage' (2009) 30 *Grotiana* 168, 57.

⁴⁰⁸ See Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 52–57.

of the ILC defines the term 'atmosphere' as "the envelope of gases surrounding the Earth, within which the transport and dispersion of degrading substances occurs".⁴⁰⁹ This is the working definition of the term. Hence, the draft guideline 3 defines it as "a natural resource essential for sustaining life on Earth, human health and welfare, and aquatic and terrestrial ecosystems".⁴¹⁰ This definition of the atmosphere can be considered as its legal definition for the purpose of answering the question posed in this chapter.

2.1. The atmosphere as a common good

The idea of a 'common good' has a long history and can be found in different fields.⁴¹¹ For example, one can refer to the writings of Aristotle on political community in the classical era.⁴¹² Historical and general discussions on the matter can be helpful in understanding the concept of common good. But, its meaning in international law should be explored to weigh against that of the atmosphere to answer the question whether the atmosphere is a common good? However, this in turn requires understanding it as a philosophical and political concept, which are helpful in the task of weighing this concept against that of the atmosphere.

2.1.1. Common good as a philosophical concept

From philosophical point of view the concept of a common good is best understood as part of an encompassing model for practical reasoning among the members of a political community. According to this model, citizens stand in a "political" or "civic" relationship with one another and this relationship requires them to develop certain facilities that serve certain common interests. The relevant facilities and interests together constitute the common good and serve as a shared standpoint for political deliberation for making policies and passing laws to resolve the problems society faces.⁴¹³ Thus, in its political

⁴⁰⁹ Shinya Murase, 'Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)' 49.

⁴¹⁰ *ibid.*

⁴¹¹ Mark Searl, 'A Normative Theory of International Law Based on New Natural Law Theory' 39.

⁴¹² See generally John M Cooper, 'Justice and Rights in Aristotle's "Politics"' [1996] *The Review of Metaphysics* 859. For a detailed overview of history of the concept of common good see: Maximilian Jaede, 'The Concept of the Common Good' [2017] University of Edinburgh working paper 2-5.

⁴¹³ See Edward N Zalta and others, 'Stanford Encyclopedia of Philosophy' common good.

sense the concept of a common good refers to those facilities made by humans to serve certain interests of a given society – which is far from the legal meaning of the atmosphere provided at the outset, as the atmosphere is a natural source for sustaining life, not a human-made facility to serve certain interests of a given society.

2.1.2. Common good as a political concept

In ordinary political context, the “common good” denotes those facilities such as the courts and the judicial system; public schools; museums and cultural institutions; public transportation; clean air and clean water; and national defense, which are necessary to care for certain interests that members of a society have in common. The term itself may refer either to the interests that members have in common or to the facilities that serve common interests. For example, a public library will serve the common good while it can be considered part of the common good of a society.⁴¹⁴

Also, Finnis⁴¹⁵ affirms that according to Aquinas, there is a common good that is specific to the political community, known as the ‘public good’.⁴¹⁶ The criterium that define the global public good are: having nonexcludable, nonrival benefits that cut across borders, generations and populations.⁴¹⁷ Accordingly, natural global commons, such as the ozone layer or climate stability could be categorized as the public good.⁴¹⁸

Since in its political meaning the concept of common good or public good encompasses clean air, the ozone layer or climate stability, this may lead to the conclusion that it encompasses the atmosphere as well. As specified in the definition of common good in its political concept, these are elements which are necessary to care for certain interests that members of a society have in common that in topic is the atmosphere.⁴¹⁹ In addition, the atmosphere as a natural resource essential for sustaining life on Earth,

⁴¹⁴ *ibid.*

⁴¹⁵ SL Brock, ‘John Finnis, Aquinas: Moral, Political, and Legal Theory’ (2001) 111 ETHICS-CHICAGO- 409.

⁴¹⁶ Searl (n 411) 50,51.

⁴¹⁷ Inge Kaul, Isabelle Grunberg and Marc A Stern, ‘Defining Global Public Goods’ [1999] Global public goods: international cooperation in the 21st century 2, 452.

⁴¹⁸ *ibid* 453.

⁴¹⁹ Searl (n 411) 70.

human health and welfare, and aquatic and terrestrial ecosystems,⁴²⁰ may not always having nonrival benefits for present and future generations. Thus, the atmosphere would fall out of the scope of common good in a political sense as implied by its definition from the ILC.

2.1.3. Meaning of common good in international treaties

A review of certain treaties between States suggests that the term ‘common good’ has three meanings: mutual benefit; maximization of welfare; and a universally shared good.⁴²¹

In certain treaties, such as the treaty between Canada and Russia concerning audio-visual relations,⁴²² and Agreement of Cooperation between the United Kingdom and Qatar⁴²³ of 1971, the term "common good" means "mutual benefit". In some international agreements such as the agreement between Spain and the United States, containing rules governing the medical services of American forces based in Spain, the term "common good" means "maximization of welfare". According to the agreement Spain and America, facilities and health services will cooperate and they will be used jointly in the event of a natural disaster in Spain affecting a large number of people.⁴²⁴

The term common good is also used as ‘universally shared good’ in the treaty between Bolivia and Spain for avoiding double taxation and preventing tax evasion. This treaty, under certain circumstances, grants a tax exemption on income of researchers who

⁴²⁰ See International Law Commission, ‘Protection of the Atmosphere, Comments and Observations Received from Governments and International Organizations, Seventy-Second Session, UN Doc A/CN.4/735, (27 April–5 June and 6 July–7 August 2020)’.

⁴²¹ Searl (n 411) 39,40.

⁴²² Art. XI of the treaty indicates that one of the Commission’s purposes is to recommend treaty modifications “intended to develop co-operation for the common good of both countries.” See: ‘UNTS. 431, Art. XI, Agreement Between the Government of Canada and the Government of the Russian Federation Concerning Audio-Visual Relations, 5 October 1995, 2026’.

⁴²³ Preamble to the Agreement affirms that the parties seek to strengthen their ties of cooperation with each other “in relation of their common good and mutual interests.” See: ‘1032 UNTS. 171, Agreement on Cooperation Between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the State of Qatar, 19 June 1976’.Preamble.

⁴²⁴ Agreement in Implementation of the Treaty of Friendship and Cooperation Between Spain and the United States of America of January 24, 1976, 1030 UNTS. 261, Procedural Annex VI, 31 January 1976.para. 11.

temporarily residing in the territory of the other party to the treaty. However, the exemption does not apply if the research is undertaken not for the common good, but primarily for the private benefit of a particular person or persons.”⁴²⁵ Accordingly, in its international legal sense, common good can be described as a common which is good for everyone.⁴²⁶

It is clear that the atmosphere falls outside of the definition of common goods in international treaties, i.e. mutual benefit; maximization of welfare; and a universally shared good, as the atmosphere is defined by the ILC as a natural resource essential for sustaining life on Earth, human health and welfare, and aquatic and terrestrial ecosystems.

2.2. The atmosphere as a global common

The term ‘global commons’ is defined as: “the concept of areas over which no one State has ownership but which are available for the use of the world community.”⁴²⁷ According to some authors these global commons now comprise the high seas and their living resources, the deep seabed, outer space (including the moon and other celestial bodies), the two polar regions, and the atmosphere (in particular the ozone layer and the climate system).⁴²⁸ In the 1980s, the shared problems of the global atmosphere were identified and led to characterization of the atmosphere as a ‘commons’.⁴²⁹ In particular some believe that the atmosphere falls under the concept of ‘global commons’ as the atmosphere within the sovereign airspace above States is not separable from that above another State, or the high seas, by State boundaries. In addition, the atmospheric damages are not limited to a restricted region and expand throughout the globe, thus in this sense “the atmosphere [is] shared by all States and is

⁴²⁵‘2050 UNTS. 255, Convention Between the Kingdom of Spain and the Republic of Bolivia for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion With Respect to Taxes on Income and Capital, 30 June 1997’. Art. 21(2).

⁴²⁶ Searl (n 411) 40.

⁴²⁷ Kathy Leigh, ‘Liability for Damage to the Global Commons’ (1993) 14 *The Australian Year Book of International Law Online* 129, 130.

⁴²⁸ Prislán and Schrijver (n 407) 205.

⁴²⁹ John Vogler, ‘Global Commons Revisited’ (2012) 3 *Global Policy* 61, 62.

akin to a shared resource”.⁴³⁰ This argument is based on Grotius’s concept of common property and doctrine of *mare liberum* in 1609, an idea that aimed to preserve the freedom of access for the benefit of all.⁴³¹ Grotius enumerated the characteristics of a common property as follows:

“The first is, that that which cannot be occupied, or which never has been occupied, cannot be the property of any one, because all property has arisen from occupation. The second is, that all that which has been so constituted by nature that although serving some one person it still suffices for the common use of all other persons, is today and ought in perpetuity to remain in the same condition as when it was first created by nature...All things which can be used without loss to anyone else come under this category”.⁴³²

In line with Grotius’s concept of common property, international commons are defined as common goods such as water, oceans and forests, and the Earth’s climate, which cannot be appropriated and must serve the life of all in present and future generations.⁴³³ A common property, which can be characterized in this sense as a common property is the air, which is not susceptible to occupation and whose common use was destined for all humans.⁴³⁴ Hence, among the commons illustrated as instances of common goods, the air is the most akin to the atmosphere, although the atmosphere has a more complicated legal character than other common properties.⁴³⁵ On the contrary, some believe that the atmosphere cannot be part of global commons as in some areas it overlaps with territorial sovereignty.⁴³⁶ In contrast, others separate the

⁴³⁰ *ibid* 134; see also Ottawa Declaration, ‘Protection of the Atmosphere: Statement of the Meeting of Legal and Policy Experts, Ottawa, 22 February 1989’ (1989) 5 *American University Journal of International Law and Policy* 528.

⁴³¹ Nico Schrijver, ‘Managing the Global Commons: Common Good or Common Sink?’ (2016) 37 *Third World Quarterly* 1252, 1263.

⁴³² See Robert Feenstra, *Hugo Grotius Mare Liberum 1609-2009: Original Latin Text and English Translation* (Brill 2009).

⁴³³ Mark Searl, 2014, *A Normative Theory of International Law Based on New Natural Law Theory*, A thesis submitted to the Department of Law of the London School of Economics for the Degree of Doctor of Philosophy London, September 2014, p 42.

⁴³⁴ Schrijver (n 431) 1254.

⁴³⁵ Vogler (n 429) 61, 66.

⁴³⁶ Werner Scholtz, ‘Common Heritage: Saving the Environment for Humankind or Exploiting Resources in the Name of Eco-Imperialism?’ (2008) 41 *Comparative and International Law Journal of Southern Africa*

atmosphere from airspace and define the atmosphere as an area consisting of a fluctuating and dynamic air mass which cannot be enclosed, albeit airspace is a static and spatial dimension subject to the sovereignty of the sub-adjacent States by which it is enclosed.⁴³⁷

Thus, there is no consensus as to the characterization of the atmosphere as a kind of international common. Accordingly, we have to continue to analyze the relevant concept i.e. common concern of humankind and compatibility of the legal sense of the atmosphere with that of common concerns of humankind.

2.3. The atmosphere as a common concern of humankind

The question now is whether the atmosphere is a common concern of humankind? A proper answer to the question requires study of the definition of common concern of humankind and its usage in certain international treaties.

2.3.1. Notion of common concern of humankind

Issues of common concerns of humankind are defined as “those issues that inevitably transcend the boundaries of a single state and require collective action in response”.⁴³⁸ Accordingly, this concept expresses the need for international cooperation through strong global institutions.⁴³⁹ In fact, issues of common concerns are those that all States may not have a direct interest in, but are more remote and more general concerns that is a benefit for all.⁴⁴⁰ The principle of common concerns of humankind with temporal

273, 284. In this regard Soroos argued that the atmosphere cannot be precisely categorized as either common property nor the common heritage of mankind such as high seas, which refers to spatial areas that are always beyond the jurisdiction of any state. Thus the task to conservation of the common resource would be difficult and other considerations need to be taken into account, including maximizing use of the resource, achieving economic efficiency, and satisfying issues of equity. Marvin S Soroos, ‘Managing the Atmosphere as a Global Commons’, *fifth annual meeting of the International Association for the Study of Common Property, Bodoe, Norway* (1995) 6, 16.

⁴³⁷ Vogler (n 429) 66; Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 53.

⁴³⁸ Dinah Shelton, ‘Common Concern of Humanity’ (2009) 39 *Environmental Policy and Law* 34.

⁴³⁹ Frank Biermann, ‘Common Concerns of Humankind and National Sovereignty’ [2002] *Globalism: People, Profits and Progress* 158.

⁴⁴⁰ Alexandre Kiss, ‘The Common Concern of Mankind’ (1997) 27 *Envtl. Pol’y & L.* 244, 245.

and spatial aspects- which provides a framework for approaching global problems⁴⁴¹ is suited to environmental problems that do not respect national boundaries⁴⁴²- is related to the conditions of life for present and future generations on the Earth. For example, the conservation of a global resource that goes beyond national boundaries (such as the atmosphere) or the remains largely within these boundaries (such as biological diversity).⁴⁴³

The term 'common concern of humankind' has been developed in close connection to the notion of the 'common heritage of mankind'. Whereas the latter phrase primarily aims at the peaceful use of common resources in the interest of all States, the concept of common concern of humankind underlines the necessity to protect the common good.⁴⁴⁴

The application of common concern of humankind to environmental issues such as climate change has legal implications. Some scholars discussed and summarized these consequences as:

"States must take into account the interests of the community in the subject matter of the concern; the subject matter of the concern is a matter not just for domestic concern but for the international agenda; States should establish an appropriate international forum and a body of rules and principles to provide a normative framework; these obligations are *erga omnes* so all States can demand compliance with these rules and principles; the 'common concern' implies States will have responsibilities and there will be entitlements on the part of the international community; as the international community arguably now encompasses states as well as intergovernmental organizations and civil society, the views of all of the members of the international

⁴⁴¹ Susana Borràs, 'Colonizing the Atmosphere: A Common Concern without Climate Justice Law?' (2019) 26 *Journal of Political Ecology* 105, 107.

⁴⁴² Chelsea Bowling, Elizabeth Pierson and Stephanie Ratté, 'The Common Concern of Humankind: A Potential Framework for a New International Legally Binding Instrument on the Conservation and Sustainable Use of Marine Biological Diversity in the High Seas' [2016] White Paper 1, 3.

⁴⁴³ Prue Taylor, 'VI. 23 Common Heritage of Mankind and Common Concern of Humankind' 315, 318.

⁴⁴⁴ Charlotte Kreuter-Kirchhof, 'Atmosphere, International Protection', (*Max Planck Encyclopedias of International Law*, 2011) para 9 <<https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1561>> accessed 12 June 2016.

community should be taken into account when international arrangements about the subject matter of the concern are debated".⁴⁴⁵

Furthermore, there are views that the notion of common concern of humankind has the possibility to emerge as a rule of customary International Law. The notion already has been progressed over time as it was applied in treaties that many States participated in such as the UNFCCC and Biological Diversity Convention; also, the Paris Agreement, with universal participation, which led to increasing cooperative actions.⁴⁴⁶

2.3.2. Common concern of humankind in international instruments and treaties

The concept of 'common concern of humankind' on the protection of the atmosphere firstly emerged in soft law instruments such as: the 1988 United Nation General Assembly Resolution 43/54⁴⁴⁷ following to the Malta proposal on the Protection of the Global Climate as part of common heritage, the 1989 Hague declaration on environment,⁴⁴⁸ the 1989 Belgrade Declaration of Non-Aligned countries,⁴⁴⁹ the 1989 Noordwijk Declaration by the Ministerial Conference on Atmospheric Pollution and Climate,⁴⁵⁰ the 1989 Declaration of Brasilia on the Environment,⁴⁵¹ the 1989 Langkawi Declaration on the environment,⁴⁵² the 1990 Declaration of the UNGA Special Session

⁴⁴⁵ Laura Horn, 'Climate Change and the Future Role of the Concept of the Common Concern of Humankind' (2015) 2 AJEL 24, 30. See Jutta Brunnée, 'Common Areas, Common Heritage, and Common Concern', *The Oxford handbook of international environmental law* (2007); AE Boyle and C Redgwell P. W. Birnie, *International Law and the Environment* (third edit, Oxford University Press 2009) 129–130. Michael Bowman, 'Environmental Protection and the Concept of Common Concern of Mankind' [2010] Research Handbook on International Environmental Law, Cheltenham: Edward Elgar 503.

⁴⁴⁶ Horn, 'Climate Change and the Future Role of the Concept of the Common Concern of Humankind' (n 445) 35,36. See Frank Biermann, 'Saving the Atmosphere. International Law, Developing Countries and Air Pollution'.

⁴⁴⁷ UNGA, 'Res 43/53 "Protection of Global Climate for Present and Future Generations of Mankind" (6 December 1988) GAOR 43rd Session Supp 49 Vol 1, 133.' (n 11).

⁴⁴⁸ 'HAGUE DECLARATION ON THE ENVIRONMENT.'" International Legal Materials, Vol. 28, No. 5' (1989).

⁴⁴⁹ General Assembly Security Council, 'The Belgrade Declaration of Non-Aligned Countries, A/44/551S/20870, 5 September 1989'.

⁴⁵⁰ *The Noordwijk Declaration on Climate Change, Atmospheric Pollution and Climatic Change, Ministerial Conference Held at Noordwijk, the Netherlands on 6th and 7th November 1989* (Leidschendam, Climate Conference Secretariat).

⁴⁵¹ 'Declaration of Brasilia on the Environment, Adopted by the Sixth Ministerial Meeting on the Environment in Latin America and the Caribbean, 31 March 1989'.

⁴⁵² 'The Langkawi Declaration on the Environment: The Commonwealth Heads of Government Meeting, Kuala Lumpur, Malaysia, 18-24 October 1989'.

on Development Cooperation,⁴⁵³ the 1991 Beijing Ministerial Declaration adopted at the Ministerial Conference on environment and development,⁴⁵⁴ and also the 1995 IUCN Draft International Covenant on Environment and Development that in Article 3 says "The global environment is a common concern of humanity".⁴⁵⁵

Subsequently, the concept of common concern has appeared in hard law instruments including the 1992 United Nations Framework Convention on Climate change, and the 1992 Convention on Biological diversity and most recently the 2015 Paris Agreement.⁴⁵⁶ The well-known first paragraph of the preamble to the 1992 United Nations Framework Convention on Climate Change acknowledges that "change in the Earth's climate and its adverse effects are a common concern of humankind". Likewise, the preamble to the Convention on Biological Diversity (opened for signature in 1992) declares the Parties thereto to be "[c]onscious ... of the importance of biological diversity for evolution and for maintaining life sustaining systems of the biosphere" (second para.), and affirms that "the Conservation of Biological Diversity is a common concern of humankind" in its prologue, the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, adopted in 1994,⁴⁵⁷ utilized phrases similar to 'common concern', including 'center of concerns', 'urgent concern of the international community' and 'problems of global dimension' in the context of combating desertification and drought.⁴⁵⁸ This section provides an

⁴⁵³ UNGA, 'Declaration of the UNGA Special Session on Development Cooperation, 18th Session (1990), Sup No 2 A/S-18/15, International Economic Cooperation'.

⁴⁵⁴ 'Ministerial Conference of Developing Countries on Environment and Development (1st : 1991 : Beijing)'.

⁴⁵⁵ International Union for Conservation of Nature and others, *Draft International Covenant on Environment and Development*, vol 31 (IUCN 2004) 36.

⁴⁵⁶ Biermann examined different aspects of the protection of the atmosphere as a common concern of humankind and argued protection of the atmosphere is not possible with any treaty regime unless by universal participation, restrictions on the sovereign rights of States and acceptance the common but differentiated obligations. see Frank Biermann, '„Common Concern of Humankind “: The Emergence of a New Concept of International Environmental Law' (1996) 34 *Archiv des Völkerrechts* 426.

⁴⁵⁷ United Nations, the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, 14 October 1994 , 1954 UNTS 3, 33 ILM 1328 (1994), [2000] ATS 18.

⁴⁵⁸ Murase, 'Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)' (n 409) 19–20.

overview of the formation of the term common concern in treaties and its corresponding influences.

2.3.2.1. Convention on Biological Diversity (1992)

The term “common concern of humankind,” was born out of drafting the history of the 1992 Convention on Biological Diversity.⁴⁵⁹ The working group assigned to investigate the possibilities for a convention on biodiversity tried to reach a consensus on the notion of biological diversity as a common resource of mankind. However, in its first report to the UN, released in November 1989, it did not reach a consensus on the notion of biological diversity as a common resource of humankind.⁴⁶⁰ The working group’s second report reveals continued resistance to a “common heritage” regime for biodiversity,⁴⁶¹ but also growing consensus around the need for some kind of shared conservation model.

To refer to biodiversity, the possibility of using “common interest or concern” instead of “common heritage” was raised by delegations in the working group’s third session in 1990.⁴⁶² By November of 1990, a new Working Group of Legal and Technical Experts was drafting a possible legal instrument, proposing variations on a theme for incorporation: “Biological diversity as a (heritage of mankind) [common responsibility of humankind]s [common interest of humankind]”.⁴⁶³ Ultimately, the group landed on “common

⁴⁵⁹ 1992 Convention on Biological Diversity, 5 June 1992, 1760 U.N.T.S. 69.

⁴⁶⁰ Working Group of Experts on Biological Diversity, ‘Ad Hoc Working Group of Experts on Biological Diversity, Report of the Ad Hoc Working Group on the Work of Its First Session, 6’ <<https://www.cbd.int/doc/?meeting=BDEWG-01>> accessed 29 May 2020.

⁴⁶¹ Ad Hoc Working Group of Experts on Biological Diversity, ‘Report of the Ad Hoc Working Group on the Work of Its Second Session in Preparation for a Legal Instrument on Biodiversity of the Planet, 3’ <<https://www.cbd.int/doc/meetings/iccbd/bdewg-02/official/bdewg-02-03-en.pdf>> accessed 29 May 2020.

⁴⁶² Ad Hoc Working Group of Experts on Biological Diversity, ‘Report of the Ad Hoc Working Group on the Work of Its Third Session in Preparation for a Legal Instrument on Biodiversity of the Planet, 6, 15’ <<https://www.cbd.int/doc/meetings/iccbd/bdewg-03/official/bdewg-03-12-en.pdf>> accessed 29 May 2020.

⁴⁶³ Ad Hoc Working Group of Legal and Technical Experts on Biological Diversity, ‘Elements for Possible Inclusion in a Global Framework Legal Instrument on Biological Diversity, 7’ <<https://www.cbd.int/doc/meetings/iccbd/bdn-01-awg-01/official/bdn-01-awg-01-03-en.pdf>> accessed 29 May 2020.

concern of humankind,” finding that the phrase expressed the core values that animated the Convention. They stated that:

“The Executive Director drew attention to four of the complex issues covered by the draft convention that were of particular importance: the first concerned the fundamental principle that the conservation of biological diversity was a common concern of all people. This principle required the participation of all countries and all peoples in a global partnership. It implied intergenerational equity and fair burden sharing. The common concern called for a balance between the sovereign rights of nations to exploit their natural resources and the interests of the international community in global environmental protection.”⁴⁶⁴

It is clear that the working group carefully considered its language and settled on “common concern” as the best possible articulation of its shared values. Note that the language requires global cooperation. By February, 1992, “all peoples” had changed to “humankind.”⁴⁶⁵

Finally, the term appeared in the preamble to the Convention as follows:

“a. Preamble: “Affirming that the conservation of biological diversity is a common concern of humankind.”

2.3.2.2. United Nations Framework Convention on Climate Change (1992)

The UNFCCC came into effect in 1994. Originally it did not include strict requirements for member States, instead setting forth principles for further action and calling for cooperation and institution-building to address climate change. It established important advisory and regulatory bodies, including the Subsidiary Body for Scientific and Technological Advice, and the Conference of the Parties (COP), which would work together to determine how best to address climate change. In 1997, the Kyoto Protocol added emissions reductions targets and effective compliance mechanisms to the

⁴⁶⁴ Ad Hoc Working Group of Experts on Biological Diversity (n 461).

⁴⁶⁵ Intergovernmental Negotiating Committee for a Convention on Biological Diversity, ‘Fourth Revised Draft Convention on Biological Diversity (February 6-15, 1992).’ <<https://www.cbd.int/doc/meetings/iccbd/bdn-06-inc04/official/bdn-06-inc-04-02-en.pdf>> accessed 29 May 2020.

framework.⁴⁶⁶ This creation of institutionalized collective law-making processes is one of the implications of the notion ‘common concern of humankind’ in the UNFCCC for addressing the climate change.⁴⁶⁷

- a. Preamble: “Acknowledging that change in the Earth's climate and its adverse effects are a common concern of humankind...”

2.3.2.3. The UNFCCC Paris Agreement

The Paris Agreement built upon the Convention and for the first time brought all nations together for a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. The Paris Agreement’s central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives.⁴⁶⁸ The term common concern of humankind is used in paragraph 11 of the preamble to the convention. The paragraph provides that:

“Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in

⁴⁶⁶ Jutta Brunnée, ‘The Global Climate Regime: Wither Common Concern?’, *Coexistence, Cooperation and Solidarity* (2 vols.) (Brill Nijhoff 2012) 727–9.

⁴⁶⁷ Taylor, ‘VI. 23 Common Heritage of Mankind and Common Concern of Humankind’ (n 443) 318.

⁴⁶⁸ See: ‘The Paris Agreement’ <<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>> accessed 29 May 2020.

vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.”

It should be noted that in those Conventions, which enjoy universal acceptance, virtually all States agreed that there was a strong need for the international community’s collective commitment to tackling global problems. In this regard, the main benefit of employing the term ‘common concern’ in environmental treaty practice has been to encourage participation, collaboration and action rather than discord, which the ILC Special Rapporteur on the protection of the Atmosphere finds especially important with regard to the topic at hand.⁴⁶⁹ Consequently, the achievement of the Paris Agreement’s ‘nationally determined contributions’ by all States (a bottom-up approach) is an outcome of the concept of ‘common concern of humankind’.⁴⁷⁰

Shelton in 2009 noted in the 1992 Convention on Biological Diversity and the UNFCCC, it is neither biological diversity nor the climate itself are common concerns. It is rather the conservation of biological resources and climate change and adverse effects therefrom that are a common concern.⁴⁷¹ This is the view that was generally accepted and later inserted in the Paris Agreement.

Both the literal definition of common concerns of humankind and its usage in international treaties - as well as definition of the atmosphere - indicate that the atmosphere as such cannot be considered a common concern of humankind. But what can be considered as a common concern of humankind is the “degradation of atmospheric conditions”, not the atmosphere itself, as expressed in the draft Guideline 3 of the second report of the ILC Special Rapporteur on the protection of the atmosphere. In other words, in view of the growing recognition of the linkages between

⁴⁶⁹ Murase, ‘Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)’ (n 409) 20.

⁴⁷⁰ Brunnée, ‘The Global Climate Regime: Wither Common Concern?’ (n 466) 736.

⁴⁷¹ Shelton, ‘Common Concern of Humanity’ (n 438) 37.

transboundary air pollution and global climate change,⁴⁷² application of the concept of “common concern to the whole of atmospheric problems is appropriate.”⁴⁷³

On the contrary, Murase argues that the atmosphere has the legal status of an international resource, whether shared or common, indispensable for sustaining life on Earth, health, crops and the integrity of ecosystems, that it is a common concern of mankind.⁴⁷⁴ However, issues or problems such as climate change can be considered a concern, not a resource. In fact, as Kiss argued, common concern is a general concept which does not connote specific rules and obligations but establishes the general basis for the community concerned to react to a problem.⁴⁷⁵ To put it in another way, more specifically, the atmosphere itself is a resource and cannot be considered as a concern as such. However, its degradation can be considered as a common concern. Now, the question that is left to be answered is the nature of atmosphere as an international common.

2.4. The atmosphere as a kind of common heritage of humankind

In this part applicability of protection of the atmosphere as a kind of ‘common heritage of mankind’ will be addressed. The doctrine of ‘common heritage of humankind’ can be traced back to the speech of Ambassador Arvid Pardo of Malta on November 1st, 1967 at the United Nations General Assembly.⁴⁷⁶ When the ambassador proposed that the seabed and the ocean floor, and the subsoil thereof, beyond the present limits of national jurisdiction be declared a ‘common heritage of mankind’, not subject to national appropriation, and reserved exclusively for peaceful purposes. He also stressed the ecological unity of ocean space and the interactions between all areas and all uses

⁴⁷² The treaty practice have been recognized the linkage between transboundary air pollution and climate change such as the 2001 Stockholm Convention on Persistent Organic Pollutants, the 2012 amendment of the Gothenburg Protocol on the 1979 LRTAP Convention, the 2013 Minamata Convention on Mercury.

⁴⁷³ See, Jutta Brunnée and Stephen J Toope, ‘Environmental Security and Freshwater Resources: Ecosystem Regime Building’ [1997] *American Journal of International Law* 26, 26–59.

⁴⁷⁴ Shinya Murase, ‘Protection of the Atmosphere and International Law: Rationale for Codification and Progressive Development’ (2012) 55 *上智法学論集* 1, 54.

⁴⁷⁵ Kiss (n 440) 246.

⁴⁷⁶ General Assembly United Nations, ‘22nd Sess., Annex Vol. 3, Agenda Item 92, at 1, U.N. Doc. A/6695’ (1967) <https://www.un.org/Depts/los/convention_agreements/texts/pardo_ga1967.pdf> accessed 28 November 2019.

of that space.⁴⁷⁷ Further the 1967 Outer Space Treaty Addressing the concept of the common heritage principle. Article 1 states: "[t]he exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic and scientific development, and shall be for the province of all mankind". In addition, the principle 'common heritage of mankind' under the Antarctica Treaty is a controversial issue.⁴⁷⁸

2.4.1. The general considerations of the principle common heritage of humankind

The principle common heritage of humankind is distinct from the principles of *res nullius* and *res communis*. The former means that property belonging to no one, the latter refers to property which is owned by no one and which therefore is rendered available for use by everyone. The notion of the 'common heritage mankind' when applied to an international era would assign ownership neither to all mankind nor to any sovereign user, and conceptually entails the principle of non-proprietorship. Consequently, there would not be any sovereign title available for legal acquisition transfer.⁴⁷⁹

2.4.2. Examining the status of the atmosphere as a kind of common heritage of mankind

There is disagreement between international legal authors as to the legal status of the atmosphere as a kind of common heritage of humankind. For example, Herber argued that the atmosphere as a global property resource should be treated as a kind of common heritage principle to improve the economic situation of developing States.⁴⁸⁰ Also, Boyle argued that to achieve a real protection of the atmosphere it seems necessary to identify the legal status of atmosphere based on a normative framework

⁴⁷⁷ For tracing the practice of the principle common heritage of mankind in light of UNCLOS during the time, see Helmut Tuerk, 'The Common Heritage of Mankind after 50 Years' (2017) 57 *Indian Journal of International Law* 259.

⁴⁷⁸ For examining the applicability of the principle common heritage of mankind to the deep seabed, outer space and Antarctica, see Jennifer Frakes, 'The Common Heritage of Mankind Principle and Deep Seabed, Outer Space, and Antarctica: Will Developed and Developing Nations Reach a Compromise' (2003) 21 *Wis. Int'l LJ* 409.

⁴⁷⁹ Christopher C Joyner, 'Legal Implications of the Concept of the Common Heritage of Mankind' [1986] *International and Comparative Law Quarterly* 190, 194.

⁴⁸⁰ Bernard P Herber, 'The Common Heritage Principle: Antarctica and the Developing Nations' (1991) 50 *American journal of economics and sociology* 391, 403, 404.

such as the common heritage of humankind.⁴⁸¹ Malta's proposal at the UN General Assembly in 1988 declared the atmosphere is kind of a common heritage of humankind. The proposal was to reconstitute the UN Trusteeship Council "as the forum through which Member States exercise their collective trusteeship for the integrity of the global environment and common areas such as the oceans, atmosphere and outer space".⁴⁸² On the contrary, Scholtz has argued that the identification of global environmental resources including the atmosphere as a kind of common heritage of humankind on one hand may cause international insecurity based on the eco-intervention argument, which can increase imperialism over environmental justice in the case of mismanagement by States. On other hand it may threaten the permanent sovereignty of developing States over their natural resources and create neo-colonization by developed and industrial countries that have already depleted the atmosphere.⁴⁸³

In addition to disagreement on the Legal status of the atmosphere as a kind of common heritage of humankind, as explained above, the problem with assessing the legal status of the atmosphere as a kind of common heritage of humankind is that there is no agreed upon definition of the notion of common heritage of humankind itself. Since, its meaning varies across different legal regimes referring to it or based on it.⁴⁸⁴ Thus, it is necessary to at least identify its common features in its usage in international law. In other words, its usage in legal frameworks for protection of the seabed and ocean floor, the legal regime for outer space, the legal framework for Antarctica, as well in international environmental law,⁴⁸⁵ can be helpful in identifying its common features to grasp the concept and its instances.

⁴⁸¹ See Alan Boyle, 'International Law and the Protection of the Global Atmosphere: Concepts, Categories and Principles' [1991] *International law and global climate change: International legal issues and implications*.

⁴⁸² Prue Taylor, 'The Concept of the Common Heritage of Mankind', *Research Handbook on Fundamental Concepts of Environmental Law* (Edward Elgar Publishing 2016) 327.

⁴⁸³ Scholtz (n 436) 292, 293.

⁴⁸⁴ Rüdiger Wolfrum, 'Common Heritage of Mankind', *Max Planck Encyclopedias of International Law* (2009) para 14.

⁴⁸⁵ For example, the Stockholm Declaration of the United Nations Conference on the Human Environment stated: 'The non-renewable resources of the Earth must be employed in such a way as to guard against

The first feature of the common heritage of humankind is that it is located in an area which is beyond the limits of present national jurisdiction; second, it cannot be appropriated;⁴⁸⁶ third, States are obligated to cooperate internationally in its use particularly with regard to the exploration and use of the deep seabed and the ocean floor;⁴⁸⁷ fourth, international management and regulated utilization; and fifth, distributive effect.⁴⁸⁸

According to the draft Guideline 1 of the second report of ILC special rapporteur on the protection of the atmosphere under the heading of “use of terms” the atmosphere is defined as “an envelope of gases surrounding the Earth”⁴⁸⁹ and according to the first part of the draft guideline 3 the atmosphere is “a natural resource essential for sustaining life on Earth, human health and welfare, and aquatic and terrestrial ecosystems”.⁴⁹⁰ These definitions can represent the first and second features of the common heritage of humankind as the atmosphere is the area located beyond the limits of present national jurisdiction and cannot be appropriated.

According to the draft Guideline 5, States are obligated to cooperate with each other and with relevant international organizations in good faith for the protection of the atmosphere.⁴⁹¹ Thus, this feature is also true about the atmosphere. This shows that the third feature of the notion of the common heritage of humankind is present in the atmosphere.

the danger of their future exhaustion and to ensure that benefits from such employment are shared by all mankind.

⁴⁸⁶ According to Art. 137 UN Convention on the Law of the Sea no State shall claim or exercise sovereignty or sovereign rights over any part of the seabed and the ocean floor or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty rights, nor such appropriation shall be recognized. The Moon Treaty, as well as the Outer Space Treaty, follows the same approach concerning non-appropriation. See Wolfrum (n 484) paras 12–21.

⁴⁸⁷ *ibid* 14.

⁴⁸⁸ *ibid* 18. Also see John E Noyes, ‘The Common Heritage of Mankind: Past, Present, and Future’ (2011) 40 *Denv. J. Int’l L. & Pol’y* 447.

⁴⁸⁹ Murase, ‘Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)’ (n 409) 12.

⁴⁹⁰ *ibid* 25.

⁴⁹¹ *ibid* 46,47.

The atmosphere lacks an institutional apparatus which is the forth feature of the common heritage of humankind. Shinya Murase, in the first report of the ILC, refed to this absence to reject recognition of the concept of common heritage of humankind as a legal aspect of the atmosphere.⁴⁹² Legal framework for protection of the atmosphere is embryonic, as the ILC is working on the issue and there is no sui generis treaty for its protection like UNCLOS, in which an institutional apparatus is agreed upon. The absence of an institutional apparatus cannot per se lead to the conclusion that the atmosphere can never attain the legal status of a common heritage of humankind. To put in another way, lacking one of the features that define the common heritage of humankind does not provide a solid enough basis for the argument that the atmosphere is not a common heritage of humankind.

The fifth feature of a common heritage of humankind can attributed to the atmosphere. Because it is the State's duty to take into particular consideration the interests and needs of developing countries with regard to the seabed as the common heritage of humankind.⁴⁹³ Also, States are obligated to take into particular consideration the interests and needs of developing countries with regard to the degrading atmosphere.⁴⁹⁴ In other words, distributive effect, which is a feature of the common heritage of humankind can be identified in its negative form in the Paris Agreement regarding the atmosphere.

⁴⁹² Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 52-57.

⁴⁹³ United Nations Convention on the Law of the Sea, 1833 UNTS 397, (10 December 1982), (entered into force 16 November 1994), [UNCLOS] (n 335). Article 140 (1).

⁴⁹⁴ Climate Change Secretariat Intergovernmental and Legal Affairs, *United Nations Framework Convention on Climate Change: Handbook* (2006) 24.

PART II. INTERNATIONAL LEGAL AND INSTITUTIONAL FRAMEWORK TO PROTECT THE ATMOSPHERE

Chapter 3. Protection of the Atmosphere, a Review of Soft Law

With increasing globalization, the need for regulating and establishing legal arrangements for international affairs has increased. Consequently, in the field of the environment, as well as atmospheric pollution, and atmospheric degradation there have been many international agreements (instruments) convened.

Traditionally, legal sources of international law are those that are mentioned in Article 38 of the Statute of the International Court of Justice (hereinafter ICJ) including: international conventions, whether general or particular, establishing rules expressly recognized by the contesting states; international custom, as evidence of a general practice accepted as law; the general principles of law recognized by civilized nations.⁴⁹⁵

However, with the growth of universal problems like environmental issues new sources of international law (such as soft law) have developed that challenge certainty of the Article 38 as the definite sources of international law.⁴⁹⁶ The appearance of the concept of 'soft law' goes back to the 1970s and gained momentum at the late 1980s and early 1990s.⁴⁹⁷ In the field of human environment soft law norms developed following to the 1972 Stockholm Conference.⁴⁹⁸

The legal status of 'soft law norms' is controversial among scholars; there is debate whether soft law norms belong to the realm of law or should be considered political or moral norms. The binary view and the idea of graduated normativity (continuum view), two contrary approaches assessed the ambiguous nature and legal effects of 'soft law'.⁴⁹⁹ As Shelton has summarized: "The most heated debate surrounding soft law

⁴⁹⁵ 'STATUTE OF THE INTERNATIONAL COURT OF JUSTICE' <<https://www.icj-cij.org/en/statute>> accessed 20 July 2020.

⁴⁹⁶ Malgosia Fitzmaurice, 'History of Article 38 of the Statute of the International Court of Justice' [2016] Queen Mary School of Law Legal Studies Research Paper 1, 31.

⁴⁹⁷ Antto Vihma, 'Analyzing Soft Law and Hard Law in Climate Change', *Climate Change and the Law* (Springer 2013) 146, 147.

⁴⁹⁸ Pierre-Marie Dupuy, 'Soft Law and the International Law of the Environment' (1990) 12 *Michigan Journal of International Law* 420, 422.

⁴⁹⁹ Anne Peters, 'Soft Law as a New Mode of Governance' [2011] *The dynamics of change in EZ governance* 21, 22.

concerns whether binding instruments and non-binding ones are strictly alternative or whether they are two ends on a continuum from legal obligation to complete freedom of action, making some such instruments more binding than others”.⁵⁰⁰

The formalist-oriented scholars (legal positivists) have defined ‘soft law’ as: “normative agreements that are not legally binding”, in this viewpoint international law is a binary choice between something binding, which is law, and something non-binding, which is not law.⁵⁰¹

Also, the contemporary literature has defined the term ‘soft law’ in binary terms, and usually in terms of what it is not: “Soft laws are not legally binding by themselves, they are not in treaty form, and they do not belong to the category of customary law.”⁵⁰²

Besson believes that soft law is not a new source of international law per se, it is a “kind of intermediary international legal outcome whose legality might be questioned and normativity *qua* law is almost inexistent”.⁵⁰³ Some soft law instruments are the first step in a treaty-making process, such as the 1988 UNGA Resolution on Protection of Global Climate for Present and Future Generations of Mankind.⁵⁰⁴ It led to formation of the 1992 UN Framework Convention on Climate Change. In addition, the non-binding resolutions of the UNGA can be considered an intermediary stage for the formation of the norm of customary international law by providing evidence of practice and *opinio juris*.⁵⁰⁵ Moreover, soft law instruments may be an important auxiliary mechanism for

⁵⁰⁰ L Shelton Dinah, ‘Soft Law in Handbook of International Law’ (London: Routledge Press 2008) 7.

⁵⁰¹ Vihma (n 345) 147, 148; Jan Klabbbers, ‘The Redundancy of Soft Law’ (1996) 65 Nordic Journal of International Law 167; Also Klabbbers argues: The understanding that ‘norms are better than chaos’ also reveals the apologetic tendency of the use of soft law, which gives “the politicians the possibility to be released from their responsibility to take necessary measures to achieve a given effect. Jan Klabbbers, ‘The Undesirability of Soft Law’ (1998) 67 Nordic Journal of International Law 381.

⁵⁰² Vihma (n 497) 147; Dinah L Shelton, ‘Commitment and Compliance: The Role of Non-Binding Norms in the International Legal System (Introduction)’ [2000] COMMITMENT AND COMPLIANCE: THE ROLE OF NON-BINDING NORMS IN THE INTERNATIONAL LEGAL SYSTEM (Dinah Shelton ed., 2000) 2013.

⁵⁰³ Samantha Besson, ‘Theorizing the Sources of International Law’, *The philosophy of international law* (Oxford: Oxford University Press 2010) 171.

⁵⁰⁴ Alan Boyle, ‘Soft Law in International Law-Making’ (2014) 2 *International law* 141, 123.

⁵⁰⁵ For a full examination of the relations between soft law and hard law and why states adopting more non-binding normative instruments in international environmental law see Dinah L Shelton, ‘Comments

treaty interpretation, application and development. Soft law may modify the meaning, interpretation or content of existing treaty law.⁵⁰⁶ The decisive factor in this understanding of soft law is the legal form and not the content of the international instruments.⁵⁰⁷

While there is no universal and precise definition of the 'soft law', in essence it refers to non-legally binding social rules made by states and other subjects of international law that have 'special legal relevance'.⁵⁰⁸ In this line, Dupuy in 1991 argued "repetition" has a significant role in the process of environmental soft law-making and acceptance of new concepts. For instance, several soft instruments referred to the concept of 'common concern of mankind' on atmospheric degradation and protecting the atmosphere as part of the 'common heritage of mankind'.⁵⁰⁹ Therefore, Dupuy said "If this phenomenon continues, it will likely have some legal consequence, particularly with regard to the environmental responsibility that the present generation has vis-à-vis future generations".⁵¹⁰ Consequently, we see the concept of 'common concern of humankind' has been accepted and placed in the binding agreements such as the UNFCCC and the Paris Agreement towards a global contribution to and protection of the atmosphere and its degradation.

In regard to the terms 'hard law' and 'soft law' rationalist and social constructivists characterized diverse types of international arrangements and their implications by the 'continuum approach' against binary terms such as legal/illegal; binding/non-binding.⁵¹¹ The 'legalization school' by rationalist scholars argues that "international agreements can be placed on a 'continuum' from hard law – *precise* and legally binding treaties that

on the Normative Challenge of Environmental'Soft Law" [2011] The transformation of international environmental law 61.

⁵⁰⁶ Fitzmaurice, 'History of Article 38 of the Statute of the International Court of Justice' (n 496) 30.

⁵⁰⁷ Ilhami Alkan Olsson, 'Four Competing Approaches to International Soft Law' (2013) 58 *Scandinavian studies in law* 177, 185.

⁵⁰⁸ Rebecca Byrnes and Peter Lawrence, 'Can "Soft Law" Solve "Hard Problems"? Justice, Legal Form and the Durban-Mandated Climate Negotiations' (2015) 34 *University of Tasmania Law Review* 34, 36.

⁵⁰⁹ Dupuy (n 498) 427.

⁵¹⁰ *ibid.*

⁵¹¹ Vihma (n 497) 144–147.

oblige a behavioral change with *delegated* enforcement bodies – to the softest of soft law, with its vague, aspirational goals and no delegation or institutional follow-up.”⁵¹² In view of rational scholars such as Lipson, ‘bindingness’ in international law and international agreements is a “misleading hyperbole”.⁵¹³ In the continuum approach there is no sharp boarder to characterize soft law and hard law. The only profoundly binary element of the intergovernmental negotiations is decision of the national constitutions in a ratifiable agreement.⁵¹⁴

Some other rationalist scholars supported the continuum approach to the international legalization. Such as Chinkin who frames soft and hard law in a hierarchy of descending ‘hardness’ of laws, including: legal soft law (imprecise hard law); secondary or delegated soft law (which includes the “statements and practice that develop around a treaty to supplement or correct the text”); and non-legal soft law (resolutions, declarations, the output of intergovernmental conferences, etc.).⁵¹⁵

Rationalist scholars believe flexibility of informal agreements (soft law) reduce the diplomatic consequences and reputational effects of formal agreements; thus it would be advantageous in solving global crises under time pressure.⁵¹⁶ Nonetheless, they find the language of binding commitments to be one of the significant costs of hard law, such as restriction of actors’ behavior and sovereignty matters. States under formal

⁵¹² *ibid* 145.

⁵¹³ Charles Lipson, ‘Why Are Some International Agreements Informal?’ [1991] *International organization* 495, 508.

⁵¹⁴ Vihma (n 497) 149.

⁵¹⁵ Christine Chinkin, ‘Normative Development in the International Legal System’, *Commitment and Compliance* (Dinah Shel, Oxford University Press 2000) 27. Also for a earliest examination of softness in international agreements see Richard R Baxter, ‘International Law in Her Infinite Variety’ (1980) 29 *Int’l & Comp. LQ* 549.

⁵¹⁶ Lipson (n 513) 501, 538. Also Guzman has explicitly addressed the choice of soft versus hard law: the flexibility and domestic issues, the inclusion or exclusion of dispute settlement, and the provision or omission of monitoring mechanisms in international agreements. See Andrew T Guzman, ‘The Design of International Agreements’ (2005) 16 *European Journal of International Law* 579.

agreements signal the seriousness of their commitments, so noncompliance entails greater reputational costs, especially in serious global concerns like climate change.⁵¹⁷

In this regard, Karlsson-Vinkhuyzen and Vihma have provided an analytical framework for comparing the legitimacy and effectiveness in three different norms with different degrees of 'softness' in global climate change governance. Their analytical framework illustrate that there is a dynamic between the norms' effectiveness. Legitimacy in this context also operates over time, between harder and softer law, and vertically between levels of governance. The dynamic indicates the choice of developing a hard or soft norm in global governance does not determine with certainty the long-term outcome.⁵¹⁸

From another view point, constructivist scholars such as Trubek,⁵¹⁹ in contrast with rationalist analysts, focus less on the binding nature of law at the enactment stage, and more on the effectiveness of law at the implementation stage, addressing the gap between the law-in-the-books and the law-in-action; they note how even domestic law varies in terms of its impact on behavior, so in this view binary distinctions between binding 'hard law' and nonbinding 'soft law' are illusory.⁵²⁰

The constructivist view has focused on "appropriate behavior"⁵²¹ and argues that "international regimes can lead states to change their perceptions of their interests through transnational processes of interaction, deliberation, and persuasion."⁵²² Thus

⁵¹⁷ Gregory C Shaffer and Mark A Pollack, 'Hard vs. Soft Law: Alternatives, Complements, and Antagonists in International Governance' (2010) 94 *Minnesota Law Review* 706, 713; Andrew T Guzman, *How International Law Works: A Rational Choice Theory* (Oxford University Press 2008) 71–111.

⁵¹⁸ Sylvia I Karlsson-Vinkhuyzen and Antto Vihma, 'Comparing the Legitimacy and Effectiveness of Global Hard and Soft Law: An Analytical Framework' (2009) 3 *Regulation & Governance* 400, 414.

⁵¹⁹ See David M Trubek, Mark Nance and Patrick Cottrell, "'Soft Law', 'hard Law', and EU Integration', *Law and New Governance in the EU and the US* (Hart Publishing 2006).

⁵²⁰ Shaffer and Pollack (n 517) 713.

⁵²¹ Vihma (n 497) 150.

⁵²² In the same view, Sikoëska proposes soft law as a solution to stagnation in creating binding international regulations for emissions in the aviation and aerospace industry. She argues once a soft law is created, the informal pressure of public opinion emerges to help enforce it. All corporations that operate in the aerospace sector – from established companies such as Boeing and Airbus to newer ones such as Virgin Galactic and Blue Origin – can prove that they care about the environment and, as a result, create self-imposed limitations. This positive public opinion could increase the companies' profits, thus placing profit maximization on the same side as the good of the environment. Paulina E Sikorska, 'The

in an *ex ante* view, actors can use different legal characteristics to facilitate international issues as well as to achieve their aims through various costs and benefits of different legal characteristics, consequently agreements would have unforeseen results, *ex post*.⁵²³

Accordingly, Abbott and Snidal have provided three factors of 'hardness' for international law which are particularly useful for analyses of hard/soft law instruments and regimes interact containing: binding obligation, precise wording, and delegation to third party. In the view of these scholars hard law "refers to legally binding obligations that are precise (or can be made precise through adjudication or the issuance of detailed regulations) and that delegate authority for interpreting and implementing the law."⁵²⁴ And soft law is defined to as a residual category: "[t]he realm of 'soft law' begins once legal arrangements are weakened along one or more of the dimensions of obligation, precision, and delegation".⁵²⁵

The interactional law framework by Brunnée and Toope based on Fuller legal theory⁵²⁶ and international relations theory of constructivism argued that in addition to the sources of Article 38 (treaties, customary law, general principles), the soft law-making process is a source of International Law when a soft law instrument accounts for the elements of interactional law account including: shared understanding (constructivism), meeting the requirements of legality (based on Fuller theory) and practice of legality.⁵²⁷ Occasionally these soft law instruments overlap at customary law, such as Principle 21 of the Stockholm Declaration and Principle 2 of the Rio Declaration which influenced on

Need for Legal Regulation of Global Emissions from the Aviation Industry in the Context of Emerging Aerospace Vehicles' (2015) 1 International Comparative Jurisprudence 133, 140.

⁵²³ Shaffer and Pollack (n 517) 717.

⁵²⁴ Kenneth W Abbott and Duncan Snidal, 'Hard and Soft Law in International Governance' [2000] International organization 421, 421. Noting "Soft law is valuable on its own, not just as a stepping-stone to hard law. Soft law provides a basis for efficient international "contracts," and it helps create normative "covenants" and discourses that can reshape international politics."

⁵²⁵ Abbott and Snidal (n 524).

⁵²⁶ See: Lon L Fuller, 'The Morality of Law' [1969] Law. Rev. ed. New Haven, Conn.: Yale University Press ch 2.

⁵²⁷ Jutta Brunnée, 'The Sources of International Environmental Law: Interactional Law' [2016] Oxford Handbook on the Sources of International Law (2017), Forthcoming 5.

identifying of the harm prevention rule in customary law as a legal source of International Environmental Law also to protect the atmosphere.⁵²⁸ In addition, some soft law instruments like non-binding supplementary regulations on UNFCCC and Kyoto protocol, the precautionary principle, and the principle of common but differentiated responsibilities (hereinafter, CBDR) in International Environmental Law, gained legal status according to elements of interactional law framework.

Accordingly, with examining different approaches such as the positivist view (formalist), the legalization school and the interactionist theory, the existence of a new kind of law and its significance is not ignorable,⁵²⁹ It potentially contributes by “reforming traditional sources of International Law and the modalities for their creation by allowing wider participation and opening up new channels for further legalization.”⁵³⁰ Moreover, the fact that violations of ‘soft’ standards do not have all of the same legal consequences as violations of treaty or customary law does not suffice to exclude them from the range of sources of International Law.⁵³¹

These are views arguing that soft law is simply not law. These views have perhaps missed some of the points made here, moreover those who see a treaty as necessarily having greater legal effect than soft law have perhaps not looked hard enough at the "infinite variety" of treaties. Soft law in its various forms can of course be abused, but so can most legal forms, and beyond the criticisms, it has generally been more helpful to the process of International Law-making than it has been objectionable. It is simply another tool in the professional lawyer's armory.⁵³²

based on above analysis of the advantages and disadvantages of soft law, it can be concluded that, although a comprehensive and binding regulation is appropriate and

⁵²⁸ *ibid* 16.

⁵²⁹ Bart van Klink and Oliver W Lembcke, ‘A Fuller Understanding of Legal Validity and Soft Law’, *Legal Validity and Soft Law* (Springer 2018) 17.

⁵³⁰ Olsson (n 507) 169.

⁵³¹ Brunnée, ‘The Sources of International Environmental Law: Interactional Law’ (n 527) 18.

⁵³² Alan E Boyle, ‘Some Reflections on the Relationship of Treaties and Soft Law’ (1999) 48 *International & Comparative Law Quarterly* 901, 913.

desirable for combating atmospheric problems, a lack of political tendency and economic calculations of some states due to limits on their national interests has been avoiding that. Thus, the international community respecting the seriousness of atmospheric degradation and its harms to the environment and human beings can take advantage opportunity of soft law instruments to fill the lack of binding law.

In this chapter, non-binding norms and instruments in field of legal atmospheric protection will be addressed.

3.1. Non-binding instruments

Non-binding instruments with mostly moral and political commitments are categorized under the topic of soft law. Non-legal instruments such as recommendations, standards, and guidelines can significantly affect behavior and domestic legislation or regulations.⁵³³ Regarding to atmospheric protection due to economic interest and political unwilling of States achieving to a comprehensive universal agreement such as the UNCLOS is not imminent. Thus, the non-binding instruments can be helpful to provide the legal ground for further creation of binding legal instrument on protection of the atmosphere.

There are two issues with the non-binding instruments, on the one hand they are forthcoming and accessible due to not requiring legislative enactment like treaties and legal instruments. On the other hand, the effectiveness and accountability of them is unclear. Indeed, the former issue was the justification of the Obama administration's approach during the 2014 climate change negotiations to end up agreeing to a non-binding agreement through the executive branch and fast implementation. Whereas the binding instruments need the approval of two thirds majority of the US Senate in a long political process.⁵³⁴

⁵³³ Daniel Bodansky, 'Legally Binding versus Non-Legally Binding Instruments' [2015] Forthcoming in: Scott Barrett Carlo Carraro and Jaime de Melo, eds., *Towards a Workable and Effective Climate Regime*, VoxEU eBook (CEPR and FERDI) 162.

⁵³⁴ Cecily Rose, 'Non-Binding Instruments and Democratic Accountability' [2016] *Experts, Networks and International Law* (Cambridge University Press), Forthcoming 1.

Further, in terms of accountability Rose argues that non-binding instruments may indeed diminish the role of legislatures with respect to the implementation of international norms, though they do not necessarily raise serious accountability concerns.⁵³⁵

The notion of 'soft law' has been a decisive factor in the very rapid development of new norms and principles over the past 30 years in the field of International Environmental Law. In respect to protection of the atmosphere, there have been several non-binding instruments through multilateral negotiations, they are listed below and will be described most important of them:

- Council of Europe Committee of Ministers resolution (71) 5 on air pollution in frontier areas (1971)
- Declaration of the United Nations Conference on the Human Environment (1972)
- Organization for Economic Cooperation and Development, Recommendation of the Council on Principles concerning Trans frontier Pollution (1974)
- Organization for Economic Cooperation and Development, Recommendation of the Council for the Implementation of a Regime of Equal Right of Access and Non-Discrimination in Relation to Trans frontier Pollution (1974)
- Rio Declaration on Environment and Development (1992)
- Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia (1998)
- International Law Commission, draft articles on prevention of transboundary harm from hazardous activities (2001)
- International Law Commission draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006)
- Eastern Africa Regional Framework Agreement on Air Pollution (Nairobi, 2008)
- Southern African Development Community Regional Policy Framework on Air Pollution (Lusaka, 2008)

⁵³⁵ ibid 16.

- West and Central Africa Regional Framework Agreement on Air Pollution (Abidjan, 2009)
- Acid Deposition Monitoring Network in East Asia (2010)
- North African Framework Agreement on Air Pollution (2011)

3.1.1. Declaration of the United Nations Conference on the Human Environment (1972)

The first global environmental conference held in Stockholm in June 1972.⁵³⁶ The Stockholm Declaration was the result of this Conference, known as milestone in the modern International Environmental Law.⁵³⁷

The Declaration does not directly address the subject of protection of the atmosphere. However, Principle 6 implied the issue as:

“The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems...”⁵³⁸

Further, while some developing nations viewed environmental protection as a concern primarily of the developed countries, most developing nations were sensitive to issues of sovereignty, especially related to the methods they could choose to pursue in exploiting their natural resources.⁵³⁹ Despite the disagreements, compromises were reached, resulting in Principle 21, which pronounces that:

⁵³⁶ For tracing the 1972 Stockholm Declaration and its impacts on the preservation and enhancement of the human environment see Louis B Sohn, ‘Stockholm Declaration on the Human Environment, The’ (1973) 14 Harv. Int’l. LJ 423.

⁵³⁷ Günther Handl, ‘Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration), 1972 and the Rio Declaration on Environment and Development, 1992’ (2012) 11 United Nations Audiovisual Library of International Law 426, 1.

⁵³⁸ ‘Stockholm Declaration on the Human Environment, in Report of the United Nations Conference on the Human Environment, UN Doc.A/CONF.48/14, at 2 and Corr.1 (1972)’.

⁵³⁹ Ved P Nanda, ‘Trends in International Environmental Law’ (1989) 20 Cal. W. Int’l LJ 187, 189.

“States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”

Principle 21 was an essay on reconsidering and restricting the sovereignty of States to attain the balance between sovereignty and responsibility (environmental protection). Further, it had constituted a foundation for acceptance of the principle common concern in solving the global problems such as atmospheric degradation.⁵⁴⁰

In line with Principle 21, the “responsibility” of states has considered as a legally binding norm. The responsibility of transboundary air pollution has been considered a principle of the customary international law.⁵⁴¹ Principle 21 makes clear that sovereign rights and duties are two sides of the same coin and cannot be analyzed separately. Whereas the Principle combines the sovereign right to use natural resources of a State pursuant to national policies and the duty not to cause damage outside of that State's borders in the same principle.⁵⁴²

The creation of the United Nations Environment Program (UNEP) was one of the most significant achievements of the Stockholm Conference which has been responsible for the establishment and implementation of such global treaties as the 1985 Vienna Convention and 1987 Montreal Protocol on ozone depletion.⁵⁴³ In addition, Principles 6 and 21 are incorporated into several conventions on transboundary air pollution such as 1979 Convention on Long-Range Transboundary Air Pollution (LRTAP), the Vienna

⁵⁴⁰ Laura Horn, ‘Globalisation, Sustainable Development and the Common Concern of Humankind’ (2007) 7 Macquarie LJ 53, 56.

⁵⁴¹ Aaron Schwabach and AR Cockfield, ‘Transboundary Environmental Harm and State Responsibility: Customary International Law’ (2009) 200 International Law and Institutions 205.

⁵⁴² Jeffrey D Kovar, ‘A Short Guide to the Rio Declaration’ (1993) 4 Colo. J. Int’l Env’tl. L. & Pol’y 119, 125.

⁵⁴³ Djamchid Momtaz, ‘The United Nations and the Protection of the Environment: From Stockholm to Rio de Janeiro’ (1996) 15 Political Geography 261, 265,266.

Convention for the protection of Ozone Layer and the United Nations Framework on Climate Change.⁵⁴⁴

3.1.2. Rio Declaration on Environment and Development (1992)

The 1992 United Nations Conference on Environment and Development led to the Rio Declaration with its 27 universal principles on sustainable development. The Declaration in the form of non-binding instrument establishes general principles which provide the foundation for future environmental protection.⁵⁴⁵

The period following the 1992 Earth Summit in Rio de Janeiro was marked by considerable progress in the field of International Law-making with respect to conservation and the sustainable use of natural wealth and resources through treaty making and soft law instruments.⁵⁴⁶ However, it is characterized by political compromise, which explains its fragmentary appearance and the lack of a systematic and a clear philosophical line.⁵⁴⁷

The Declaration had an essential shift from environmental law under Principle 21 of the Stockholm Declaration and its modification- to the law of sustainable development through the wording of Principle 2. It declares:

“States have, in accordance with the Charter of the United Nations and the principles of International Law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction”.

⁵⁴⁴ SK Tussupbekova, BA Taitorina and GT Baisalova, ‘On the Question of the Justification of the Principles International Legal Protection of Atmospheric Air from Pollution’ 70.

⁵⁴⁵ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 37.

⁵⁴⁶ Schrijver (n 431) 1262.

⁵⁴⁷ Luc Hens, ‘The Rio Declaration on Environment and Development’ [2005] Regional sustainable development review: Africa. Oxford, UK, Eolss Publishers 2.

Both principles codified the 'prevention principle' as the golden rule of International Environmental Law. However, Viñuales argues the prevention principle does not seem to arise from direct protection of the environment, but rather to protect the territorial sovereignty of neighboring States.⁵⁴⁸

The Declaration under Principle 3 and 4 provides the key defining concepts for the integration of environment and development.⁵⁴⁹ As Principle 3 states that "the right to development must be fulfilled as to equitably meet developmental and environmental needs of present and future generations". Also, Principle 4 states that "in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it". Read together, the two principles form the core of sustainable development. One of the key points in the Declaration and under aforementioned principles is the integration of environmental concerns into the economic development big picture. The stated purpose of the Declaration is to promote sustainable and environmentally sound development in all countries by elaborating strategies and measures that halt and reverse the effects of environmental degradation.⁵⁵⁰

The Declaration codified several important principles in line with the concept of sustainable development (Principle 27) such as the precautionary principle (Principle 15), intragenerational and intergenerational equity (Principle 3), and common but differentiated responsibilities (Principle 7).⁵⁵¹ Further, the Declaration contains specific provisions on procedural elements, such as access to information and opportunities for public participation (Principle 10); environmental impact assessments (Principle 17); and notification, information exchange and consultation (Principle 19).⁵⁵² Thus, the

⁵⁴⁸ Jorge E Viñuales, *The Rio Declaration on Environment and Development: A Commentary* (OUP Oxford 2015) 108.

⁵⁴⁹ Ileana M Porras, 'The Rio Declaration: A New Basis for International Co-Operation' (1992) 1 *Rev. Eur. Comp. & Int'l Env'tl. L.* 245, 275.

⁵⁵⁰ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 38.

⁵⁵¹ For detailed reviewing of all principles under Rio declaration see Viñuales (n 548).

⁵⁵² See generally Kovar (n 542).

Declaration provides a framework for the development of environmental law at the national and international level which will serve as an important point of reference to guide decision-making. Its contribution to the development of rules of customary law has become clearer over time, although many of its provisions were already found in treaties and other international acts and reflected in the domestic practice of many States.⁵⁵³

3.1.3 Acid Deposition Monitoring Network in East Asia

The rapid economic development and industrialization faced many countries in the East Asian region with a serious threat from air pollution and problems related to excess deposition, including acidic substances. Regional cooperation for countermeasures to prevent regional air pollution and moving towards sustainability should be taken seriously.⁵⁵⁴ The Acid Deposition Monitoring Network in East Asia (EANET) was developed in 2001 to establish a regional framework for the control of transboundary air pollution.⁵⁵⁵ The Network aims to create a common understanding of the state of the acid deposition problems in East Asia; to provide useful inputs for decision-making at local, national and regional levels aimed at preventing or reducing adverse impacts on the environment caused by acid deposition; and to contribute to cooperation on the issues related to acid deposition among the participating countries.⁵⁵⁶

The institutional arrangement for the Network, the Intergovernmental Meeting is the decision-making body, and the Scientific Advisory Committee, composed of scientific

⁵⁵³ PHILIPPE SANDS Qc, *Principles of International Environmental Law* (Cambridge University Press 2003) 56, 57.

⁵⁵⁴ Jung Wk Kim, 'The Environmental Impact of Industrialization in East Asia and Strategies toward Sustainable Development' (2006) 1 *Sustainability Science* 107, 113.

⁵⁵⁵ Thirteen countries have participated in the Network including Cambodia, China, Indonesia, Japan, the Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, the Philippines, the Republic of Korea, the Russian Federation, Thailand and Viet Nam. See 'The Acid Deposition Monitoring Network in East Asia (EANET)' <<https://www.eanet.asia/>> accessed 25 December 2020.

⁵⁵⁶ Ms Adelaida B Roman, 'Acid Deposition Monitoring Network in East Asia (EANET)' 4.

and technical experts, is established under the Intergovernmental Meeting. The secretariat and the Network Centre are designed to support the Network.⁵⁵⁷

By 2010, 54 deposition monitoring sites had been set up in 10 participating States, and ecological surveys had been conducted at 44 sites (forests, lakes and rivers) in the region.⁵⁵⁸ In 2020, the number of the EANET monitoring sites has increased, with a total number of 60 wet deposition monitoring sites, 47 dry deposition monitoring sites, 21 soil and vegetation monitoring sites, 19 inland aquatic environment monitoring sites, and 2 catchment-scale monitoring sites, located in 13 countries of Asia.⁵⁵⁹

3.2. The International Law Commission Codification Works to the Protection of the Atmosphere

The International Law Commission (hereinafter, ILC) founded in 1949 to work in the form of draft conventions or draft articles with the purpose of negotiation and adoption as treaties (hard law), although it did also release soft law' documents such as principles and draft declarations. However, since the 1990s, the ILC's work has transitioned from mainly hard law to soft law products, such as its work on 'protection of the Atmosphere'. This transition has been based on a general global willingness, and following to the failure of some conventions developed from the ILC's draft articles, also the United Nations General Assembly (hereinafter, UNGA) has opposed to negotiate treaties based on the ILC's draft articles and recommendations.⁵⁶⁰

According to Shinya Murase, the ILC is unique for an organ of the United Nations as it is composed of members who join the commission not as state representatives but in their individual capacity. The members of commission work in the collegial spirit based on

⁵⁵⁷ Supat Wangwongwatana, 'Instrument for Strengthening the Acid Deposition Monitoring in East Asia (EANET)', presentation at Regional Cooperation Mechanisms for Air Quality Better Air Quality (BAQ) 2012 Conference December (2012) 5.

⁵⁵⁸ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 39.

⁵⁵⁹ Tomi Haryadi, 'EANET NEWSLETTER ACID DEPOSITION MONITORING NETWORK IN EAST ASIA', vol 26 (2020) 8.

⁵⁶⁰ Elena Baylis, 'The International Law Commission's Soft Law Influence' (2018) 13 FIU L. Rev. 1007, 1008. For more examining the form of ILC's products and its reasons and implications see Jacob Katz Cogan, 'The Changing Form of the International Law Commission's Work' (2014) 108 AJIL Unbound 4.

mutual respect and solidarity as lawyers, and each of them represent his/her unique legal culture and background. The ILC is in fact not a political organ that makes new laws, instead it is a legal organ in charge of codification and progressive development of international law on the basis of existing or emerging customary international law. The nature of work of the commission is supposed to be an objective, almost scientific, research rather than political negotiation. Therefore, members are meant to apply their legal expertise in their individual capacity rather than merely represent the political interest of their States. Murase argues that this neutrality is important to maintain the basic character of the commission.⁵⁶¹

During the 1950s and 60s, the ILC produced a number of influential codification conventions such as the 1958 Geneva Conventions on the Law of the Seas,⁵⁶² the Vienna Convention on the Diplomatic and Consular Relations⁵⁶³, and the 1969 Vienna Convention on the Law of the Treaties,⁵⁶⁴ just to name a few. However, in the 1970s and 80s the ILC's work gradually became more difficult because it started dealing with topics of progressive development which inevitably contained certain elements of new law making and thus created some tensions within the commission as well as the sixth committees of the general assembly. The ILC's role and productivity declined during

⁵⁶¹ Murase, 'Protection of the Atmosphere and Codification and Progressive Development of International Law', (n 9).

⁵⁶² The unity of the law of the sea, painstakingly reached at the final stages of the work of the ILC, was lost in the 1958 Geneva Conference (such unity was to be one of the main objectives pursued and reached in the 1982 United Nations Convention on the Law of the Sea). The adoption of four conventions and a protocol in lieu of one all-encompassing convention may be seen, and was conceived, as a device to attract the acceptance by a broad number of States of at least some of the Conventions, in this way avoiding very radical reservations, or the decision by certain States not to accept an all-encompassing convention because of opposition to one or more of its main component parts. the United Nations Conference on the Law of the Sea opened for signature four conventions and an optional protocol: the Convention on the Territorial Sea and the Contiguous Zone (CTS); the Convention on the High Seas (CHS); the Convention on Fishing and Conservation of the Living Resources of the High Seas (CFCLR); the Convention on the Continental Shelf (CCS); and the Optional Protocol of Signature concerning the Compulsory Settlement of Disputes (OPSD). See United Nations, 'Conventions on the High Seas, Geneva, 29 April 1958, Treaty Series , Vol. 450' <<https://legal.un.org/avl/ha/gclos/gclos.html>> accessed 5 February 2021.

⁵⁶³ United Nations, Vienna Convention on Diplomatic Relations, 18 April 1961, 500 UNTS 95, (entered into force 24 April 1964, accession by Canada 25 June 1966) [VCDR].

⁵⁶⁴ United Nations, Vienna Convention on the Law of Treaties, 23 May 1969, 1155 UNTS 331, (Entred into force: 27 January 1980), [VCLT].

these years.⁵⁶⁵ In 1990s the ILC's revival was well demonstrated by the completion of the draft articles of States Responsibility in 2001.⁵⁶⁶ The ILC developed many regulations and codifications in context of environment, such as the 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses,⁵⁶⁷ its 2001 Draft Articles Principles on Transboundary Harm from Hazardous Activities,⁵⁶⁸ 2006 Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities,⁵⁶⁹ 2008 Draft Articles on the Law of Transboundary Aquifers,⁵⁷⁰ and its ongoing work on Draft Principles for Protection of the Environment in Relation to Armed Conflicts.⁵⁷¹ In this section most relevant topics of ILC's work to the protection of the Atmosphere will be addressed.

3.2.1. International Law Commission draft articles on prevention of transboundary harm.

The Commission, while addressing State responsibility for wrongful acts, since 1978 started to address the issue of States liability for lawful acts (acts not prohibited by international law) as well. Following to the recommendation of the Working Group who had been working on the topic, in 1997 the Commission decided to divide the two aspects of the topic, namely, prevention and remedial measures (liability).⁵⁷²

⁵⁶⁵ Murase, 'Protection of the Atmosphere and International Law: Rationale for Codification and Progressive Development' (n 474) 4.

⁵⁶⁶ International Law Commission, 'Draft Articles on Responsibility of States for Internationally Wrongful Acts, Supp No. 10, U.N.DOC. A/56/10' (2001).

⁵⁶⁷ United Nations General Assembly, Convention on the Law of the Non-navigational Uses of International Watercourses, 21 May 1997, Supp No. 49(A/51/49), (Entered into force on 17 August 2014).

⁵⁶⁸ International Law Commission, 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, 53rd Session of the ILC, UN Doc. A/RES/56/82' (2001).

⁵⁶⁹ International Law Commission, 'Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising out of Hazardous Activities, with Commentaries, Fifty-Eighth Session, UN Doc A/CN.4/566' (2006).

⁵⁷⁰ International Law Commission, 'Draft Articles on the Law of Transboundary Aquifers, Sixtieth Session, Suppl No. 10, UN Doc (A/63/10)' (2008).

⁵⁷¹ See International Law Commission, 'Protection of the Environment in Relation to Armed Conflicts' <https://legal.un.org/ilc/guide/8_7.shtml> accessed 18 May 2020.

⁵⁷² Pemmaraju Sreenivasu Rao, 'Prevention of Transboundary Harm from Hazardous Activities' (2002) 32 Environmental policy and Law 27, 27.

The Commission's work on the draft articles on the prevention of transboundary harm finalized and submitted to the General Assembly in 2001. The draft articles represent the Commission's attempt not only to codify but to progressively develop the law through its elaboration of the procedural and substantive content of the duty of prevention.⁵⁷³ The Draft Articles on Prevention draw heavily on prior interpretations of the no-harm rule, including the *Trail Smelter* arbitration, Principle 21 of the Stockholm and Principle 2 of Rio declaration.⁵⁷⁴ The noticeable role of the *Trail Smelter* arbitration in the ILC's work is indicative of the importance of the Draft Articles on Prevention to solving the atmospheric issues.

The articles deal with the concept of prevention in the context of authorization and regulation of hazardous activities, which pose a significant risk of transboundary harm. Whereas compensation in case of harm often cannot restore the situation prevailing prior to the event or accident. Prevention in this sense, as a procedure or as a duty deals with the phase prior to the situation where 'significant' harm or damage might actually occur.⁵⁷⁵ The scope of the articles under Article 1 is limited to the activities not prohibited by International Law which involve a risk of causing significant transboundary harm through their physical consequences. Also, Article 2 (d) limits the scope of the articles to those activities carried out in the territory or otherwise under the jurisdiction or control of a State.⁵⁷⁶

Article 3 states that the State of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof. The obligation to prevent transboundary harm is based on a standard of 'due diligence'.

⁵⁷³ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 39. The obligation to inform the public (Article 13), the need to provide foreign nationals with access to domestic, judicial and quasi-judicial forums (Article 15) and on the settlement of disputes (Article 19) are examples of progressive development. Rao (n 572) 28.

⁵⁷⁴ Kerryn Anne Brent, 'The Role of the No-Harm Rule in Governing Solar Radiation Management Geoeengineering' 137.

⁵⁷⁵ In the commentary to the 2001 Draft Principles, the term 'significant' can be defined as "something more than detectable but not at the level of serious or substantial". Commission, 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, 53rd Session of the ILC, UN Doc. A/RES/56/82' (n 568) 152.

⁵⁷⁶ International Law Commission, 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries' (2001) 2 Yearbook of the International Law Commission 148, 149.

Further in Article 7 due diligence involves the duty to assess the risk of activities likely to cause significant transboundary harm. Under Article 8 the State of origin shall notify and provide relevant information to State(s) likely to be affected, if the assessment referred to in article 7 indicates a risk of causing significant transboundary harm.

In connection with the duty of prior State authorization for risk-posing activities, the draft articles illustrate the interrelation between prevention and principle precaution and due diligence.⁵⁷⁷ Thus the Commission under Article 4 refers to the duty to cooperate in 'good faith' and Articles 9 and 10 deal with seeking solutions regarding measures to be adopted in order to prevent significant transboundary harm or to minimize the risk thereof based on an 'equitable balance of interests' in light of the 'precautionary principle' to emphasizing the particular importance of protection of the environment.⁵⁷⁸ In addition to elaborating the duty of due diligence, the articles codify several important overarching principles, some already well-established in international law and some referred to with increasing frequency in international environmental treaties.⁵⁷⁹

According to the IPCC and WHO Reports, it is fairly clear that the impacts of climate change and air pollution will result in significant transboundary damages to the environment, human health, and property.⁵⁸⁰ Hence the articles would be beneficial to protection of the atmosphere and solving atmospheric issues, as in the Case Concerning *Aerial Herbicide Spraying* (Ecuador v Colombia) the draft articles on prevention of transboundary harm was referred to by Ecuador that claimed breach of the no-harm

⁵⁷⁷ Ling Chen, 'Realizing the Precautionary Principle in Due Diligence' (2016) 25 Dalhousie J. Legal Stud. 1, 20, 21.

⁵⁷⁸ Commission, 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries' (n 576).

⁵⁷⁹ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 39.

⁵⁸⁰ See Michael Oppenheimer and others, 'Emergent Risks and Key Vulnerabilities', Climate Change 2014 Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects (Cambridge University Press 2015). Scovronick (n 33). Hans Orru, KL Ebi and Bertil Forsberg, 'The Interplay of Climate Change and Air Pollution on Health' (2017) 4 Current environmental health reports 504.

rule and the obligation of due diligence to prevent significant transboundary harm and regarding the duty to conduct an environmental impact assessment (EIA).⁵⁸¹

The Draft Articles on Prevention have significantly shaped how states, jurists and legal scholars understand the scope of the no-harm rule and its duty of care. The Draft Articles on Prevention have been praised for providing a more precise interpretation of the no-harm rule than other sources and several legal scholars have expressed the opinion that they reflect existing customary international law.⁵⁸² For instance in Ecuador v Colombia Case, Ecuador relied on the ILC draft articles in support of its interpretation of no-harm rule as a customary international law more than other sources.⁵⁸³

3.2.2. International Law Commission draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities.

The impacts of climate change and air pollution are breach of the no-harm rule that make right to compensation for affected States.⁵⁸⁴ It is imperative to develop a liability and redress framework as one of the few effective options to offer compensation to vulnerable people and countries affected by atmospheric degradation such as climate change.⁵⁸⁵

Since 1978, the Commission has been considering the subject of international liability for injurious consequences arising out of acts not prohibited by international law while working on the subject of prevention of significant transboundary harm from hazardous activities.⁵⁸⁶ The Commission in 1998 decided to work on the topic of international

⁵⁸¹ International Court of Justice(ICJ), 'Memorial of Ecuador, Aerial Herbicide Spraying (Ecuador v. Colombia), 28 April 2009' 275 <<https://www.icj-cij.org/public/files/case-related/138/17540.pdf>> accessed 19 April 2020.

⁵⁸² Brent (n 574) 138.

⁵⁸³ Kerry Anne Brent, 'The Certain Activities Case: What Implications for the No-Harm Rule?' (2017) 20 Asia Pacific Journal of Environmental Law 28, 43.

⁵⁸⁴ Birsha Ohdedar, 'Loss and Damage from the Impacts of Climate Change: A Framework for Implementation' (2016) 85 Nordic Journal of International Law 1, 26.

⁵⁸⁵ Philippe Cullet, 'Liability and Redress for Human-Induced Global Warming: Towards an International Regime' (2007) 43 A Stan. J. Int'l L. 99, 121.

⁵⁸⁶ Stephen C McCaffrey, 'The Work of the International Law Commission Relating to Transfrontier Environmental Harm' (1987) 20 NYUJ Int'l L. & Pol. 715, 716. The ILC reached the view that States would not support the idea of creating a form of international legal liability for the consequences of activities that were not themselves prohibited by international law. In the end, progress has been achieved by drafting a scheme based on a 'privatized' approach to risk. Caroline Foster, 'The ILC Draft Principles on the

liability separately; in 2001 approved it and in 2002 resumed its work on the issue of liability with respect to transboundary harm.⁵⁸⁷ However, The ILC draft, like most of the civil liability treaties, proposes a strict liability scheme in national law.⁵⁸⁸ The draft principles do not provide for State liability. Instead, they provide for operator liability on a strict liability basis. The role of the State is to put in place a system of victim compensation through the adoption of national laws or international agreements. The principles attempt to create a framework to guide States with its substantive and procedural provisions.⁵⁸⁹ Thus, in some ways it could be helpful for treating atmospheric damages. As the draft principle ensuring prompt and adequate compensation to natural or legal persons including States that are victims of transboundary damage, including damage to the environment.⁵⁹⁰ The draft principles read as follow:

considering the interrelated nature of the concepts of ‘prevention’ and ‘liability’ the scope of activities included in the draft principles remains the same as in the draft articles. The focus of both draft articles and draft principles is ‘transboundary damages’ with four elements including a) such activities are not prohibited by international law; b) such activities involve a risk of causing significant harm; c) such harm must be transboundary; and d) the transboundary harm must be caused by such activities through their physical consequences.⁵⁹¹

The draft principles have binary purposes: first, to “ensure prompt and adequate compensation to victims of transboundary damage”; and second, to “preserve and protect the environment in the event of transboundary damage, especially with respect to mitigation of damage to the environment and its restoration or reinstatement”.⁵⁹² It

Allocation of Loss in the Case of Transboundary Harm Arising out of Hazardous Activities: Privatizing Risk’ (2005) 14 Rev. Eur. Comp. & Int’l Envtl. L. 265, 265,266.

⁵⁸⁷ See International Law Commission, ‘International Liability in Case of Loss from Transboundary Harm Arising out of Hazardous Activities’ <https://legal.un.org/ilc/guide/9_10.shtml> accessed 20 January 2021.

⁵⁸⁸ Michael G Faure and André Nollkaemper, ‘International Liability as an Instrument to Prevent and Compensate for Climate Change’ (2007) 26 A Stan. Envtl. LJ 123, 150.

⁵⁸⁹ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 40.

⁵⁹⁰ Faure and Nollkaemper (n 588) 150.

⁵⁹¹ Commission, ‘Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising out of Hazardous Activities, with Commentaries, Fifty-Eighth Session, UN Doc A/CN.4/566’ (n 569) 62.

⁵⁹² *ibid* Principle 3, P72.

is significant that the principles recognize the intrinsic value of the environment and prioritize its protection/preservation. In conjunction with the draft articles, they reinforce the principles of equity and sustainable development, and compensation is based on the polluter pays principle.⁵⁹³

Principle 4 is requiring “prompt and adequate compensation” for transboundary environmental damage, the cost-benefit analysis of preventive measures is altered; environmental costs (for example, control and remedial measures) are internalized, giving operators a greater incentive to take preventive measures. At the substantive end is Principle 4, the provision of prompt and adequate compensation for victims of transboundary damage (comprising assignation of liability without proof of fault, specification of minimum conditions, and establishing insurance, bonds or other financial guarantees to cover liability). It should be noted that a threshold of “significant” transboundary harm must be met in order to trigger the application of the regime.

At the procedural end is Principle 6 that the provision of domestic and international procedures for claim settlements comprising non-discriminatory access, availability of effective legal remedies, and access to information. The provisions are neither couched in the language of rights or obligations, nor do they address the issue of non-operator State liability.⁵⁹⁴

In addition, Article 13 deals with the right of access to environmental information to the public about the risk of transboundary harm. The purpose of Article 13 in giving such information to the public is to “ascertain their views”.⁵⁹⁵

3.2.3. International Law Commission draft guidelines on protection of the Atmosphere

The direct work of the ILC on protection of the environment as a core topic is not simply a component started in 2011 with the draft principles on protection of the environment in relation to armed conflict and later in 2014 the Draft Guidelines on Protection of the

⁵⁹³ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 40.

⁵⁹⁴ *ibid.*

⁵⁹⁵ Carrie Noteboom, ‘Addressing the External Effects of Internal Environmental Decisions: Public Access to Environmental Information in the International Law Commission’s Draft Articles on Prevention of Transboundary Harm’ (2003) 12 NYU Envtl. LJ 245, 284.

Atmosphere. Furthermore, the Draft Guidelines on Protection of the Atmosphere marks the first foray of the Commission into the global commons.⁵⁹⁶

3.2.3.1 Selecting the topic of protection of the atmosphere

The ILC has been at a crossroads in selecting the topics. However, it still has a very important role to play, since the ILC's work has started during the last century to shift from the 'traditional' topics to the areas of 'special regimes' such as human right law, environmental law and economic law.⁵⁹⁷

There has been a substantial growth of treaties in each of these special fields, Murase calls this fact as a 'treaty congestion' and 'treaty inflation'. There is a great number of conventions in each field of those special regimes. Notwithstanding, there are significant gaps as well as overlaps because there have been little or no coordination or harmonization, therefore no coherence among them.⁵⁹⁸ This is precisely the pathological phenomenon, which Murase has characterized in his book as fragmentation of International Law.⁵⁹⁹ This is a great opportunity for the ILC to exercise the progressive development and codification of international law since the UNEP has been emphasizing the need to enhance synergies among the existing conventions.⁶⁰⁰

The commission deals with the proposed new topics of special fields from the perspective of general international law in order to fill the gaps or solve the overlaps of existing treaties and to ensure coordination among various compartments of the

⁵⁹⁶ Nilufer Oral, 'The International Law Commission and the Progressive Development and Codification of Principles of International Environmental Law' (2018) 13 FIU L. Rev. 1075, 1081.

⁵⁹⁷ Crawford and others (n 363) 42.

⁵⁹⁸ Murase, 'Protection of the Atmosphere and Codification and Progressive Development of International Law', (n 9).

⁵⁹⁹ See Shinya Murase, *International Law: An Integrative Perspective on Transboundary Issues* (Sophia University Press 2011).

⁶⁰⁰ United Nations Environment Programme, 'Report of the Governing Council, Seventh Special Session, 13-15 February 2002, UNEP/GCSS.VII/6' 11.

international law.⁶⁰¹ According to Murase, the ILC is in fact the only organ that can play such a role and provide a guidance for the sixth committee.⁶⁰²

What is the most important point in this context is to select attractive topics for the work of the commission. The criteria for the selection of ILC topics have been clearly established in the practice of the Commission. First, the ‘practical’ consideration as to whether there is any urgent need in the international community as a whole. Second, the ‘technical’ feasibility of the topic, i.e. whether the topic is ripe enough in light of the relevant state practice and literature. Third the ‘political’ feasibility, i. e. that is during proposed topic might or might not meet strong political resistance from states. And finally, the topic should be concrete and feasible for progressive development and codification.⁶⁰³ Regarding to the selection of new topics, the Commission in its 1997 report stressed that it “should not restrict itself to traditional topics, but could also consider those that reflect new developments in international law and pressing concerns of the international community as a whole”.⁶⁰⁴

The topic of ‘protection of the atmosphere’ met the elements of criteria for the selection of ILC topics. It was practical, as degradation of the atmosphere and atmospheric environmental protection as exemplified by transboundary air pollution, ozone depletion, and climate change have been a matters of serious concern for the international community. Whereas the atmosphere is dynamic and flows across State borders, the atmosphere needs to be treated as a single global unit in a comprehensive manner. The topic was ripe enough due to evidence of State practice including judicial precedents, treaties, and other normative documents.

⁶⁰¹ Crawford and others (n 363) 43.

⁶⁰² Murase, ‘Protection of the Atmosphere and International Law: Rationale for Codification and Progressive Development’ (n 474) 6.

⁶⁰³ Bertrand G Ramcharan, *The International Law Commission: Its Approach to the Codification and Progressive Development of International Law* (Martinus Nijhoff Publishers 1977) 60–63.

⁶⁰⁴ ‘Report of the International Law Commission to UNGA, 49th Session, UN Doc A/52/10, (12 May– 18 July 1997)’ 72 <https://legal.un.org/ilc/documentation/english/reports/a_52_10.pdf> accessed 5 May 2020.

In line with the mandate of the ILC for promotion of the ‘progressive development of international law and its codification’,⁶⁰⁵ in 2009 Professor Shinya Murase proposed the inclusion of “Protection of the Atmosphere” in the long-term ILC work agenda. In 2011, the ILC included the "Protection of the Atmosphere" in its long-term work program, on the basis of the proposal contained in annex B to the report of the Commission.⁶⁰⁶ The proposal envisaged an instrument similar to Part XII of the United Nations Law of the Sea Convention on the Protection and the Preservation of the Marine Environment. According to the Special Rapporteur’s proposal, the ILC’s work is supposed to fill in the gaps of existing treaty regimes, lead to the harmonization with international treaties outside environmental law, as well as the harmonization of national laws, rules and regulations with international standards. He also stated that the objective would be to combine the transboundary and global atmospheric problems while working on identifying the legal status of the atmosphere along the lines of the concepts of common heritage, common property, common concern or common natural resources.⁶⁰⁷

Initial governmental reactions to the proposed new topic in the 2011–2012 sessions of the UNGA were mainly positive. For instance, the Nordic countries welcomed the reconstitution of the Working Group on the Long-term Program of Work and the inclusion of protection of the Atmosphere topic, and also expressed a desire for the Commission to give priority to the topic.⁶⁰⁸ Also the representatives from Canada, China,⁶⁰⁹ Nigeria, Poland, Slovenia,⁶¹⁰ Spain⁶¹¹ representatives expressed their keen interest in the subject. The view was expressed that the “topic of protection of the

⁶⁰⁵ International Law Commission, Statute of the International Law Commission, Adopted at Session II of the United Nations General Assembly through UNGA Resolution 174(II) 1947 Article 1.

⁶⁰⁶ Shinya Murase, ‘Report of the International Law Commission to UNGA, Sixty-Third Session, Supp NO.10, UN Doc A/66/10, (26 April–3 June and 4 July–12 August 2011)’ 315–329.

⁶⁰⁷ *ibid* 317, 318, 321.

⁶⁰⁸ United Nations General Assembly, ‘Sixth Committee, Summary Record of the 18th Meeting, 24 October 2011, UN Doc A/C.6/66/SR.18’ para 30.

⁶⁰⁹ United Nations General Assembly, ‘Sixth Committee, Summary Record of the 19th Meeting, 25 October 2011, UN Doc A/C.6/66/SR.19’.

⁶¹⁰ United Nations General Assembly, ‘Sixth Committee, Summary Record of the 20th Meeting, 26 October 2011, UN Doc A/C.6/66/SR.20’.

⁶¹¹ United Nations General Assembly, ‘Sixth Committee, Summary Record of the 27th Meeting, 2 November 2011, UN Doc A/C.6/66/SR.27’ para 37.

atmosphere addressed a growing global concern” and that an “effort by the Commission to take stock of rules under existing conventions and to elaborate a new legal regime would be commendable”.⁶¹² The Japanese representative expressed a consenting view, going on further to state that the “deteriorating state of the atmosphere made its protection a pressing concern”.⁶¹³ Several delegations expressed their opposition, such as the US representative that stated: “the current structure of law in that area was treaty-based, focused and relatively effective, and in light of the ongoing negotiations designed to address evolving and complex circumstances, it would be preferable not to attempt to codify rules in that area at present”.⁶¹⁴

In addition to the legal debates, the topics such as protection of the atmosphere require certain scientific and technical knowledge. Especially in case of codification and progressive development of International Law. In this regard, some concerns expressed in 2011 Sixth Committee. The France representative was opposed, stating “the Commission taking up the highly technical topic of protection of the atmosphere, many aspects of which lay outside its areas of expertise”.⁶¹⁵ Also, the Netherlands stated “The question of protection of the atmosphere seemed more suited for discussion among specialists”.⁶¹⁶ The Iranian representative hoped that the topic’s “highly technical nature would not render the exercise futile”.⁶¹⁷ In this regard, the Special Rapporteur affirmed it is indispensable for the commission to reach out to the international environmental organizations and to the scientific community for assessment of the technical aspects of the expected protection. The statute of the Commission requires in Article 16E to

⁶¹² Assembly, ‘Sixth Committee, Summary Record of the 19th Meeting, 25 October 2011, UN Doc A/C.6/66/SR.19’ (n 609).

⁶¹³ Assembly, ‘Sixth Committee, Summary Record of the 18th Meeting, 24 October 2011, UN Doc A/C.6/66/SR.18’ (n 608).

⁶¹⁴ Assembly, ‘Sixth Committee, Summary Record of the 20th Meeting, 26 October 2011, UN Doc A/C.6/66/SR.20’ (n 610).

⁶¹⁵ *ibid.*

⁶¹⁶ UNGA, ‘Summary Record, 28th Meeting of the Sixth Committee, 66th Session, UN Doc A/C.6/66/SR.28’ (2011) para 64.

⁶¹⁷ Assembly, ‘Sixth Committee, Summary Record of the 27th Meeting, 2 November 2011, UN Doc A/C.6/66/SR.27’ (n 611).

consult with scientific institutions and individual experts.⁶¹⁸ It has clearly been this approach that has made it possible for the Commission to reach sets of principles, that make sense not only to lawyers but also to the scientific and technical community.⁶¹⁹

Also, the project of protection of the atmosphere had been controversial among a number of ILC members. For instance, Huang Huikang believed: "what protection of the Atmosphere lacked was not regulations, but concrete commitments and substantive action, which depended to a considerable degree on the political will of States".⁶²⁰

Eventually, the ILC after resistance expressed in the Sixth Committee specially by representatives of the permanent members of the security council (p-5) decided to change the nature of its outcome by providing a non-binding 'draft guidelines' under the self-imposed limitations and narrowing down the scope of the project via the 2013 understanding.⁶²¹

Subsequently, on August 9, 2013, in its 65th session, the Commission decided to include the theme of "Protection of the Atmosphere" in its work program, together with an understanding, and the appointment Mr. Shinya Murase as Special Rapporteur.⁶²²

The Commission restricted the scope of the project, by way of an 'understanding' reading as follows:

"(a) Work on the topic will proceed in a manner so as not to interfere with relevant political negotiations, including on climate change, ozone depletion, and long-range transboundary air pollution. The topic will not deal with, but is also without prejudice to, questions such as: liability of States and their

⁶¹⁸ International Law Commission Statute of the International Law Commission, Adopted at Session II of the United Nations General Assembly through UNGA Resolution 174(II) (n 605).

⁶¹⁹ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 11.

⁶²⁰ 'International Law Commission, Provisional Summary Record of the 3249th Meeting, Sixty-Seventh Session (First Part), 12 May 2015, UN Doc A/CN.4/SR.3249' 5.

⁶²¹ Sand (n 331) 202.

⁶²² *ibid* 201, 102.

nationals, the polluter-pays principle, the precautionary principle, common but differentiated responsibilities, and the transfer of funds and technology to developing countries, including intellectual property rights;

(b) The topic will also not deal with specific substances, such as black carbon, tropospheric ozone, and other dual-impact substances, which are the subject of negotiations among States. The project will not seek to “fill” gaps in the treaty regimes;

(c) Questions relating to outer space, including its delimitation, are not part of the topic;

(d) The outcome of the work on the topic will be draft guidelines that do not seek to impose on current treaty regimes, legal rules or legal principles not already contained therein.⁶²³

The 2013 understanding of the Special Rapporteur was faced with different critiques. Some views have argued that the guidelines based on the 2013 understanding do not live up to the mission to promote the progressive development and codification of international law and does not reach a comprehensive regulation to the topic of protection of the atmosphere. According to former ILC member M Kamto, the understanding was not an ‘accord’, but an ‘entente’.⁶²⁴ Since the ILC cannot interfere in substantial and relevant issues for the protection of the atmosphere such as relevant political negotiations related to climate change, the depletion of the ozone layer and long-distance or transboundary air pollution. Another important limitation is that the Commission cannot address the liability of States and their nationals, the “polluter-pays” principle, and the precautionary principle. It neither can address responsibilities

⁶²³ ‘Report of the International Law Commission Sixty-Fifth Session (6 May–7 June and 8 July–9 August 2013), UN Doc A/68/10’ 115.

⁶²⁴ Sand (n 331) 203. Mr. Kamto states referring to the continuing debate on the advisability of the Commission’s addressing the topic, said that although the Sixth Committee had plainly approved of the project, some members of the Commission still appeared to have lingering doubts. An understanding like the one reached in 2013, which should be termed an “entente” and not an “accord” in French, should be the first step towards determining the most appropriate way of addressing a topic. If the Commission subsequently wished to provide the Special Rapporteur with precise guidance on how it wished him to proceed, it could and should do so unambiguously, as it had in the past with regard to other topics such as the expulsion of aliens. ‘International Law Commission, Provisional Summary Record of the 3249th Meeting, Sixty-Seventh Session (First Part), 12 May 2015, UN Doc A/CN.4/SR.3249’ (n 620).

and technology transfer to developing countries, including intellectual property rights, nor can it address specific issues such as black carbon, tropospheric ozone and other dual-impact negotiations between States. It cannot fill gaps in conventional regimes, especially those related to the status of airspace under International Law, nor questions related to outer space, including its delimitation.⁶²⁵

The restrictions imposed to the work of ILC may have different causes. In one hand, it's the Commission itself that is not interested to work on interdisciplinary and multi-disciplinary projects that is required to deal with other branches of science and human activity.⁶²⁶ Therefore, topics such as protection of the atmosphere and its problems with integrated nature could not be managed with a same policy and mechanism. Thus, the targets and timetables that worked for ozone depletion may fizzle negotiations over climate change.⁶²⁷ As one Commission member cautioned, "a one-size-fits-all approach to the topic, which wrongly presupposed that all problems related to the atmosphere were of a similar nature and aimed to develop uniform legal rules to harmonize disparate regimes, was bound to be problematic".⁶²⁸ In other hand as noted above is the serious political resistance by the industrial countries and major world powers specifically P-5 members to keep out ILC's work from their hair. They attempted by manifests and debates in the six committee of general assembly, and also frequent messages through the 'seasoned lawyer- diplomats' who are also commission members with high dominance.⁶²⁹ For instance, the US delegation at the 69th session of the UNGA Sixth Committee cautioned against the risk that the ILC project "would complicate and inhibit on-going and future negotiations on issues of global concern".⁶³⁰ Hence a

⁶²⁵ Borràs (n 441) 108.

⁶²⁶ Sand and Wiener (n 1) 210.

⁶²⁷ GEO UNEP, '5: Global Environmental Outlook—Environment for the Future We Want' 57.

⁶²⁸ Sean D. Murphy, 'UN Doc A/ CN.4/SR.3211, in ILC, Summary Record of the 3211th Meeting, 20 June 2014', 5.

⁶²⁹ Sand (n 331) 205,206.

⁶³⁰ UNGA, 'Summary Record, 24th Meeting of the Sixth Committee, 69th Session, UN Doc A/C.6/69/SR.24' (2014) para 13.

commentator indicated that the ‘understanding’ came out “at the cost of a political compromise that excluded virtually any important issues from the scope of the topic”.⁶³¹

As was seen, there are some critical views to the 2013 understanding by other ILC member countries that argued Special Rapporteur was faced with a “dilemma” and an “untenable position” by Commission, due to inflexibility and constraint under the understanding. They suggested that the Commission reconsider the understanding or agree on a flexible approach to its application.⁶³² Further, according to Plakokefalos, this turn of ILC’s work watered down significantly the initial proposal, “offering a mandate to the Special Rapporteur that provides for very little room to produce a meaningful result”. Plakokefalos has argued that it would have been more plausible for the ILC either not to open the project at all or to return to the original proposal of special rapporteur.⁶³³

Contrary views from other ILC members believed that the Special Rapporteur has to “pursue a modest goal of identifying existing general principles of international environmental law, whether based on customary law or on general principles of law, and to declare their applicability to the protection of the Atmosphere.” They argued it is more surmountable for ILC’s work to not deal with all aspects of protection of the Atmosphere and work on a collegial and collective level while assigning the significant decisions to the political level.⁶³⁴

Furthermore, the applicability of rules of international law is not excluded by the political nature of the matter (such as climate change) which involves a legal question.⁶³⁵

⁶³¹ Benoît Mayer, ‘The Relevance of the No-Harm Principle to Climate Change Law and Politics’ (2016) 19 Asia Pacific Journal of Environmental Law 79, 84.

⁶³² Shinya Murase, ‘Report of the International Law Commission to UNGA, Sixty-Ninth Session, Supp No. 10, UN Doc A/69/10, (5 May–6 June and 7 July–8 August 2014)’ 211.

⁶³³ Llias Plakokefalos, ‘International Law Commission and the Topic “Protection of the Atmosphere”: Anything New on the Table?’ <<http://www.sharesproject.nl/international-law-commission-and-the-topic-protection-of-the-atmosphere-anything-new-on-the-table/>> accessed 28 March 2020.

⁶³⁴ Murase, ‘Report of the International Law Commission to UNGA, Sixty-Ninth Session, Supp No. 10, UN Doc A/69/10, (5 May–6 June and 7 July–8 August 2014)’ (n 632) 221.

⁶³⁵ Benoit Mayer, ‘A Review of the International Law Commission’s Guidelines on the Protection of the Atmosphere’ (2019) 20 Melbourne Journal of International Law 10.

Whereas, the ICJ is adamant that it has “never shied away from a case brought before it merely because it had political implications or because it involved serious elements of the use of force”.⁶³⁶ In particular, “the fact that negotiations are being actively pursued during the ... proceedings before the Court is not, legally, any obstacle to the exercise by the Court of its judicial function”.⁶³⁷ Thus, Mayer argues when the ICJ could decide a dispute related to the protection of the atmosphere, when States have to comply with their obligations under international law, and when domestic courts may also need to interpret international law, the ILC could have a role to play in providing a coherent interpretation of some of the key principles, thus helping organize the debate on the law applicable to the protection of the atmosphere.⁶³⁸

3.2.3.2. Analyzing the reports of the Special Rapporteur

Till today the Special Rapporteur has provided six reports on the topic based on the 2013 understanding.

The first report that was presented by the Special Rapporteur Shinya Murase to the 66th session of the ILC in 2014, which deals with the description of the rationale for the topic and the basic approach taken. It also addresses a discussion of the historical evolution of the protection of the atmosphere in international law. The first report also provides references made to the sources relevant to the progressive development and codification of the law on the topic, together with information on the physical characteristics of the atmosphere, to serve as a basis for defining the atmosphere in legal terms. The report also provides a broad outline of the various elements comprising the general scope of the projects, with a view identifying the main legal questions to be covered. The report expressed that the work with a ‘cautious approach’ would

⁶³⁶ International Court of Justice, ‘Case Concerning Military and Paramilitary Activities in and against Nicaragua, Judgment, Jurisdiction of the Court and Admissibility of Application of 26 Nov 1984’ para 96.

⁶³⁷ International Court of Justice, ‘Aegean Sea Continental Shelf (Greece v. Turkey), 19 December 1978’ para 29.

⁶³⁸ Mayer, ‘A Review of the International Law Commission’s Guidelines on the Protection of the Atmosphere’ (n 635) 10. In this regard Belgium, the Netherlands, and Antigua and Barbuda have the same position. See International Law Commission, ‘Protection of the Atmosphere, Comments and Observations Received from Governments and International Organizations, Seventy-Second Session, UN Doc A/CN.4/735, (27 April–5 June and 6 July–7 August 2020)’ (n 420) 4, 8, 12.

distinguish arguments based on *lex lata* (law as it is) from *lex ferenda* (law as it ought to be).⁶³⁹ This report ends with the discussion of the legal status of the atmosphere.

The second report of the Special Rapporteur, has presented to the 67th session of the ILC in 2015. The report deals with the new set of draft guidelines, incorporating changes made to the original proposals presented in the first report, concerning: definitions, scope, basic principles concerning the protection of the atmosphere, degradation of atmospheric, conditions as a common concern of humankind, general obligation of States to protect the atmosphere, and international cooperation.⁶⁴⁰

The third report of the Special Rapporteur, has been presented in 68th session of the ILC in 2016. The report deals with further consideration of the obligation of States to protect the atmosphere, as initially proposed as draft Guideline 4 in the second report, addressing such issues as the duty to prevent transboundary atmospheric pollution, the duty to mitigate the risk of global atmospheric degradation and the duty to assess environmental impacts. Discussion of obligations of sustainable and equitable utilization of the atmosphere, including legal limits on intentional modification of the atmosphere are also addressed in this report. Further, the report contains proposals for a preambular paragraph and five new draft guidelines.⁶⁴¹

The fourth report was presented to the 69th session of the ILC in 2017. The report comprises consideration of the interrelationship between international law on the protection of the atmosphere and other fields of international law, namely, international trade and investment law (section II), the law of the sea (section III) and international human rights law (section IV). The report provides proposals for draft Guidelines 9 to 12.⁶⁴² The fourth report was not welcomed by ILC members. The report

⁶³⁹ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 9.

⁶⁴⁰ Murase, 'Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)' (n 409).

⁶⁴¹ Shinya Murase, 'Third Report on the Protection of the Atmosphere, International Law Commission, Sixty-Eighth Session, UN Doc A/CN.4/692, (2 May-10 June and 4 July-12 August 2016)'.

⁶⁴² Shinya Murase, 'Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, (1 May-2 June and 3 July-4 August 2017), UN Doc A/CN.4/705'.

was opposed with the ILC's previous study on the fragmentation of international law, and most ILC Members doubted that 'mutual supportiveness' constituted a legal principle. With regard to content of the forth report one of the ILC members, Dire Tladi, said that "he was really not sure whether the issues covered ought to have been covered, at least not as topics in and of themselves", as "the issues of mutual supportiveness and interrelationships would be just as relevant for any topic seeking to address normative or primary rules".⁶⁴³

The fifth report was submitted to the 70th session of the ILC in 2018. The report contains consideration of issues relating to implementation (section II), compliance (section III) and dispute settlement (section IV). The report provides proposals for draft Guidelines 10 to 12.⁶⁴⁴

And finally, the sixth report of the Special Rapporteur, has been submitted to 72nd session of the ILC in 2020. The report contains consideration of comments and observations on the draft preamble and guidelines, as adopted on first reading, received from governments and international organizations, together with proposals for consideration at second reading as well as for the recommendation to the General Assembly.⁶⁴⁵

The content of the six reports of the Special Rapporteur could be considered as a substantial material in further codifications of the corresponding draft convention by ILC. The main substantive contents of the reports will be analyzed in different chapter of the thesis based on the material categorization that has been made.

Despite the importance of the work of the Special Rapporteur, and the potential contribution to the codification of protection of the atmosphere, it is distinct from the

⁶⁴³ International Law Commission, 'Protection of the Atmosphere, Provisional Summary Record of the 3355th meeting, Sixty-Ninth Session (First Part), 10 May 2017, UN Doc A/CN.4/SR.3355' 5.

⁶⁴⁴ Shinya Murase, 'Fifth Report on the Protection of the Atmosphere, International Law Commission, Seventieth Session, UN Doc A/CN.4/711, (New York, 30 April–1 June 2018; Geneva, 2 July–10 August 2018)'.

⁶⁴⁵ Shinya Murase, 'Sixth Report on the Protection of the Atmosphere, International Law Commission, Seventy-Second Session, UN Doc A/CN.4/736, (27 April–5 June and 6 July–7 August 2020)'.

original proposal, as formulated in the 2011 syllabus, which aimed at ‘draft articles’ for a new framework convention on the protection of the Atmosphere, on the lines of part XII (protection and preservation of the marine environment) of the United Nations Convention on the Law of the Sea.⁶⁴⁶

3.2.3.3. Examining the draft preamble and guidelines

The critical and important sentence about the scope of commission’s mandate in the preambular paragraph of the understanding is “the project will not seek to ‘fill’ gaps in treaty regimes”.⁶⁴⁷ Also the preambular paragraph states the draft guidelines “are not to interfere with relevant political negotiations, including those on climate change, ozone depletion, and long- range transboundary air pollution”.

Historically the mandate of the ILC and the concepts of development of international law and codification are ambiguous by both UN Charter and international law commission. In Article 13, paragraph 1 of the UN Charter stated that “the General Assembly shall initiate studies and make recommendations for the purpose of: ...encouraging the progressive development of international law and its codification”, according to some debates and interpretation, the scope of mandate of the ILC is a gradual process on the development of international law and its codification.⁶⁴⁸ Moreover, the Statute of the International Law Commission explicated in Article 15 that “progressive development of international law” is used for convenience as meaning the preparation of draft conventions on subjects which have not yet been regulated by international law or in regard to which the law has not yet been sufficiently developed in the practice of States. Similarly, the expression “codification of international law” is used for convenience as meaning the more precise

⁶⁴⁶ Shinya Murase, ‘Report of the International Law Commission to UNGA, Sixty-Third Session, Supp No. 10, UN Doc A/66/10, (26 April–3 June and 4 July–12 August 2011)’ 317.

⁶⁴⁷ ‘Report of the International Law Commission to UNGA, 67th Session, UN Doc A/70/10, (4 May–5 June and 6 July–7 August 2015)’ 23.

⁶⁴⁸ Pavel Šturma, ‘The International Law Commission Between Codification, Progressive Development, or a Search for a New Role’ (2019) 13 FIU Law Review 1126.

formulation and systematization of rules of international law in fields where there has already been extensive state practice, precedent and doctrine.⁶⁴⁹

The current works of the ILC are not necessarily drafts of conventions. On one hand, the Commission more and more often selects new topics as most parts of general international law have been already codified- which bear on progressive development of international law or even differ from both codification and progressive development such as studies and interpretative guides. On the other hand, today, States seem to be less interested in binding treaties, in particular the general codification conventions elaborated by the expert body, such as the ILC, instead of inter-governmental negotiations.⁶⁵⁰ Similarly, about the Atmosphere topic, there is an uncertainty in ILC's work and task. The Special Rapporteur with a "middle -ground approach" intended to identify the gaps in treaties through the reports, although those will not be used in the draft guidelines and just be regarded as comments.⁶⁵¹ However, it was presumed by outspoken opponents to the project as violations of the 'Understanding' and potential interferences with international negotiations on climate change and UNFCCC.⁶⁵² For instance, Mr. Park was uncertain as to whether the approach taken by the Special Rapporteur corresponded to the Commission's understanding or has strayed from that structure in paragraphs 10 and 12 of the report and subparagraph (c) of draft guideline 1, which specifically mentioned ozone depletion and climate change as examples of atmospheric degradation despite the fact they were among the topics of the political negotiations excluded from the scope of the project under the Commission's 2013 understanding.⁶⁵³ This cautious view of some ILC members has been avoiding to achieve a 'progressive development' of international law on the topic.

⁶⁴⁹ International Law Commission Statute of the International Law Commission, Adopted at Session II of the United Nations General Assembly through UNGA Resolution 174(II) (n 605).

⁶⁵⁰ Šturma (n 648) 1127.

⁶⁵¹ 'International Law Commission, Summary Record of the 3214th Meeting, 14 July 2014, UN Doc A/CN.4/3214' 3.

⁶⁵² Benoit Mayer, 'A Review of the International Law Commission's Guidelines on the Protection of the Atmosphere' 1, 11.

⁶⁵³ International Law Commission, 'Provisional Summary Record of the 3244th Meeting, 67th Sess, 1st Pt, UN Doc A/CN.4/SR.3244 (Held 4 May 2015)' 6.

The draft guideline 1 (b) has defined 'air pollution' as: "the introduction or release by humans, directly or indirectly, into the Atmosphere of substances contributing to deleterious effects extending beyond the State of origin of such a nature as to endanger human life and health and the Earth's natural environment", while in other documents such as UNCLOS and LRTAP Convention air pollution defined as the introduction of 'substances of energy'.⁶⁵⁴ The word energy eliminated after discussions on its necessity to the definition of air pollution, some ILC members at sixty-six session argued the term 'energy' to be eliminated as its related to radioactive and nuclear emissions, the Special Rapporteur declared the importance and necessity of including the term energy considering the serious problem of nuclear emissions such as the 2011 Fukushima nuclear disaster.⁶⁵⁵ Although the Commentary mentioned that, for the purposes of the draft guidelines, the word 'substances' includes 'energy', and also clarified that 'energy' is understood to include heat, light, noise and radioactivity introduced and released into the atmosphere through human activities.⁶⁵⁶

As noted above, another shortcoming in the work of Commission is the exclusion of all States' liability issues. The commission in the scope of the draft Guideline 2 in paragraph 1 stated "The present draft guidelines do not deal with, but are without prejudice to, questions concerning the polluter-pays-principle, the precautionary principle, common but differentiated responsibilities, the liability of States and their nationals, and the transfer of funds and technology to developing countries, including intellectual property rights"⁶⁵⁷ This elimination is an approved on the injustice caused in terms of the existing constraints on attribution of climate liability.⁶⁵⁸ This shortage had happened before in

⁶⁵⁴ Mayer, 'A Review of the International Law Commission's Guidelines on the Protection of the Atmosphere' (n 652) 18.

⁶⁵⁵ Murase, 'Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)' (n 409) 9. For tracing the changes of CO₂ emissions and human health impacts in Japan and Germany after 2011 Fukushima accident due to major cuts in nuclear power see Pushker A Kharecha and Makiko Sato, 'Implications of Energy and CO₂ Emission Changes in Japan and Germany after the Fukushima Accident' (2019) 132 Energy Policy 647.

⁶⁵⁶ Shinya Murase, 'Report of the International Law Commission to UNGA, Seventieth Session, Supp No. 10, UN Doc A/73/10, (30 April-1 June and 2 July-10 August 2018)' 171.

⁶⁵⁷ 'Report of the International Law Commission to UNGA, 67th Session, UN Doc A/70/10, (4 May-5 June and 6 July-7 August 2015)' (n 647) 16.

⁶⁵⁸ Borràs (n 441) 109.

the 1979 LRTAP Convention upon request of the United Kingdom due to rapid reach to the 1970s treaties at the time.⁶⁵⁹ However it is not certainly necessary and reasoning to apply this pragmatic approach for the work of ILC in drafting and global guidelines.⁶⁶⁰

Moreover, paragraph 3 excluded the specific substances, such as black carbon, tropospheric ozone, and other dual-impact substances from the scope of the guidelines.⁶⁶¹ It seems irrational to eliminate these substances from global legal analysis, whereas ground level ozone and black carbon are considered short-lived climate pollutants (SLCPs) that greatly contribute to climate change.⁶⁶²

Tropospheric ozone and black carbon both have health impacts, for instance fine particulate matter such as soot from diesel engines, domestic combustion sources and agricultural biomass burning were responsible for 3.5 million premature deaths annually in 2017 and ranked a top ten overall risk factor for global premature mortality.⁶⁶³ Also exposure to ground level ozone is responsible for approximately 150,000 deaths annually from respiratory conditions.⁶⁶⁴ Regarding importance of SLCPs, the Climate and Clean Air Coalition (CCAC) established in 2012 as an action-oriented, flexible and multi stakeholder partnership, aimed to catalyze rapid reductions in short-lived climate pollutants to protect human health, agriculture and climate benefits.⁶⁶⁵ In fact, the

⁶⁵⁹ Sand (n 331) 206.

⁶⁶⁰ Sand and Wiener (n 1) 213.

⁶⁶¹ 'Report of the International Law Commission to UNGA, 67th Session, UN Doc A/70/10, (4 May–5 June and 6 July–7 August 2015)' (n 647) 16.

⁶⁶² Black carbon is one of the largest contributors to global warming and decreasing agricultural yield and accelerate glacier melting, also is the major component of fine particulate matter (PM_{2.5}). See 'Ambient Air Pollution: Health Impacts' <<https://www.who.int/airpollution/ambient/health-impacts/en/>> accessed 11 May 2020.

⁶⁶³ Susan Anenberg and others, 'A Global Snapshot of the Air Pollution-Related Health Impacts of Transportation Sector Emissions in 2010 and 2015' [2019] International Council on Clean Transportation 55.

⁶⁶⁴ Scovronick (n 33).

⁶⁶⁵ 'The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants, (CCAC)' <<https://ccacoalition.org/en>> accessed 11 May 2020.

Commission reduced the definition of the atmospheric pollution to gaseous emissions.⁶⁶⁶

The Special Rapporteur in his first report applied the term 'common concern of humankind' in preambular paragraph and draft guideline 3 on legal status of the Atmosphere, also suggested it could be used as enforceable *erga omnes* to protect the global Atmosphere by all States.⁶⁶⁷ Despite the recognition of the climate change as a common concern of mankind by the UN General Assembly in 1988, the term was faced strong resistance in ILC and sixth committee, however, the term and concept of common concern have been identified in the United Nation Framework on Climate Change in 1992, and the Convention on Biological Diversity in 1993. Some opponents argued that the concept was vague and controversial, its content was not only difficult to define but also variously interpreted.⁶⁶⁸ Moreover, the Minamata Convention on Mercury in 2013 and the 2015 Paris Agreement cited the term common concern. Nonetheless the Special Rapporteur in 2015 was forced to eliminate the term of common concern of humankind in draft Guideline 3, and use the phrase 'pressing concern of the international community as a whole' in the preambular paragraph.⁶⁶⁹

Some ILC members believed Special Rapporteur used the term 'common concern' without clarifying and considering its consequences. They questioned implications of the term: whether "is there a legal responsibility to prevent damage?; does that legal responsibility devolve to all States; does it create *erga omnes* obligations and would the responsibility of States be engaged thereby?; does it create obligations on society as

⁶⁶⁶ Sand and Wiener (n 1) 214.

⁶⁶⁷ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) para 89.

⁶⁶⁸ International Law Commission, 'Topical Summary of the Discussion Held in the Sixth Committee of the General Assembly, Sixty-Ninth Session, UN Doc A/CN.4/678, 4 May-5 June and 6 July-7 August 2015' 12. For different interpretation of the term common concern of humankind see Biermann, '„Common Concern of Humankind“: The Emergence of a New Concept of International Environmental Law' (n 456) 462. Boyle, 'International Law and the Protection of the Global Atmosphere: Concepts, Categories and Principles' (n 481) 11–13. Ved Nanda and George Rock Pring, *International Environmental Law and Policy for the 21st Century* (Martinus Nijhoff Publishers 2012) 39. Sands and others (n 336) 245–46.

⁶⁶⁹ Mayer, 'A Review of the International Law Commission's Guidelines on the Protection of the Atmosphere' (n 635) 17,18.

a whole and on each individual member of the community?; does it establish standing to sue, including an *actio popularis*?; does it create a duty of international environmental solidarity?; is the draft guideline not inadvertently diminishing the relevance of the *sic utere* principle?"⁶⁷⁰ In response to the considerations of draft Guideline 3 the Special Rapporteur confirmed that "it was not the atmosphere but rather the protection of the atmosphere that was a common concern. Its scope was intended to be narrow, applied to establish a cooperative framework for atmospheric protection and not to establish common ownership or management of the Atmosphere. It created substantive obligations of environmental protection, in addition to those already recognized by customary international law". He confirmed a close linkage between '*erga omnes*' obligations, and their enforcement, and the notion of 'common concern', whose aspects, including the related concept of '*actio popularis*' needs more survey.⁶⁷¹

The opponents of the term believed that including this concept in draft guideline could be recognized as the protection of the atmosphere as an international obligation by all States, which will cause possible complications, as the representative from France argued, "protection of the environment would be an *erga omnes* obligation, incumbent on all States, and could thus serve as a basis for international contentious proceedings, which would be unacceptable".⁶⁷² In contrast, some other believe that recognizing the protection of the atmosphere as a common concern of humankind and existence of *erga omnes* obligations to protect the atmosphere do not necessarily provide feasibility of *actio popularis*, as some ILC members feared, an unlimited right of any State to invoke the responsibility of any other State.⁶⁷³

⁶⁷⁰ Murase, 'Report of the International Law Commission to UNGA, Sixty-Ninth Session, Supp No. 10, UN Doc A/69/10, (5 May–6 June and 7 July–8 August 2014)' (n 632) 225.

⁶⁷¹ *ibid* 228.

⁶⁷² UNGA, 'Summary Record, 22th Meeting of the Sixth Committee, 69th Session, UN Doc A/C.6/69/SR.22, (29 October 2014)' para 35.

⁶⁷³ Mayer, 'A Review of the International Law Commission's Guidelines on the Protection of the Atmosphere' (n 635) 19–20.

In this regard the Austrian representative presumed “the rights and obligations of States in relation to the protection of the atmosphere should perhaps be determined before defining the legal status of the atmosphere”.⁶⁷⁴

However, other proponents thought the notion common concern of humankind was well established in relation to climate change and the Commission had to use the opportunity of the second reading of the draft guidelines to reincorporate this term.⁶⁷⁵

For instance, some scholars argue that protection of the atmosphere is common concern of humankind and should be reinstatement to the work of ILC on the atmosphere. Since treaty law recognized climate change and atmospheric degradation as a common concern (UNFCCC and Gothenburg Protocol), and two other key features that the international community would have to categorize the atmosphere as an issue of common concern: “first, atmospheric degradation endangers both humanity and the global environment. Second, action at a global scale is indispensable to addressing the issue in a manner that can reverse the damage, prevent further deterioration, and create adequate atmospheric conditions for all”.⁶⁷⁶

In addition, this is considerable that the ILC with a State-consent-oriented approach following the resistance of some members of the Commission removed the term ‘common concern of humankind’. This experience within the ILC is representative of certain difficulties concerning the articulation and promotion of collective interests within the structures and rules which prevail in international organizations.⁶⁷⁷

⁶⁷⁴ UNGA, ‘Summary Record, 22th Meeting of the Sixth Committee, 69th Session, UN Doc A/C.6/69/SR.22, (29 October 2014)’ (n 672) para 21.

⁶⁷⁵ Mayer, ‘A Review of the International Law Commission’s Guidelines on the Protection of the Atmosphere’ (n 635) 19.

⁶⁷⁶ Nadia Sanchez Castillo-Winckels, ‘Why “Common Concern of Humankind” Should Return to the Work of the International Law Commission on the Atmosphere’ (2017) 29 *Georgetown International Environmental Law Review* 131, 149, 150.

⁶⁷⁷ Georg Nolte, ‘The International Law Commission and Community Interests’ 17.

Anyhow once again the Special Rapporteur has suggested the term ‘common concern of humankind’ in his sixth report in 2020 regardless of all opposition.⁶⁷⁸ It remains to be seen whether the Commission will reconsider its decision in the light of the Paris Agreement on Climate Change and using the term in the second reading of the work.

Chapter 4. Protection of the Atmosphere in Light of Customary International Law

Along with treaty law, customary international law is considered one of the two principal sources of international law.⁶⁷⁹ The term customary international law concerns, “on the one hand, the process through which certain rules of international law are formed, and, on the other, the rules formed through such a process.”⁶⁸⁰ Customary international law is binding for the international community as a whole, it is beyond states treaty-law formulations with binding authority over each and every state in the absence of any written legal commitment by them.⁶⁸¹

As mentioned in the introduction of the thesis, comparing to the marine and nuclear pollution standards and liabilities, air pollution, and generally protection of the atmosphere is less well regulated by treaty and in the absence of negotiated agreements is, for good or for ill, more apt to be subject to the general principles of international law as noted in Article 38 (1)(C) of ICJ Statute.⁶⁸² In the words of the Special Rapporteur, the jurisprudence of international courts and tribunals is no doubt an important source

⁶⁷⁸ Murase, ‘Sixth Report on the Protection of the Atmosphere, International Law Commission, Seventy-Second Session, UN Doc A/CN.4/736, (27 April–5 June and 6 July–7 August 2020)’ (n 645) 38.

⁶⁷⁹ International Law Association, ‘International Law Association, London Conference (2000): Formation of General Customary International’ [2000] International Law Association 1, 2.

⁶⁸⁰ Tullio Treves, ‘Customary International Law’ Max Planck Encyclopedias of International Law [MPIL] 1.

⁶⁸¹ Louis J Kotzé and Wendy Muzangaza, ‘Constitutional International Environmental Law for the Anthropocene?’ (2018) 27 Review of European, Comparative & International Environmental Law 278, 285.

⁶⁸² Catherine Redgwell, ‘Transboundary Pollution: Principles, Policy and Practice’, Transboundary Pollution (Edward Elgar Publishing 2015) 35.

for determining the customary law status of the rules and principles relating to the protection of the atmosphere.⁶⁸³

Despite its substantial importance, the notion of customary international law, there are inherent serious difficulties in setting out the customary international law, for a number of reasons. Customary law is by its very nature the result of an informal process of rule-creation, so that the degree of precision found in more formal processes of law-making is not to be expected here. Moreover, some of the issues concerned touch on controversial questions of deep legal theory and ideology. As example, those who regard State sovereignty and sovereign will as the very roots of international law are more inclined to look for consent (manifest or imputed) in the customary process than those who take a less State-centered standpoint.⁶⁸⁴

This chapter first addresses the role of customary international law in setting environmental rules in general and particularly in providing the legal grounds for protection of the atmosphere. Second, some corresponding recognized general principles of the protection of the atmosphere will be described and their contribution to the progressive development of international law on protection of the atmosphere will be discussed.

4.1. A Preamble to the Role of Customary International Environmental Law

In order to identify the established and emerging rules of customary international law, different views exist regarding the necessity of ascertaining States practice and *opinio juris* in traditional and modern understanding of customary international law. Some traditional scholars with an inductive approach believed that the constituent element of customary international law is only State practice and could be passed over the element

⁶⁸³ See *North Sea Continental Shelf, Judgment, ICJ Reports 1969, p 3* [69–71]; Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 35.

⁶⁸⁴ International Law Association (n 679) 2. International Law Association, 'International Law Association, London Conference

of *opinio juris*.⁶⁸⁵ On the contrary, the modern doctrine with an interpretative approach has recognized customary law by de-emphasizing the State practice and acceptance of a wide range of states' behavior (including those reflected in resolutions of international organizations) and reliance on the element of *opinio juris*. This view mostly aimed to expand the set of customary international law norms.⁶⁸⁶ In fact, based on the interpretative approach, the element of State practice found a formality or auxiliary function in determining or the emergence of customary international law norms. Even the ICJ that defined customary law as consisting of state practice and *opinio juris* in substance only examined *opinio juris*.⁶⁸⁷ In this regard, in the field of human rights certain obligations are recognized as customary International Law norms including the prohibition of genocide, slavery, torture and other cruel, inhumane or degrading treatment or punishment, prolonged arbitrary detention, and systematic racial discrimination.⁶⁸⁸ In line with the modern legal doctrine Koskenniemi concludes that "the interpretation of "State behavior" or "State will" is not an automatic operation but involves the choice and use of conceptual matrices that are controversial", thus it is impossible to justify human rights by the positivist discourse. He argues:

"But it is also, and more fundamentally, useless because we do not wish to condone anything that states may do or say, and because it is really our certainty that genocide or torture is illegal that allows us to understand state behavior and to accept or reject its legal message, not state behavior itself that allows us to understand that these practices are prohibited by law. It seems to me that if we are uncertain of the latter fact, then there is really little in this world we can feel confident about."⁶⁸⁹

Other scholars, like Petersen, argued that States consensus (reflected in documents such as the U.N. Resolutions on Outer Space), expresses the compliance (the beliefs of

⁶⁸⁵ Niels Petersen, 'Customary Law without Custom-Rules, Principles, and the Role of State Practice in International Norm Creation' (2007) 23 Am. U. Int'l L. Rev. 275, 278.

⁶⁸⁶ Bhupinder S Chimni, 'Customary International Law: A Third World Perspective' (2018) 112 American Journal of International Law 1, 3; See: Roozbeh Rudy B Baker, 'Customary International Law: A Reconceptualization' (2016) 41 Brooklyn Journal of International Law 1.

⁶⁸⁷ Petersen (n 685) 280.

⁶⁸⁸ Daniel T Murphy, 'The Restatement (Third)'s Human Rights Provisions: Nothing New, But Very Welcome', Int'l L. (HeinOnline 1990) 922.

⁶⁸⁹ Martti Koskenniemi, 'The Pull of the Mainstream' (1990) 88 Michigan Law Review 1946, 1952.

states and not only their public statements) and certain declarations of the UN General Assembly (such as the Universal Declaration of Human Rights) would be considered as State practice especially for the establishment of fundamental moral principles.⁶⁹⁰ However, Robert Jennings with a critical view of the modern doctrine of customary international law states what they determine as customary international law norms as: “is not only not customary law: it does not even faintly resemble a customary law.”⁶⁹¹ Generally understood neither *opinio* without practice nor mere custom without *opinio* qualify as customary law. Though, it is not always easy to categorize material as evidence of *opinio juris* or state practice. Sometimes, the same source such as domestic legislation is double counted as evidence of both *opinio juris* and State practice. Thus, the assessment of evidence regarding the customary nature of a rule must be done on a case-by-case basis.⁶⁹²

The ILC in its draft conclusions on identification of customary international law illustrates that some important fields of international law are still governed essentially by customary international law, with few if any applicable treaties. Even where there is a treaty in force, the rules of customary international law continue to govern questions not regulated by the treaty and continue to apply in relation with and among non-parties to the treaty. In the ILC words, the indispensable requirement for the identification of a rule of customary international law is that both a general practice and acceptance of such practice as law (*opinio juris*) be ascertained. As the requirements of practice, the ILC illustrates that, the requirement of a general practice, as a constituent element of customary international law, refers primarily to the practice of States that contributes to the formation, or expression of rules of customary international law. In certain cases,

⁶⁹⁰ Petersen (n 685) 280–282; Bin Cheng, ‘United Nations Resolutions on Outer Space: “Instant” International Customary Law?’ (1965) 5 *Indian Journal of International Law* 23; Bin Cheng, ‘On the Nature and Sources of International Law’ [1982] *International Law: Teaching and Practice* 203; Andrew T Guzman, ‘Saving Customary International Law’ (2005) 27 *Mich. J. Int’l L.* 115; Louis B Sohn, ‘The Human Rights Law of the Charter’ (1977) 12 *Tex. Int’l LJ* 129.

⁶⁹¹ Robert Y Jennings, ‘The Identification of International Law’ in Bin Cheng (ed), *INTERNATIONAL LAW, TEACHING, AND PRACTICE* (Stevens 1982) 5.

⁶⁹² Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 35.

the practice of international organizations also contributes to the formation, or expression, of rules of customary international law.⁶⁹³

From what discussed, disregarding the theoretical debate over the notion and criteria of the customary rules it could be concluded that as far as principles are derived from legal relations or municipal law, these principles are transported to the international level by finding acceptance in the jurisprudence of international courts or tribunals or by being referred to in resolutions of international organizations or policy statements of international conferences, such as world summits, for example. This equally establishes them as independent principles and as a source of international law. With respect to principles derived from international relations and in particular from international agreements, only their establishment as independent principles are required.⁶⁹⁴

4.2. Customary Rules and the Protection of the Atmosphere

As discussed, the word ‘principle’ in general is described as: a binding legal statement which describes obligations of conduct or obligations to achieve an objective. In the words of the Special Rapporteur, Shinya Murase, the main principles on protection of the atmosphere which are considered as customary international law included: the common concern of humankind, the general obligations of States, international cooperation, *sic utere tuo ut alienum non laedas*, sustainable development, equity, prevention and precaution.⁶⁹⁵

The creation of customary rules in certain novel issues like the environment and human rights have been at least partly influenced by the existence of international organizations, conferences and treaties, and they have tended to develop more rapidly than was the case in the past. This is not to say that the fundamentals of customary law-

⁶⁹³ International Law Commission, Draft conclusions on identification of customary international law, with commentaries, UN Doc A/73/10 2018 126–130.

⁶⁹⁴ Rüdiger Wolfrum, ‘General International Law (Principles, Rules and Standards)’, Max Planck Encyclopedia of Public International Law, Bd. 4 (Oxford University Press 2012) para 55.

⁶⁹⁵ Murase, ‘Second Report on the Protection of the Atmosphere, International Law Commission, Sixty-Seventh Session, UN Doc A/CN.4/681, (4 May-5 June and 6 July-7 August 2015)’ (n 409) 16.

creation have been entirely overturned: but it is desirable to be aware of the changes and to take them into account as appropriate.⁶⁹⁶

Not directly linked to the protection of the atmosphere but in a relatively similar issue, the ICJ in its decision on certain activities carried out by Nicaragua in the Border Area (*Costa Rica v. Nicaragua*) of 2015 states:

“To fulfil its obligation to exercise due diligence in preventing significant trans-boundary environmental harm, a State must, before embarking on an activity having the potential adversely to affect the environment of another State, ascertain if there is a risk of significant transboundary harm, which would trigger the requirement to carry out an environmental impact assessment [...] If the environmental impact assessment confirms that there is a risk of significant transboundary harm, the State planning to undertake the activity is required, in conformity with its due diligence obligation, to notify and consult in good faith with the potentially affected State, where that is necessary to determine the appropriate measures to prevent or mitigate that risk”.⁶⁹⁷

This paragraph of the decision is particularly useful because at the same time: i) it identifies the norms to which the customary rule is recognized (the requirement of due diligence broadly as well as within the framework of the principle of prevention, and their procedural expressions, to know the obligation to cooperate in good faith, in particular through notification and consultation, and the requirement to carry out a prior environmental impact assessment), and ii) refers to the jurisprudential precedents in which the customary basis has been recognized previously, in particular the decision of the ICJ in the case of the *Paper mills* on the Uruguay River, between Argentina and Uruguay⁶⁹⁸, a decision that, in turn, refers to various previous decisions, proof of the roots of the standards identified. In addition to the reads of this case, the application of customary norms of environmental protection was affirmed in several other decisions and advisory opinions of the International Tribunal for the Law of the Sea (ITLOS) and

⁶⁹⁶ International Law Association (n 679) 3.

⁶⁹⁷ *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v Nicaragua)*, dissenting opinion of Judge ad hoc Dugard.

⁶⁹⁸ International Court of Justice, ‘Pulp Mills on the River Uruguay (Arg. v. Uru.)’, GL No. 135 ,2010 I.C.J. (Apr. 20)’ (2010) <<https://www.icj-cij.org/en/case/135/judgments>> accessed 22 March 2018.

arbitration decisions⁶⁹⁹ despite the fact that the title and sovereign rights over certain maritime spaces were disputed.⁷⁰⁰

4.2.1. Prevention Principle

The duty to prevent significant transboundary pollution, perhaps could be considered as the courts' most important substantive contribution to international environmental law. The duty to prevent was first articulated in the *Trail Smelter* arbitration, which observed that 'no state has the right to use or permit the use of its territory in such a manner as to cause injury ... in or to the territory of another or the properties or persons therein, when the case is of serious consequence'.⁷⁰¹ It was broadened to encompass pollution of the global commons in Principle 21 of the 1972 Stockholm Declaration on the Human Environment⁷⁰² and Principle 2 of the 1992 Rio Declaration on Environment and Development, which provides:

"States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction".⁷⁰³

⁶⁹⁹ See Responsibilities and obligations of States sponsoring persons and entities with respect to activities in the Area, Advisory Opinion of 1 February 2011, ITLOS Case No. 17, par. 131-135 (where it is stated that the precautionary principle can be considered as an expression of the obligation of due diligence and its independent customary character is even suggested), and para. 145 (customary nature of the obligation to carry out a prior environmental impact assessment, even beyond a transboundary context).

⁷⁰⁰ Jorge E Viñuales, 'La Protección Ambiental En El Derecho Consuetudinario Internacional' (2017) 69 *Revista Española de Derecho Internacional* 71, 73–74.

⁷⁰¹ See *Trail Smelter case (United States of America v. Canada)*, *United Nations publication, Sales No. 1949.V.2* (n 330).

⁷⁰² Assembly, 'United Nations Conference on the Human Environment (Stockholm Declaration), A/RES/2994, 15 December 1972' (n 328).

⁷⁰³ United Nations, '1992 Rio Declaration on Environment and Development, UN Doc. A/CONF.151/26 (Vol. I), 31 ILM 874 (1992), 14/06/1992' (n 329).

The preventive principle has been referred to by the ICJ several cases including, *Corfu Channel*, the *Nuclear Tests* case, the *Nuclear Weapons Advisory Opinion*, *Pulp Mills*, and *Costa Rica v. Nicaragua*.⁷⁰⁴

In the ICJ jurisprudence on the duty to prevent, the Court was initially unclear as to the source of the duty, characterizing it as part of the 'corpus of international law' without specifying whether it is a treaty rule, custom, or a general principle. But the Court subsequently clarified in *Pulp Mills* that it regarded the duty to prevent as a 'customary rule' although it cited no state practice or *opinio juris* in support of this conclusion.⁷⁰⁵ The duty to prevent could be defined as one of the well-established customary principles of environmental law.⁷⁰⁶

4.2.2. Precautionary Principle

The precautionary principle has been included in a number of multilateral environmental agreements. For example, the Vienna Convention for the Protection of the Ozone Layer⁷⁰⁷ and the Montreal Protocol⁷⁰⁸ refer to the precautionary principle in their preambles. Principle 15 of the Rio Declaration provides for the precautionary principle, which states that the lack of scientific certainty regarding an identified environmental risk must not be a reason to postpone action that could prevent environmental harm. It is essentially a principle for inducing States to foresee and avoid or minimize environmental risks. The precautionary principle also could help in

⁷⁰⁴ Daniel Bodansky, 'The Role and Limits of the International Court of Justice in International Environmental Law' [2020] *The Cambridge Companion to the International Court of Justice*, Carlos Esposito and Kate Partlett, eds. (Cambridge University Press, Forthcoming) 5–6.

⁷⁰⁵ *ibid* 7.

⁷⁰⁶ See Andri G Wibisana, *Three Principles of Environmental Law: The Polluter-Pays Principle, the Principle of Prevention, and the Precautionary Principle* (Edward Elgar: Northampton, UK 2006); Gayathri D Naik, 'Leslie-Anne Duvic-Paoli, The Prevention Principle in International Environmental Law' [2020] *Yearbook of International Environmental Law*.

⁷⁰⁷ United Nations, 'Vienna Convention for the Protection of the Ozone Layer (Adopted 22 March 1985) 1513 UNTS 293'.

⁷⁰⁸ United Nations, 'The Montreal Protocol on Substances That Deplete the Ozone Layer, 16 September 1987'.

identifying the general standards for due diligence and the appropriate standard of care required for preventing transboundary harm.⁷⁰⁹

There are several definitions of the concept of precaution (some argue as many as nineteen different ones) and many of these are incompatible with each other. At the unexceptionable end of the spectrum precaution is nothing more than a reflection of the age old-adage "better safe than sorry" it would suggest that "a lack of decisive evidence of harm should not be a ground for refusing to regulate."⁷¹⁰ Considering the precautionary principle as a customary rule has been subject of disputes. In the Southern Bluefin Tuna⁷¹¹ case the International Tribunal for the Law of the Sea believed that lack of scientific certainty should not be used to delay the conservation of the stock of southern Bluefin tuna. The Tribunal did, however, not clarify if the precautionary principle could be considered binding international customary rule. It is unlikely at this stage that the precautionary principle could be seen to have achieved customary rule status, and the predominant view is that it is at best an 'emerging rule of customary international environmental law'.⁷¹² In contrast to the duty to prevent and the duty to undertake environmental impact assessments, the Court has not opined about whether the precautionary principle is part of general international law, as opposed to specific treaties.⁷¹³

With regards to the measures of prevention and precaution to protect the Atmosphere, one of the outstanding issues will be differentiation and relationship between traditional preventive principle and relatively new precautionary principle. Preventive measures should be taken where probably damage is foreseeable with clear cause of links and proof. Whereas in contrast precautionary measures all to be taken even damages are scientifically uncertain and environmental impact assessment will be

⁷⁰⁹ Kotzé and Muzangaza (n 681) 287.

⁷¹⁰ INTERNATIONAL LAW ASSOCIATION, 'Legal Principles Relating to Climate Change, 74 Rep. Conf. 346' 373,374.

⁷¹¹ ARBITRAL AWARDS, Southern Bluefin Tuna Case between Australia and Japan and between New Zealand and Japan, Award on Jurisdiction and Admissibility 2000.

⁷¹² Kotzé and Muzangaza (n 681) 287.

⁷¹³ Bodansky, 'The Role and Limits of the International Court of Justice in International Environmental Law' (n 704) 11.

crucial in certain situation. Implementation of the prescribed obligations should be carried out through the domestic law of each State.⁷¹⁴

It could be argued that few legal concepts have provoked more debate over the last several decades than the precautionary principle, not only in the environmental arena but also in law and policy in general. Precaution has been central to debates over whether chemicals or greenhouse gases should be regulated in advance of harm, and whether preventive wars should be waged to prevent future attacks. Hence, it seems that the controversial debates over the precautionary principle finally have convinced the ILC to exclude, among other controversial topics, the precautionary principle.⁷¹⁵

4.2.3. No-Harm Principle

The Permanent Court of International Justice in *S.S. Wimbledon*⁷¹⁶ stressed that State sovereignty is not inalienable, meaning it can be limited. Such a viewpoint is exemplified by the no-harm principle, which first emerged in an environmental context in the *Trail Smelter Arbitration*⁷¹⁷, in which it was held that no State may use its territory in a way that causes harm to the territory of another State. Transboundary environmental harm usually takes three forms: air pollution, the transboundary movement of hazardous waste and the pollution of a transboundary environmental resource such as water-courses.⁷¹⁸ It is probably correct to say that the no-harm principle does not absolutely prohibit all and any transboundary harm: it simply suggests an obligation on States to exercise due diligence in their relations with one another that could cause transboundary harm. State practice and *opinio juris* for the no-harm principle are reflected by the principle's subsequent codification in a number of soft law instruments and multilateral environmental agreements and recognition by international courts. After its recognition in *Trail Smelter*, the no-harm principle was included in Principle 21 of the Stockholm Declaration, which specifies States have 'the sovereign right to exploit

⁷¹⁴ Schwabach and Cockfield (n 541) 203.

⁷¹⁵ Jonathan B Wiener, 'Precautionary Principle', *Elgar Encyclopedia of Environmental Law* (Edward Elgar Publishing Limited 2018) 179.

⁷¹⁶ 'S.S. Wimbledon (United Kingdom v Japan) (1923) PCIJ Rep Series A No 1.'

⁷¹⁷ For the *Trail Smelter Arbitration* see chapter 6.1.

⁷¹⁸ See Schwabach and Cockfield (n 541).

their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction'. State practice and *opinio juris* for the no-harm principle are reflected by the principle's subsequent codification in a number of soft law instruments and multilateral environmental agreements and recognition by international courts. After its recognition in *Trail Smelter*, the no-harm principle was included in Principle 21 of the Stockholm Declaration, which specifies States have 'the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction'. Resolutions adopted by the UN, and other international organizations such as the Organization for Economic Co-operation and Development (OECD). Consequently, there seems to be general consensus that the no-harm principle has attained customary international law status.⁷¹⁹

4.2.4. Polluter Pays Principle

The concept of the polluter pays was first applied by the OECD in the 1970s, as an instrument for allocating the costs of pollution prevention and control in order 'to encourage the rational use of scarce environmental resources and to avoid distortions in international trade and investment'.⁷²⁰ It had an objective to ensure that polluters bear the expenses for carrying out the pollution prevention and control measures introduced by public authorities in OECD countries. In 1992 the Rio Declaration recast the polluter-pays principle in Principle 16. It calls on:

"[n]ational authorities [to] endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment".

⁷¹⁹ Kotzé and Muzangaza (n 681) 285,286.

⁷²⁰ The Organisation for Economic Co-operation and Development (OECD), OECD, Recommendation of the Council Concerning International Economic Aspects of Environmental Policies [C(72)128] 1972.

The formulation sets out a global policy for pollution control that aims to make polluters bear the costs of pollution and ensure sustainable activities.⁷²¹ In basic terms, the polluter pays principle means that the party responsible for polluting the environment must bear the costs of remediating such pollution and/or the costs of preventing and controlling such pollution. To this end, the principle aims to regulate pollution, ensure environmentally sustainable activities and provide for the most efficient way to allocate costs of pollution prevention and control measures.⁷²²

4.2.5. Sustainable Development Principle

Sustainable development is defined as the development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.⁷²³ Sustainable development requires the balancing of environmental, social and economic interests during 'development', broadly conceived. Sustainable development is also concerned with inter- and intra-generational equity, which is the balancing of interests between members of this generation and between the present and future generations. It is argued that sustainable development is a universally accepted notion because of its proliferation in global politics and governance (as the adoption of the Sustainable Development Goals in 2015 by the United Nations General Assembly aptly suggests), and more specifically as a cornerstone and guiding principle of international environmental law.⁷²⁴ It is, however, more likely those environment-related human rights interests could be protected through and by means of other human rights-based *jus cogens* norms. To the extent that human rights concerns in the environmental domain significantly overlap with other human rights issues, as is generally the case, it could be possible to argue that the remit of 'traditional' *jus cogens* norms related to, for example, the prohibition against apartheid (which per implication

⁷²¹ Priscilla Schwartz, 'The Polluter-Pays Principle', Elgar Encyclopedia of Environmental Law (Edward Elgar Publishing Limited 2018) 260–261.

⁷²² Kotzé and Muzangaza (n 681) 288.

⁷²³ Strategic Imperatives, 'Report of the World Commission on Environment and Development: Our Common Future' (1987) 10 Accessed Feb.

⁷²⁴ Owen McIntyre, 'The Role of Customary Rules and Principles of International Environmental Law in the Protection of Shared International Freshwater Resources' [2006] Natural Resources Journal 157, 173.

includes human rights issues such as the right to life, dignity and equality) should be expanded to include environmental considerations as well.⁷²⁵

By invoking the concept of sustainable development in the *Gabcikovo-Nagymaros Project*⁷²⁶, the ICJ indicated that the term has a legal function as well as a procedural and temporal aspect and a substantive aspect:

“Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past this was often done without consideration of the effects upon the environment. False, new norms and standards have been developed [and] set forth in a great number of instruments during the last two decades. Such new norms have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities, but also when continuing such activities in the past. This need to reconcile economic development with the protection of the environment is aptly expressed in the concept of sustainable development”.⁷²⁷

According to the Court, what this means for the present case is that the Parties should look afresh at the effects of the project on the environment and find a satisfactory solution to the volume of water to be released into the old bed of the Danube. In his separate opinion Judge Weeramantry considered, unlike the Court, that sustainable development is a principle with normative value. Tracing its historic foundations, he asserted “international law in the field of sustainable development is now sufficiently well established”.⁷²⁸

Sustainable development is perhaps the only environmental norm more frequently invoked than the precautionary principle. However, like the precautionary principle, the ICJ has mentioned it only in passing and has done little to elaborate its meaning. In

⁷²⁵ Kotzé and Muzangaza (n 681) 286–287.

⁷²⁶ International Court of Justice, ‘*Gabčíkovo-Nagymaros Project, Hungary v Slovakia, Judgment, Merits, ICJ GL No 92, [1997] ICJ Rep 7, [1997] ICJ Rep 88, (1998) 37 ILM 162, ICGJ 66 (ICJ 1997), 25th September 1997*’ <<https://www.icj-cij.org/en/case/92>> accessed 21 March 2018.

⁷²⁷ Sumudu Atapattu, ‘From Our Common Future to Sustainable Development Goals: Evolution of Sustainable Development under International Law’ (2018) 36 *Wis. Int’l LJ* 215, 240–241.

⁷²⁸ *ibid.*

*Gabčíkovo-Nagymaros*⁷²⁹, the Court noted that the “need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development” but left it up to the Parties to find ‘an agreed solution’ for a joint management regime. In *Pulp Mills*, the Court’s Provisional Measures Order provided that the use of the River Uruguay should allow for sustainable development which takes account “of the need to safeguard the continued conservation of the river and the rights of economic development of the riparian States” but did not provide any additional elaboration of the concept of sustainable development either in the Order or in its final judgment.⁷³⁰

4.2.6. The Human Right to a Healthy Environment

To date, there is neither a globally recognized international right to a healthy environment, nor an international human rights treaty, which provides for an enforceable substantive right to a healthy environment. The majority of domestic constitutions, however, now recognize the right to a healthy environment in one form or another, while regionally the right is also entrenched in various human rights instruments. Yet, despite such widespread recognition, there is little evidence suggesting that the right to a healthy environment has already achieved the status of customary rule.⁷³¹ The article 24 of the African Charter on Human and Peoples’ Rights could be considered as a unique transnational legal instrument in which the peoples are specifically guaranteed the right to ‘a general satisfactory environment favorable to their development.’⁷³² Generally, discussions of customary law focus on the way that states behave vis-à-vis each other. This vision of customary law focuses on how states navigate those points where state sovereignties intersect. Traditionally, when a state acted entirely internally, there was no other state “interested” in the action and

⁷²⁹ International Court of Justice, ‘*Gabčíkovo-Nagymaros Project, Hungary v Slovakia, Judgment, Merits*, ICJ GL No 92, [1997] ICJ Rep 7, [1997] ICJ Rep 88, (1998) 37 ILM 162, ICGJ 66 (ICJ 1997), 25th September 1997’ (n 726).

⁷³⁰ Bodansky, ‘The Role and Limits of the International Court of Justice in International Environmental Law’ (n 704) 13.

⁷³¹ Kotzé and Muzangaza (n 681) 290.

⁷³² See Mulesa Lumina, ‘The Right to a Clean, Safe and Healthy Environment Under the African Human Rights System’, *Human Rights and the Environment under African Union Law* (Springer 2020).

therefore no role for customary international law.⁷³³ To the extent that human rights concern in the environmental domain significantly overlap with other human rights issues, as is generally the case, it could be possible to argue that the remit of 'traditional' jus cogens norms related to, for example, the prohibition against apartheid (which per implication includes human rights issues such as the right to life, dignity and equality) should be expanded to include environmental considerations as well. It could be concluded that currently, no explicit environmental customary norms exist. There is, however, some scope for such rules to develop over time through existing customary international law and through the global human rights agenda.⁷³⁴

4.2.7. Environmental Impact Assessment

Environmental impact assessment first developed as a regulatory tool under domestic law. One of the first jurisdictions to introduce EIA requirements and procedures was the United States (US), which in 1969 enacted the National Environmental Policy Act that comprised some environmental impact assessment. A first attempt to introduce a comprehensive trans-boundary environmental impact assessment regime was made by the former European Communities (EC) with its Directive 85/337, which requires Member States to inform one another on measures that are likely to have significant transboundary effects. However, apart from this requirement to share information, the Directive does not specify other transboundary environmental impact assessment requirements. The most significant treaty governing transboundary environmental impact assessment to date is the Espoo Convention of 1991, developed by the United Nations Economic Commission for Europe to establish a transboundary environmental impact assessment regime for Europe. The provisions of the Convention, however, are binding only *inter partes* among the States party to it, which are predominantly European countries, notwithstanding the fact that the Espoo Convention was adopted by some non-European States. While provisions on transboundary environmental impact assessment are included in various other treaties such as the Madrid Protocol to

⁷³³ Rebecca M Bratspies, 'Reasoning Up to Human Rights: Environmental Rights as Customary International Law' [2018] *The Human Right to a Healthy Environment* (John Knox and Ramin Pejani, eds. 2018) 7.

⁷³⁴ Kotzé and Muzangaza (n 681) 290,291.

the Antarctic Treaty of 1991, the Convention on Biological Diversity of 1992 and the North American Agreement on Environmental Cooperation of 1993, a universally binding treaty establishing an environmental impact assessment regime under public international law does not exist. Thus, outside of the territorial scope of the Espoo Convention or specific environments (i.e., marine environments) public international law on environmental impact assessment is so far predominantly governed by customary international law.⁷³⁵

In other environmental areas like the water resources, no requirement of transboundary environmental impact assessment was ever included in the ILC Draft Articles on International Watercourses or the UN Watercourses Convention⁷³⁶, which was developed based on the ILC Draft Articles on International Watercourses, suggests that there was no consensus among States on provisions regarding environmental impact assessment at that time. However, support for a requirement of transboundary environmental impact assessment under international law appears to have grown significantly in recent times. For example, in a dispute between Argentina and Uruguay over a pulp mill on the River Uruguay, the ICJ found that there is a practice 'which in recent years has gained so much acceptance among States that it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource.'⁷³⁷

Unlike the draft guidelines of the International Watercourses, in the draft guidelines of the ILC regarding the protection of the atmosphere there is a reference to the environmental impact assessment. Draft Guideline 4 reads:

⁷³⁵ Nicolas Bremer, 'Post-environmental Impact Assessment Monitoring of Measures or Activities with Significant Transboundary Impact: An Assessment of Customary International Law' (2017) 26 *Review of European, Comparative & International Environmental Law* 80, 80,81.

⁷³⁶ United Nations General Assembly Convention on the Law of the Non-navigational Uses of International Watercourses, 21 May 1997, Supp No. 49(A/51/49), (Entered into force on 17 August 2014) (n 567).

⁷³⁷ Bremer (n 735) 82.

“While the relevant precedents for the requirement of an environmental impact assessment primarily address transboundary contexts, it is considered that there is a similar requirement for projects that are likely to have significant adverse effects on the global atmosphere, such as those activities involving intentional large-scale modification of the atmosphere”.⁷³⁸

In 2001, the ILC identified environmental impact assessment as an integral part of the duty on states to prevent transboundary harm.⁷³⁹ This understanding of transboundary environmental impact assessment, as an element of due diligence was confirmed by the ICJ in the *Pulp Mills* case in 2010:

“In this sense, the obligation to protect and preserve [the environment] . . . has to be interpreted in accordance with a practice, which in recent years has gained so much acceptance that it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource. Moreover, due diligence, and the duty of vigilance and prevention which it implies, would not be considered to have been exercised, if a party planning works liable to affect the regime of the river or the quality of its waters did not undertake an environmental impact assessment on the potential effects of such works”.⁷⁴⁰

⁷³⁸ ILC, ‘ILC, Protection of the Atmosphere: Texts and Titles of Draft Guidelines 1, 2 and 5, and Preambular Paragraphs, Provisionally Adopted by the Commission on 2 June 2015, with Commentaries Adopted at the 3287th and 3288th Meetings of the Commission on 5 and 6’ 6.

⁷³⁹ International Law Commission, ‘International Liability in Case of Loss from Transboundary Harm Arising out of Hazardous Activities’ (n 587).

⁷⁴⁰ Neil Craik, ‘Environmental Impact Assessment’ (Edward Elgar Publishing Limited 2018) 198. International Court of Justice, ‘Pulp Mills on the River Uruguay (Arg. v. Uru.)’, GL No. 135 ,2010 I.C.J. (Apr. 20)’ (n 698).

Chapter 5. International and Regional Legal Instruments: Main Corresponding Treaties

Airspace is a concept used to signify the spatial dimension where States exercise their jurisdiction or control for aviation and defense.⁷⁴¹ At the turn of the 20th century the view that airspace, like the high seas, should be free was sometimes advanced.⁷⁴² For example, Paul Fauchille was the leading advocate of freedom of the air. The gist of his arguments was that real property of the air was impossible because no one could appropriate it and that the same applied to the possibility of the State to “dominate” the air. As a result airspace was a *res communis omnium*, and therefore free. For reasons of security, however, he proposed a safety zone for the first 1,500 meters above ground.⁷⁴³ But the principle of airspace sovereignty was unequivocally affirmed in the Paris Convention on the Regulation of Aerial Navigation (1919).⁷⁴⁴ The principle is restated in the Chicago Convention on International Civil Aviation (1944), its Article 1 states “... every State has complete and exclusive sovereignty over the ‘airspace’ above its territory”.⁷⁴⁵

State sovereignty and the free will of States in their relations with the environment is one of the reasons that international environmental law seems unable to comprehensively and effectively respond to the Anthropocene’s deepening socio-ecological crisis. In consequence, despite over 700 multilateral environmental agreements have been adopted since 1857, due to ineffectively sanctioning States’ non-

⁷⁴¹ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 53.

⁷⁴² Bin Cheng, ‘Air Law’ (*Encyclopedia Britannica*) <<https://www.britannica.com/topic/air-law>> accessed 5 February 2021.

⁷⁴³ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 13. See also Paul Fauchille, *Le Domaine Aérien et Le Régime Juridique Des Aérostats, Par Paul Fauchille...* (A Pedone 1901).

⁷⁴⁴ For overview of freedom of the air to international air law and recognizing States sovereignty see Peter H Sand, James T Lyon and Geoffrey N Pratt, ‘An Historical Survey of International Air Law Since 1944’ (1960) 7 McGill LJ 125.

⁷⁴⁵ Convention on International Civil Aviation (adopted 7 December 1944), (entered into force 4 April 1947) 15 UNTS 295 (Chicago Convention) (n 337).

compliance with their obligations under international environmental law, during this period, the rate of anthropogenic global environmental change has been accelerating.⁷⁴⁶ Considering the long-term environmental, social, economic, or public health consequences of the atmospheric changes mentioned in Chapter 1, there is no doubt for the need for prompt international action, both on a regional and global level.

According to Article 2(a) of the Vienna Convention on the Law of Treaties (VCLT) a treaty defines as: “an international agreement concluded between States in written form and governed by international law whether embodied in a single instrument or in two or more related instruments and whatever its particular designation”.⁷⁴⁷ The international agreements in the type of legally binding instrument (hard law) are not necessarily precise with obligatory provisions, however they have been imperative under the principle of ‘*Pacta sunt servanda*’ which affirmed by Article 26 of the VCLT that says “Every treaty in force is binding upon the parties to it and must be performed by them in good faith.”⁷⁴⁸

There are several conventions and treaties focused on atmospheric pollution that deals with transboundary air pollution, ozone depletion, outer space and climate change. This chapter aims to provide an understanding on the existing international as well as regional legal instruments in the context. Several legal instruments have been developed in last few decades that deal with different aspects of protection of Atmosphere. Substantially talking, these legal instruments could be categorized as follows: legal regimes concerning the bilateral and multilateral transboundary air pollutions agreements, ozone layer protection treaties and treaties aiming to tackle

⁷⁴⁶ Kotzé and Muzangaza (n 681) 279. To managing States sovereignty aimed to the environmental protection see Stephen Stec, ‘Humanitarian Limits to Sovereignty: Common Concern and Common Heritage Approaches to Natural Resources and Environment’ (2010) 12 International Community Law Review 361. Louis J Kotzé, ‘Arguing Global Environmental Constitutionalism’ (2012) 1 Transnational Environmental Law 199. See also Kim and Bosselmann (n 6).

⁷⁴⁷ United Nations Vienna Convention on the Law of Treaties, 23 May 1969, 1155 UNTS 331, (Entered into force: 27 January 1980), [VCLT] (n 564). For the American viewpoint regarding the legal circumstances of treaties in the US legal order see ‘Treaties as Binding International Obligation’ <<https://www.asil.org/insights/volume/2/issue/4/treaties-binding-international-obligation>> accessed 5 June 2020.

⁷⁴⁸ Scott Barrett, Carlo Carraro and Jaime De Melo, ‘Towards a Workable and Effective Climate Regime’ [2015] Review of Environment, Energy and Economics (Re3) 158.

climate change. The chapter firstly describe the content of the mentioned regimes and later in chapter conclusion, from a critical point, the legal lacunas in regional and international documents will be addressed.

In respect of air pollution, there are several bilateral and multilateral agreements. The multilateral agreements such as:

- 1979 Convention on Long Range Transboundary Air Pollution and the eight protocols thereto,⁷⁴⁹
- ECE 1998 Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles,⁷⁵⁰
- ECE 1991 Convention on Environmental Impact Assessment in a Transboundary Context,⁷⁵¹
- ECE 1992 Convention on the Transboundary Effects of Industrial Accidents,⁷⁵² and its Protocol on Civil Liability and Compensation for Damage Caused by Transboundary Effects of Industrial Accidents on Transboundary Waters to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and to the 1992 Convention on the Transboundary Effects of Industrial Accidents, which adopted in 2003 and yet it's not in force.⁷⁵³
- Council of the European Union directives on air pollution, including in particular directive 2001/81/EC of the European Parliament and the Council of the European Union on national emission ceilings for certain atmospheric pollutants, which updated and replaced by Directive (EU) 2016/2284 of the European

⁷⁴⁹ Convention On Long-Range Transboundary Air Pollution,13 November 1979, 1302 UNTS 217, (Entry into force16 March 1983),[LRTAP].

⁷⁵⁰ Agreement Concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts Which Can Be Fitted and/or Be Used on Wheeled Vehicles, 25 June 1998, 2119 UNTS 129 (n 354).

⁷⁵¹ United Nations, Treaty Series, vol. 1989, No. 34028

⁷⁵² United Nations Economic Commission for Europe, 'Convention on the Transboundary Effects of Industrial Accidents, 1992, as Amended 15 December 2015' (1992).

⁷⁵³ 'Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes' (2003).

Parliament and of the Council on the Reduction of National Emissions of Certain Atmospheric Pollutants;⁷⁵⁴ directive 2007/46/EC of the European Parliament and the Council of the European Union establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, with related annexes and technical regulations implementing/adapting the corresponding ECE agreements for wheeled vehicles;⁷⁵⁵ directive 2008/50/EC of the European Parliament and of the Council of the European Union on ambient air quality and cleaner air for Europe; and directive 2010/75/EU of the European Parliament and of the Council of the European Union on industrial emissions (integrated pollution prevention and control)⁷⁵⁶

- Standards and Recommended Practices of the International Civil Aviation Organization (ICAO) for aircraft engine emissions: annex 16, volume II (Environmental Protection) of the 1944 Convention on International Civil Aviation. ⁷⁵⁷
- protocol of 1997 (Annex VI — Regulations for the Prevention of Air Pollution from Ships) to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)
- 2002 Association of Southeast Asian Nations (ASEAN) Agreement on Transboundary Haze Pollution
- 2004 Stockholm Convention on Persistent Organic Pollutants

⁷⁵⁴ 'Regulation of Air Pollution: European Union' <<https://www.loc.gov/law/help/air-pollution/eu.php>> accessed 1 March 2021.

⁷⁵⁵ 'DIRECTIVE 2007/46/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (Establishing a Framework for the Approval of Motor Vehicles and Their Trailers, and of Systems, Components and Separate Technical Units Intended for Such Vehicles)' 5 September 2007.

⁷⁵⁶ 'DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (on Industrial Emissions (Integrated Pollution Prevention and Control))' 24 November 2010.

⁷⁵⁷ ICAO, 'Standards and Recommended Practices of the International Civil Aviation Organization (ICAO) for Aircraft Engine Emissions: Annex 16' <<https://www.icao.int/environmental-protection/Pages/environment-publications.aspx>> accessed 1 March 2021.

- 2006 Framework Convention for the Protection of the Environment for Sustainable Development in Central Asia
- 2013 Minamata Convention on Mercury

Bilateral agreements on transboundary air pollution:

- The 1974 Czech-Polish Treaty concerning Protection of the Atmosphere against Pollution
- The 1980 Memorandum of Intent Between the Government of the United States of America and the Government of Canada Concerning Transboundary Air Pollution
- The 1983 Agreement and two complementary agreements between Mexico and the United States of America on cooperation for the protection and improvement of the environment in the border area
- The 1991 Canada and US Air Quality Agreement
- The 1992 Czech-German Agreement and three complementary agreements.

The Multilateral conventions on universal atmospheric concerns are:

- 1985 Vienna Convention for the Protection of the Ozone Layer, with its 1987 Montreal Protocol on Substances that Deplete the Ozone Layer;
- 1992 United Nations Framework Convention on Climate Change, with its 1997 Kyoto Protocol;
- 2015 Paris Agreement within the United Nations Framework Convention on climate change

5.1. The 1979 Convention on Long-Range Transboundary Air Pollution and its Protocols

The 1979 Geneva Convention on Long Range Transboundary Air Pollution was formulated under the auspices of the United Nation Economic Commission for Europe, in the form of a framework agreement to meet the measures concerns about acid rain

and other disposed pollutants in Europe.⁷⁵⁸ Its series of eight separate Protocols have been substantially negotiated and agreed between the members. The 1979 LRTAP Convention was adopted in accordance with Principle 21 of the Stockholm Declaration⁷⁵⁹, and the Final Act of Helsinki Conference on Security and Cooperation in Europe in 1975. The environmental chapter of CSCE looks for international collaboration for control and monitoring of air pollutant and its adverse effect including short term air pollution or long-term transboundary air pollution.⁷⁶⁰

The LRTAP Convention is a unique and significant multilateral agreement, which considered as a legally binding instrument over transboundary air pollution.⁷⁶¹ The LRTAP Convention with eight protocols addressed the problem of acid rain and other air pollutants comprising atmospheric emissions of greenhouse gases and ozone depletion, caused by industrialization, agricultural modernization, and fossil fuel consumption.⁷⁶² The soft nature of the commitment without specific binding numerical target or timetable, and also a flexible and diplomatic language,⁷⁶³ ensured the widest possible participation. Simultaneously the long-term effectiveness of the regime crucially depends on procedures and institutions to secure compliance – and to sanction non-compliance – with the due diligence standards so established.⁷⁶⁴ Thus, it was a

⁷⁵⁸ Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

⁷⁵⁹ The United Nations Conference on the Human Environment, having met at Stockholm from 5 to 16 June 1972, having considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment. 'Report of the United Nations Conference on the Human Environment, Stockholm' (1971).

⁷⁶⁰ Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

⁷⁶¹ Tair Teran, Lara Lamon and Antonio Marcomini, 'Climate Change Effects on POPs' Environmental Behaviour: A Scientific Perspective for Future Regulatory Actions' (2012) 3 Atmospheric Pollution Research 466, 468.

⁷⁶² Adam Byrne, 'The 1979 Convention on Long-Range Transboundary Air Pollution: Assessing Its Effectiveness as a Multilateral Environmental Regime after 35 Years' (2014) 4 Transnational Environmental Law 37, 38.

⁷⁶³ For an example of flexible and diplomatic language see Article 2 "Contracting Parties ... shall endeavor to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution". Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

⁷⁶⁴ Peter H Sand, 'The Practice of Shared Responsibility for Transboundary Air Pollution' [2015] Center for International Law (ACIL) of the University of Amsterdam. All websites were last accessed in 14.

considerable example of a convention that advanced global agreement and set a general limit that would protect humankind and the environment against the damages of air pollution.⁷⁶⁵

The LRTAP Convention a science-based regime, is considered by researchers as well as politicians as an exemplary form of co-operation between science and policy. The convention through the concept of critical loads (CL) of ecosystem and the interactive computer model of the regional acidification information system (RAINS) have served as important tools for connecting scientific knowledge to policymaking.⁷⁶⁶

Article 1 of LRTAP Convention defines the Long-range transboundary air pollution as: "air pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one state and which has adverse effects in the area under the jurisdiction of another state at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources".

The target of the convention is to struggle and reducing the transboundary air pollution and regulating some measures and general commitments. The decision making in LRTAP based on consensus. Although this type of voting provides less flexibility but in fact prevents the states opting out if admissible to.⁷⁶⁷ The contracting States shall exchange information, hold consultation (as an important element of convention), establish cooperative program (EMEP).⁷⁶⁸ Furthermore the convention asked for perform research and provide monitoring of expanding the policies and strategies by obtaining

⁷⁶⁵ Sands and others (n 336) 261; Paolo Galizzi, 'Air, Atmosphere and Climate Change' 4.

⁷⁶⁶ Göran Sundqvist, Martin Letell and Rolf Lidskog, 'Science and Policy in Air Pollution Abatement Strategies' (2002) 5 Environmental Science & Policy 147, 147. Through an empirical investigation, the article shows that CL and RAINS have different meanings for the involved actors, which include heterogeneous views on the boundary between science and policy. However, this has not constrained but rather enabled co-operation. Through a flexible understanding of CL and RAINS, actors from different fields have been able to find and agree upon successful solutions.

⁷⁶⁷ Byrne (n 762) 20.

⁷⁶⁸ Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

The Contracting Parties in Article 9 stress the need for the implementation of the existing "Cooperative program for the monitoring and evaluation of the long-range transmission of air pollutants in Europe" (EMEP)

the most useful and available technologies and information which is economically possible to implement. In this regard the LRTAP Convention through the scientific and political needs created different working groups, including Working Group on Strategies, Working Group on Effects, and Working Group on Technology.⁷⁶⁹ The executive body consists of representatives of the contracting states is the main organ of the convention. This organ annually is held to review the implementation of the convention.⁷⁷⁰

The LRTAP Convention came into force by 1983. One of the influential elements of LRTAP Convention and its Protocols is the broad participation of states. By 1988, the convention had 35 signatories and 32 parties. After the break-up of the Soviet Union and Yugoslavia, new established states have joined the convention. Currently, there are 51 parties to the convention including nearly all of Western European States, Turkey, the majority of the Eastern Europe, Caucasus and Central Asia (EECCA) States, the US, and Canada. However, not all parties ratified all protocols. Ratification of the protocols depends to the economic situation of states. Some parties ratified all the protocols and others have partially ratified some of the protocols. For example, states in Western Europe have ratified almost all of the Protocols, some states like Ireland and Greece have selectively ratified and a few of states like Turkey have not ratified any Protocol.⁷⁷¹ Byrne believes the lack of substantial financial incentives are main factor for EECCA countries to not participating to the protocols, and⁷⁷² the Eastern UNECE region for short to medium term (for next 20 years) will remain outside the scope of protocols.

In following parts, the eight protocols of this Convention that regulate the levels of emissions of particular substances will be analyzed.

⁷⁶⁹ Joørgen Wettestad, 'Acid Lessons? LRTAP Implementation and Effectiveness' (1997) 7 *Global Environmental Change* 235, 237.

⁷⁷⁰ Dinah Shelton, *International Environmental Law* (Brill Nijhoff 2004) 565.

⁷⁷¹ Byrne (n 762) 23.

⁷⁷² Adam Byrne, 'Trouble in the Air: Recent Developments under the 1979 Convention on Long-Range Transboundary Air Pollution' (2017) 26 *Review of European, Comparative and International Environmental Law* 210, 216.

5.1.1. The 1984 Monitoring and Evaluation Protocol

The 1984 protocol is the first protocol to the LRTAP Convention established to finance EMEP to cover the annual costs of international centers. The Protocol came into force in 1988 and covered thirty- four countries beside the European Union. The EMEP has about 100 stations in 24 ECE countries.⁷⁷³ Collaboration within EMEP consists of mandatory contribution by all contracting Parties to the Protocol which are located in the geographical zone of EMEP and supplemented by voluntary contributions that could be held by the contracting Parties or Signatories to the Protocol even outside of the geographical zone of EMEP.⁷⁷⁴

The Article 4 specifies the mandatory contributions and determines that the necessity to modify or amend the Annex shall be agreed by consensus in the executive body. The annex to the protocol determines the scale of contribution of members in costs for financing EMEP.

In general, significant role of European Union on development and support of the LRTAP Convention has to be taken into account. After creation of LRTAP, EU adopted many rules and provisions on air pollution and pollutant sources. As instance, four daughter Directives which were developed by EU beyond the boundaries of LRTAP Convention has to be taken into account in this context. However, there is a significant degree of overlap and linkage between LRTAP and EU air pollution regulations. The EU contribution has added a more effectiveness characteristic to the LRTAP Convention.⁷⁷⁵

5.1.2. The 1985 Sulphur Protocol

The LRTAP Convention has three different protocols on sulphur emissions: the 1985 Helsinki Protocol on the reduction of sulphur emission or transboundary fluxes, the 1994

⁷⁷³ 'The 1984 Geneva Protocol on Long-Term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP)' <http://www.unece.org/fileadmin//DAM/env/lrtap/emep_h1.htm> accessed 2 March 2018.

⁷⁷⁴ 'Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution On Long-Term Financing Of The Cooperative Program For Monitoring And Evaluation Of The Long-Range Transmission Of Air Pollutants In Europe (EMEP)' (1984) art 3.

⁷⁷⁵ Byrne (n 762) 8.

Oslo Protocol on further emission of sulphur reduction, and 1999 Gothenburg Protocol to abate acidification, eutrophication and ground level ozone.

The second protocol to the LRTAP Convention initiated following the succeeded Declaration on Acid Rain in 1984 which was considered as a nonbinding instrument seeking a reduction of 30% of sulphur emissions by some Scandinavian countries like Sweden.⁷⁷⁶ The 1985 Sulphur Protocol was established to control and reduce the serious damage caused by acidification of the environment from sulphur dioxide, nitrogen oxides and other pollutants from the combustion of fossil fuels. It also aims to protect historical monuments and human health in parts of Europe and North of America.⁷⁷⁷

All parties in Article 2 of the Sulphur Protocol determined the essential requirement for achieving the target. Article 2 reads: “The Parties shall reduce their national annual sulphur emissions or their transboundary fluxes by at least 30 percent as soon as possible and at the latest by 1993, using 1980 levels as the basis for calculation of reductions”.

It was a tough and strict approach in this protocol that ignored the different situation between states and asked them a same provision, even resulted in parties deciding not to accede to the Protocol, including a number of key states such as Poland, Spain, the United Kingdom (UK), the United States (US), and Yugoslavia.⁷⁷⁸ Barrett argues that the Helsinki Protocol was an unsuccessful agreement, whereas some important polluters like Poland and the UK did not participate in the protocol.⁷⁷⁹

The 1985 Protocol as a regulatory agreement required parties to develop without untimely delay national programs, policies, strategies to reduce Sulphur emissions or their transboundary fluxes by at least 30 percent and at the latest by 1993.⁷⁸⁰ The parties

⁷⁷⁶ *ibid.*

⁷⁷⁷ Sands and others (n 336) 263.

⁷⁷⁸ Byrne (n 762) 10.

⁷⁷⁹ Espen Bratberg, Sigve Tjøtta and Torgeir Øines, ‘Do Voluntary International Environmental Agreements Work?’ (2005) 50 *Journal of Environmental Economics and Management* 583, 587.

⁷⁸⁰ Wettestad (n 769) 237.

have to establish dual report including the national emissions data and the method of calculation and progress towards achieving the goal to the Executive Body of the LRTAP Convention.⁷⁸¹ However Sulphur Protocol was too inflexible although the target was reached and all the parties complied with the agreement. The main problem for implement the protocol and take the Technology- specific and environmental quality requirements was the politic difficulty as regards the sates had to balance the national industries and interests and level of exposure to environmental damages.⁷⁸² The achievement of the protocol was registered in Europe. By 1993, all the contracting parties had reduced 1980 Sulphur emissions by more than 50 percent, there were eleven parties that reduced even more than 60 percent.⁷⁸³

There is no certain evidence to indicate the real and direct effectiveness of Helsinki Protocol on local efforts to reduce Sulphur emissions. Some analysis shows that the Sulphur reduction by signatory states under LRTAP Convention and its Sulphur Protocols has increased just a few amounts more than the amount that already intended to be reduced. However, the Sulphur Protocol has indirectly impacted on reducing Sulphur emissions. Whereas it was interesting for some states to expand their global market, the technologically improved countries (like the Germany) encouraged firms to invent new technologies and transfer the new patent to signatory states all around the world. The inventive activities and transfer of knowledge fulfilled expected changes in local and international policy.⁷⁸⁴

5.1.3. The 1988 NOx Protocol

This Protocol to the LRTAP Convention came into force in 1990 and is about control of Emission of Nitrogen Oxides or Their Transboundary Fluxes. The protocol is wider and more flexible than the 1985 Sulphur Protocol.⁷⁸⁵

⁷⁸¹ Article 6 of 'Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution On The Reduction Of Sulphur Emissions Or Their Transboundary Fluxes' (1985).

⁷⁸² Byrne (n 762) 12.

⁷⁸³ Sands and others (n 336) 263.

⁷⁸⁴ Thijs Dekker and others, 'Inciting Protocols' (2012) 64 Journal of Environmental Economics and Management 45.

⁷⁸⁵ Sands and others (n 336) 263.

The Parties shall take essential measures to fix down their NO_x emissions biased in 1987 by 1994. Article 2 (1) reads: “ The Parties shall, as soon as possible and as a first step, take effective measures to control and/or reduce their national annual emissions of nitrogen oxides or their transboundary fluxes so that these, at the latest by 31 December 1994, do not exceed their national annual emissions of nitrogen oxides or transboundary fluxes of such emissions for the calendar year 1987 or any previous year to be specified upon signature of, or accession to, the Protocol, provided that in addition, with respect to any Party specifying such a previous year, its national average annual transboundary fluxes or national average annual emissions of nitrogen oxides for the period from 1 January 1987 to 1 January 1996 do not exceed its transboundary fluxes or national emissions for the calendar year 1987 ”.

Within 2 years after the date of entry into force of the present Protocol all Parties shall apply national emissions standards to major new stationary sources and/or source categories, and to substantially modified stationary sources in major source categories. Also, shall apply national emission standards to new mobile sources in all major source categories and introduce pollution control measures for major existing stationary sources. All national standards should be according to the best existing technologies which are practical and possible in terms of economic and expenses. Moreover parties required to take the technical Annex to the protocol that consider a nonmandatory Annex on Control Technology however the subsequent Protocols tried to create more mandatory technical standards and measures.⁷⁸⁶ The next step to achieving the target and reduce the NO_x or transboundary fluxes is negotiation that had to start in six month of entry in to force of the Protocol, parties adopted even more strict measures than those asked in Article 2.⁷⁸⁷ As a result of protocol by the end of 1994, overall emissions of parties to the 1988 NO_x Protocol reduced 9 percent by 1987 baseline, Nineteen

⁷⁸⁶ Byrne (n 762) 13.

⁷⁸⁷ ‘Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Nitrogen Oxides’ (1988).

parties out of the twenty-five parties to the Protocol have achieved the target and fixed emissions at the level of 1987.⁷⁸⁸

The NOx Protocol are applied 'critical loads' concept to the control and management of acidity and nutrient nitrogen by focusing on the health and environmental effects of exposure to pollutant concentrations in the atmosphere, this method used for ground-level ozone, particulate matter, and ammonia, in Article 6 of the NOx Protocol explained the work program under the critical loads approach. Some scholars argue that the critical loads approach was 'virtually revolutionary in diplomacy', because it tried to assign national targets according to environmental vulnerability.⁷⁸⁹ For the other pollutants, the Convention has used traditional methods of bans, phase-outs, limits, and restricted use.

Parties in less than 6 months after of entry in to force of the 1988 NOx Protocol provides appropriate situation for exchange of technology to reduce emissions of nitrogen oxides consistent with their national laws, regulations and practices. The Parties shall provide convenient and sufficient unleaded fuels at least along main international transit roads.⁷⁹⁰

The Protocol asked Parties to develop as soon as possible their national programs, policies and strategies to control and reduce the emissions and report annually to the executive body. EMEP provide executive body to use the information from calculations of nitrogen budgets and also of transboundary fluxes and deposition of nitrogen oxides within the geographical scope of Europe or EMEP.⁷⁹¹ This protocol was considered as a voluntary agreement without any compensation and fine. Also, in case of any dispute

⁷⁸⁸ Sands and others (n 336) 264.

⁷⁸⁹ Byrne (n 762) 12.

⁷⁹⁰ 'Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Nitrogen Oxides' (n 787) arts 3,4.

⁷⁹¹ *ibid* arts 7,8,9.

between Parties about the interpretation and implementation of the Protocol, they have to solve the problem with negotiation or any other acceptable method by them.⁷⁹²

However, six Parties of the Protocol including Spain and Ireland could not reach the target but still the Sofia Protocol could be considered as efficient. Comparison of annual data for Parties in the LRTAP Convention illustrate the annual NO_x emission reduction reached more 2.1 percent with the 1988 Sofia Protocol.⁷⁹³

5.1.4. The 1991 Volatile Organic Compounds Protocol

The first step for addressing the fourth Protocol of LRTAP Convention is to define the concept of Volatile Organic Compounds (VOC): “unless otherwise specified, all organic compounds of anthropogenic nature, other than methane, that are capable of producing photochemical oxidants by reactions with nitrogen oxides in the presence of sunlight”.⁷⁹⁴

The VOC Protocol provide the various ways to reduce and control of emissions of Volatile Organic Compounds in order to reduce their transboundary fluxes and the resulting secondary photochemical oxidant products that caused harms to the environment and human health from adverse effects in exposed places of Europe and north America.⁷⁹⁵

There are three options that states adopt to achieve the target according to amount of their annual emissions and geographic and demographic situation, specified upon signature.

The parties that choose first option shall: “as soon as possible and as a first step, take effective measures to reduce its national annual emissions of VOCs by at least 30 percent by the year 1999, using 1988 levels as a basis or any other annual level during

⁷⁹² Bratberg, Tjøtta and Øines (n 779) 586.

⁷⁹³ *ibid* 596.

⁷⁹⁴ ‘Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Volatile Organic Compounds Or Their Transboundary Fluxes (VOC)’ (1991) art 2(9).

⁷⁹⁵ *ibid* art 2 (1).

the period 1984 to 1990, which it may specify upon signature of or accession to the present Protocol".⁷⁹⁶

The second option was not available for all Parties, only the ones whose annual emissions contribute to tropospheric ozone concentrations in areas under the jurisdiction of one or more other Parties, and such emissions originate only from areas under its jurisdiction that were specified as tropospheric ozone management areas (TOMAs) under annex I to the protocol. A party under this option shall:

1- Reduce its annual emissions of VOCs from the areas so specified by at least 30 percent by the year 1999, using 1988 levels as a basis or any other annual level during the period 1984-1990, which it may specify upon signature of or accession to the present Protocol; and

2- Ensure that its total national annual emissions of VOCs by the year 1999 do not exceed the 1988 levels.⁷⁹⁷

Two States that have TOMAs in their territory are Canada in The Lower Fraser Valley in the Province of British Columbia and The Windsor-Quebec Corridor in the Provinces of Ontario and Quebec as well as Norway in the total Norwegian mainland also its exclusive economic zone.⁷⁹⁸

There was another option that was taken by parties whose national annual emissions of VOCs were in 1988 lower than 500,000 tones and 20 kilograms per habitant and 5 tones per square kilometers. Thus, these states shall as soon as possible, and as a first step take effective measures to ensure that their national annual emissions of VOCs in the end of 1990 do not exceed the 1988 levels.⁷⁹⁹

The twenty States that signed the Protocol have chosen option Article 2(2)(a) are: Austria, Belgium, Estonia, Finland, France, Germany, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom, Denmark, Liechtenstein, Switzerland, United States,

⁷⁹⁶ *ibid* art 2 (2)(a).

⁷⁹⁷ *ibid* art 2 (2)(b).

⁷⁹⁸ Annex I, Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Volatile Organic Compounds Or Their Transboundary Fluxes (VOC).

⁷⁹⁹ *ibid* art 2 (2)(c).

Czech Republic, Italy, Luxemburg, Monaco and Slovakia.⁸⁰⁰ The three states that have chosen the Article 2(2)(b) option are: Canada, Norway and Ukraine. Bulgaria, Greece and Hungary were the last group, and they have chosen Article 2(2)(c).⁸⁰¹ All parties up to two years after the date of entry into force of the present Protocol were required to put on appropriate national or international emission standards to new stationary sources and new mobile sources based on the best available technologies which are economically practical and possible, taking into consideration annexes II, III.

The main stationary sources and industries that emit Volatile Organic Compounds are:

- (a) products that contain solvents like inks, glues, paints.
- (b) Petroleum industry including petroleum-product handling;
- (c) Organic chemical industry
- (d) Small-scale combustion sources (e.g., domestic heating and small industrial boilers.)
- (e) Food industry
- (f) Iron and steel industry
- (g) Handling and treatment of wastes
- (h) Agriculture.⁸⁰²

The major VOC emissions of mobile sources drive through incomplete combustion of fossil fuels especially petrol rather than diesel fuels in the engines of motor vehicles and due to evaporation during refining and refueling.⁸⁰³

Also, each party about products that contain Solvent shall take national and international measures and promote to use products with low or free of VOCs and

⁸⁰⁰ Sands and others (n 336) 265.

⁸⁰¹ *ibid* 266.

⁸⁰² Annex II, 'Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Volatile Organic Compounds Or Their Transboundary Fluxes (VOC)' (n 794).

⁸⁰³ Sands and others (n 336) 265.

labelling such products to specify their VOC content. Annex II has to be taken into account in this context.⁸⁰⁴

It is important to encourage public participation in emission control programs through public advertisement and encourage the best use of all modes of transportation and promote traffic management programs.⁸⁰⁵

According to Article 2 (3) up to five years after the provision entered in to force, all parties had to take best efforts and available technologies which are economically feasible to reduce and control of VOC emissions due to petrol distribution sources, motor vehicle refueling operations and reduce volatility of petrol and any kind of situations and products that help to produce VOC emissions and possibility to create photochemical ozone, also that states ensure during the process of substitution do not substitute toxic and carcinogenic VOCs and those that harm the stratospheric ozone layer for other VOCs. Taking in to consideration Annexes II, III, IV. States had to commence negotiation and take the greatest available and economic instruments as well as scientific and technological development to adopt measures and timetable for achieving the goal no later than 1 January 2000. However, the VOC Protocol introduced “differentiated target” which was a new approach according to capacity and inclination of states to reduce emissions.⁸⁰⁶ Therefore, if the situation is not the same for all parties, they can take additional time to achieve the target. For example, Spain has been non-compliant for more than a decade and cannot achieve compliance before 2020.⁸⁰⁷

Protocol did not let parties to reduce total gaseous emissions take some measures that may cause and contribute significantly to climate change, to the formation of

⁸⁰⁴ ‘Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Volatile Organic Compounds Or Their Transboundary Fluxes (VOC)’ (n 794) art 2(3)(a)(ii),.

⁸⁰⁵ *ibid* art 2 (3) (a)(iv).

⁸⁰⁶ Byrne (n 762) 25.

⁸⁰⁷ Sands and others (n 336) 267.

tropospheric background ozone or to the depletion of stratospheric ozone, or that are toxic or carcinogenic.⁸⁰⁸

5.1.5. The 1994 Sulphur Protocol II

The second Sulphur Protocol established in Oslo following the 1985 Sulphur Protocol, which was aimed at further reduction of sulphur emissions based on “critical loads” approach. This approach had different definitions and various ways for calculation of critical levels. A general definition of “critical loads” has provided by Nilsson as: “The highest load that will not cause chemical changes leading to long-term harmful effects on the most sensitive ecological systems”.⁸⁰⁹ The critical loads approach is not based on a fix reduction and target for all parties, and reduction of sulphur emissions is designated as a long-term target that it would not be reached all at once.⁸¹⁰

The essential obligations of Parties have provided in the Protocol, Article 2 (1) reads: “The Parties shall control and reduce their sulphur emissions in order to protect human health and the environment from adverse effects, in particular acidifying effects, and to ensure, as far as possible, without entailing excessive costs, that depositions of oxidized Sulphur compounds in the long term do not exceed critical loads for sulphur given, in annex I, as ç, in accordance with present scientific knowledge”.

The Parties shall take measures appropriate in their specific circumstance, were required by protocol to take ‘most effective measures’ due to reduction of sulphur emissions for new and existing sources, which consisting measures to increase energy efficiency, increase the use of renewable energy, promote the use of fuel with low sulphur content, also apply the best available control technologies compliance Annex IV without taking excessive costs.⁸¹¹

⁸⁰⁸ ‘Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution Concerning The Control Of Emissions Of Volatile Organic Compounds Or Their Transboundary Fluxes (VOC)’ (n 794) art 3,.

⁸⁰⁹ KR Bull, ‘The Critical Loads / Levels Approach to Gaseous Pollutant Emission Control’ (1991) 69 105, 108.

⁸¹⁰ Wettestad (n 769) 238.

⁸¹¹ ‘Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution On Further Reduction Of Sulphur Emissions’ (1994) art 2 (4).

In this Protocol, Best Available Technology Economically Feasible (BATEF) changed to Best Available Technology (BAT) because BATEF faced a lot of criticisms which believed that the economic feasibility makes states able to prioritize economic considerations to environmental consequences or use it to justify inactivity and lack of required willing to invest in pollution abatement measures.⁸¹²

According to the Article 2 (6) and (7), Protocol Parties can take economic instruments that would encourage cost-effective approaches to the reduction of sulphur emissions, also in case of confirmation of executive body it would be possible to the joint implementation with two or more parties to perform the obligations of the protocol.

All Parties other than those Parties subject to the United States/Canada Air Quality Agreement of 1991, shall put on national emission limits to major new stationary sources, and about major existing stationary sources shall introduce pollution control measures as exact as specified in Annex V by 1 July 2004. Parties up to two years after the date of entry into force of the present Protocol were required to take national standards for the Sulphur content of gas oil as exact as specified in Annex V. This period in special situation can extend for a period of maximum ten years. In 1994 Sulphur Protocol II like VOC Protocol applied “differentiated target” approach for example those states with greatest tendency and capability to reduce Sulphur emissions such as Germany and the Nordic countries, reduced around 80% of 1980 levels by 2000 but France and the UK took ten years more to attain the similar target. Highly polluting EIT countries also received additional time.⁸¹³ However the first sulphur protocol based on a fix amount of 30 percent emission reduction for all parties, the second sulphur protocol based on a fair system of differentiated emissions goal that all together was 50.8 percent emission reduction.⁸¹⁴

⁸¹² Byrne (n 762) 14.

⁸¹³ *ibid* 25.

⁸¹⁴ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 21.

Similar to other Protocols, the 1994 Sulphur Protocol have some articles that determined obligations and guidance for implement and achieve to the target of Protocol by parties like adopt the national strategies, policies and program, apply national measures to control and reduce Sulphur emissions, collect and maintain information on actual levels of Sulphur emissions, periodic reporting to executive body on national implementation measures and level of national Sulphur emissions, exchange of technologies, and also encourage research, development, monitoring and cooperation between parties, for example evaluate the effects of Sulphur emissions on human health and environment also economic benefits of reduction of Sulphur emissions on human health and environment.⁸¹⁵

The LRTAP Convention in all Protocols up to 1994 Sulphur Protocol asked parties to solve the problems by negotiation or any admissible procedure, this Protocol added new possibility for submit the disputes to the international court of justice. Also the implementation Committee (IC) was a major advance that emerged by 1994 Sulphur Protocol that was so useful in effectiveness of LRTAP Convention, its functions contain (i) the review of compliance with reporting obligations; (ii) consideration of submissions or referrals, with the adoption of any necessary reports or recommendations; (iii) the preparation of detailed compliance reports on specific obligations; (iv) consideration of systemic compliance issues; and (v) the production of annual compliance reports for the Executive Body, with recommendations if necessary.⁸¹⁶

5.1.6. The 1998 Aarhus Protocol on Heavy Metals

This Protocol was adopted in Aarhus on 24 June 1998 and put into effect on 29 December 2003. Thirty-three states joined this protocol.⁸¹⁷ The Protocol in article 3 required Parties to control and reduce emissions into the atmosphere from three specific harmful heavy metals including metal, lead and cadmium that mostly caused by anthropogenic activities and exposed on hazardous human health and environment.

⁸¹⁵ Articles 3, 4, 5 and 6, 'Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution On Further Reduction Of Sulphur Emissions' (n 811).

⁸¹⁶ Byrne (n 762) 53–55.

⁸¹⁷ Sands and others (n 336) 268.

According to Annex I the reference year for obligations of Parties were between 1985 and 1995. Article 3 (2) requires the Parties to take effective measures to reduce annual emissions based on limit values and best available techniques to new stationary sources in a period of two years after entry in to force date of the Protocol. Moreover, the article bound the Parties to take effective measures in reducing the existing sources in an eight year deadline.⁸¹⁸ All Parties shall undertake product control emissions to limit using of leaded petrol and ensure to reduce its adverse effects on human health and environment. Each Party can use and market the unleaded petrol with lead content lower than 0/013 g/l and shall try to maintain or lower that level.⁸¹⁹ However, there are some exemptions in Annex VI. Annex VI (3) determined that if a state distinguishes that the limitations in paragraph 1 of this annex cause hard socio-economic situations or technical problems in the country and would not lead to environmental and health benefits, the State can extend the time period specified in paragraph 1 to a period of up to 10 years, and during which it may market leaded petrol with a lead content not exceeding 0.15 g/l. Also, each party should apply product management measures which in Annex VII as a guideline are proposed for products containing mercury. The Parties shall relevant with their regulation prepare the convenient situation to exchange the technology and information by promoting the commercial exchange of available technologies, direct industrial contacts and cooperation, including joint ventures, exchange of information and experience and provision of technical assistance among Parties as well as organization and individuals in the private and public sectors.⁸²⁰ Like last Protocols and due to Article 7 Parties must report to the executive body on measures taken to fulfilment the Protocol. All Parties as soon as possible shall develop strategies, policies and programs e.g. economic instruments, develop government/industry covenants and voluntary agreements, encourage the more efficient use of resources and raw materials, and use of less polluting energy sources, apply measures to develop and introduce less polluting transport systems, phase out

⁸¹⁸ Article 3 (2), Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution On Heavy Metals (1998).

⁸¹⁹ Annex VI (1) 'Protocol on Heavy Metals The 1998 Aarhus Protocol on Heavy Metals' <https://www.unece.org/env/lrtap/hm_h1.html> accessed 5 July 2018.

⁸²⁰ Articles 4 and 6, Protocol To tThe 1979 Convention On Long-Range Transboundary Air Pollution On Heavy Metals.

certain heavy metal emitting processes where substitute processes are available on an industrial scale and applying cleaner processes. Parties can apply more strict measures than those demanded by the Protocol.⁸²¹ There is an amendment for this Protocol were adopted in 2012 but have not entered into force. The amendments intend to apply more stringent controls of heavy metals emissions and to introduce flexibilities to facilitate accession of new Parties, notably countries in Eastern Europe, South-Eastern Europe, the Caucasus and Central Asia.⁸²² It is noted that probably development of emission reductions and prevention technics will control PM⁸²³ and significant reductions in emissions of metals occur except for mercury.

5.1.7. The 1998 Aarhus Protocol on Persistent Organic Pollution

Following a report in LRTAP Working Group on Effects in 1989, illustrated needs to address on Persistent Organic Pollutants (POPs). The Aarhus Protocol aimed to control, reduce or eliminate discharges, emissions and losses of POPs to the atmosphere.⁸²⁴ The protocol concentrates on a list of sixteen substances that include eleven pesticides, two industrial chemicals and three contaminants.⁸²⁵ Also, the Parties to the Protocol on POPs added seven new substances by decisions 2009/1 and 2009/2 which are not yet in force.⁸²⁶ All Parties are required to take measures to eliminate the production and use of specific POPs scheduled in annexes I and to restrict the use of substances scheduled in annex II, as well as about the substances scheduled in annex III to the POP Protocol each party shall reduce their annual emissions of these substances based on the reference years (between 1985 and 1995). All Parties, in order to reduce emissions of dioxins and furans shall take limit values and the best available technologies, for new and existing stationary sources in accordance with annexes IV and V to the POP Protocol, and further take effective measures to control emissions of POPs from mobile sources, taking into consideration annex VII to

⁸²¹ Article 5, Protocol *ibid*.

⁸²² 'Protocol on Heavy Metals The 1998 Aarhus Protocol on Heavy Metals' (n 819).

⁸²³ UNECE, 'Long-Term Strategy for the Convention on Long-Range Transboundary Air Pollution and Action Plan for Its Implementation' 1, 6.

⁸²⁴ Teran, Lamon and Marcomini (n 761) 568.

⁸²⁵ 'The 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs)' <https://www.unece.org/env/lrtap/pops_h1.html> accessed 20 September 2018.

⁸²⁶ See: <https://www.unece.org/env/lrtap/pops_h1.html> accessed 20 September 2018.

the POP Protocol.⁸²⁷ Each Party shall take measures to ensure the wastes containing or acquired from substances listed in annexes I, II, III to the POP Protocol are destroyed or disposed in an environmentally sound manner, accordance with the 1989 Basel Convention⁸²⁸ on the control of transboundary movements of hazardous wastes and their disposal.⁸²⁹ The Protocol provided possibility of the exemption to implement the obligations of POPs Protocol due to specific purposes and conditions.⁸³⁰

The 1998 POP Protocol had an essential effect on the adoption of the Stockholm Convention on Persistent Organic Pollutants in 2001 and came into force in 2004.⁸³¹ Meanwhile incorporation into the POP Protocol, ratifying and implementing the present Protocol are so important for parties, if new substances appear, the first action of parties will be nominating them in the Stockholm Convention, and it is necessary to keep the vigorous link with Stockholm Convention.⁸³²

Similar to other protocols of LRTAP convention, Parties in this Protocol shall develop strategies, policies and programs to fulfill their obligations under the Protocol, facilitate the exchange of information and technologies, join to collaboration activities for research, development and monitoring in relation to POPs, and report periodically to the Executive Body on measures applied to implement the Protocol. In addition, parties are required in accordance with their regulation, to promote the provision of information to the general public, including individuals who are direct users of persistent organic pollutants.⁸³³ Some studies show mountains are the most sensitive region which are exposure to climate change by POPs.⁸³⁴

⁸²⁷Article 3, 'Protocol on Persistent Organic Pollutants (POPs)' <http://www.unece.org/env/lrtap/pops_h1.html> accessed 5 July 2018.

⁸²⁸ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, opened for signature Mar. 22, 1989, 1673 U.N.T.S. 125, 28 I.L.M. 657, (entered into force May 5, 1992).

⁸²⁹ Article 3 (3) and (4), 'Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants' (1998).

⁸³⁰Article 4, 'Protocol on Persistent Organic Pollutants (POPs)' (n 827).

⁸³¹ Byrne (n 762) 22.

⁸³² UNECE (n 823) 6.

⁸³³ Sands and others (n 336) 270.

⁸³⁴ Teran, Lamon and Marcomini (n 761) 474.

5.1.8. The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone

The Gothenburg Protocol is the last Protocol of LRTAP Convention adopted by Executive body on 30 November 1999. Twenty-six States are Parties to the Protocol.⁸³⁵ The purpose of the protocol is to control and reduce emissions of sulphur, nitrogen oxides, ammonia and volatile organic compounds that are caused by anthropogenic activities and are likely to cause adverse effects on human health, natural ecosystems, materials and crops, due to acidification, eutrophication or ground-level ozone caused by long-range transboundary atmospheric moving.⁸³⁶ It was expected that subsequent to the fulfilment of the Protocol, the area of Europe that was exposed to excessive levels of acidification will shrink from 93 million hectares (in 1990) to 15 million hectares. Also, excessive levels of eutrophication are expected to decrease from 165 million hectares (in 1990) to 108 million hectares and the number of days with excessive ozone levels shall be halved.⁸³⁷ The NOx protocol and Sulphur Protocol II tried to reduce the gap between critical loads and emissions by 60%, however, the economic concerns did not allow the goals to be achieved. The Gothenburg Protocol was an initiative that taken into account this issue. According to Byrne, the compromises made in the Protocol were biased towards economic concerns, rather than meeting the environmental objectives. Hereupon, European Union acceded to Gothenburg Protocol in 2003 after the adoption of Directive 2001/81/EC that initiated more stringent provisions.⁸³⁸

The Parties in the Gothenburg Protocol have committed to ensure atmospheric depositions or concentrations of pollutants do not exceed, on a long term and stepwise approach. The critical loads of acidity, the critical loads of nutrient nitrogen and the critical levels of ozone for parties in the geographical scope of EMEP specified in annex I of Gothenburg Protocol. Regarding the Canada, the Canada-wide Standard⁸³⁹, and

⁸³⁵ Sands and others (n 336) 270.

⁸³⁶ Article 2, '1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone' (1999).

⁸³⁷ Sands and others (n 336) 270.

⁸³⁸ Byrne (n 762) 48.

⁸³⁹ Canada-wide Standards (CWS) are intergovernmental agreements developed under the Canadian Council of Ministers of the Environment (CCME) Canada-wide environmental standards sub-agreement, which operates under the broader CCME Canada-wide accord on environmental harmonization. See:

regarding the United States of America, the National Ambient Air Quality Standards⁸⁴⁰ specified the critical levels of ozone.⁸⁴¹

Annex II to the Gothenburg Protocol provided a table of emission ceilings by 2010, for Sulphur, NO_x, VOCs, and ammonia related to the provisions of Article 3 (paragraph 1, and 10). Annex II provides informative data of emissions of each Party in 1980 and 1990, a later determined the ceiling level in 2010.

Different levels of emissions reduction for each Party have been determined according to the character of the emissions, which have more dangerous and intense environmental and health impacts and also by considering the lower costs of such reduction.⁸⁴² Further, the Protocol requires the Parties to apply limit values specified in annexes IV, V, VI to the Gothenburg Protocol to each new stationary source. Moreover, each Party shall apply the limit values for the fuels and new mobile sources identified in annex VIII to the Gothenburg Protocol, no later than the timescales specified in annex VII to the Gothenburg Protocol. Parties are required to adopt the best available techniques to reduce emissions.⁸⁴³

Ammonia is the major gaseous base in the atmosphere and serves to neutralize about 30% of the hydrogen ions in the atmosphere. 50% to 75% of the ammonia (NH₃) from terrestrial systems is emitted from animal and crop-based agriculture from animal excreta and synthetic fertilizer application. Gothenburg is the first protocol under LRTAP Convention that specifically addresses emissions of reduced nitrogen compounds like ammonia. Annex IX to Gothenburg Protocol takes three ambition levels to control and

<<https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/agreements/related-federal-provincial-territorial/standards.html>> accessed 20 January 2019.

⁸⁴⁰ National Ambient Air Quality Standards are: standards for harmful pollutants Established by the United States Environmental Protection Agency (EPA) under authority of the Clean Air Act

⁸⁴¹ Article 2, '1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone' (n 836).

⁸⁴²Sands and others (n 336) 270.

⁸⁴³ Article 3, '1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone' (n 836).

reduce ammonia caused by agricultural sources to abate Acidification, Eutrophication and Ground Level Ozone. Parties are required to take certain measures to control ammonia from the use of solid fertilizers based on area, and manure application and storage, and animal housing. A guidance document adopted in 2007 provides guidance to parties to identify ammonia control options and techniques for reducing emissions from agricultural and other stationary sources.⁸⁴⁴

Once again Parties shall develop strategies, policies, and programs to fulfill the obligations under the Gothenburg Protocol; to promote the access of information to the general public; to facilitate the exchange of technology and information; and to engage in cooperative research, development and monitoring.⁸⁴⁵ Parties are required to report periodically to the Executive Body to notify it about process of implementation of the Protocol, with compliance overseen by the Implementation Committee.⁸⁴⁶

Following the 2011 recommendations of a special black carbon working group, the 1999 Gothenburg Protocol was revised in 2012 to address additional aspects like fine particular matter, including black carbon which is a strong contributor to global warming and intercontinental movement of air pollution.⁸⁴⁷ Since methane, ozone and particularly black carbon have effects on global warming and climate change, considered as short-lived pollutants and climate forcers.⁸⁴⁸ Emission limit values for stationary and mobile sources updated and the document also provide obligations on parties for the period up to 2020 and beyond. The amendments of Gothenburg Protocol provide more differentials between Parties, specifically new members to the Protocol. The Protocol provided for new Parties an extension of the development of implementation plans with

⁸⁴⁴ Sands and others (n 336) 271.

⁸⁴⁵ Articles 4-6 and 8 of the '1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone' (n 836).

⁸⁴⁶ Articles 7,8 of the *ibid.*

⁸⁴⁷ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 21/58.

⁸⁴⁸ World Bank International Cryosphere Climate Initiative, 'On Thin Ice : How Cutting Pollution Can Slow Warming and Save Lives' (2013) 21 <<https://openknowledge.worldbank.org/handle/10986/16628>> accessed 20 January 2021.

a final implementation deadline of December 31, 2030.⁸⁴⁹ The revision of the Protocol replaced two previous Sulphur Protocols, the NO_x protocol and the VOC Protocol where all Parties to those Protocols have become Parties to the revised Gothenburg Protocol. This multi-dimensional aspect of Gothenburg Protocol illustrates sophistications of LRTAP over time comparing to previous Protocols which focused on single pollutants and or a single problem like acid rain.⁸⁵⁰

5.2. The 1991 Canada-US Air Quality Agreement

The 1991 Canada-US Air Quality Agreement was developed following the LRTAP Convention during 1970s in which the transboundary air pollution emerged as a significant environmental issue and common concern in North America and Europe.⁸⁵¹ However, both countries as parties to the LRTAP Convention also agreed on bilateral agreements to address transboundary air pollution problems by Sulphur dioxide and nitrogen oxides. The Agreement initially focused on reducing acid depositions in wet form (rain, snow, fog) or dry form (gases and particles). The 1991 Agreement between Canada and the US does not diminish the rights and obligations of Parties in other international agreements between them.⁸⁵² Parties under the 1991 Agreement have established air quality objectives to limit and reduce emissions of sulphur dioxide and nitrogen oxides and prevent air quality degradation and work towards visibility protection. The 1991 Agreement also needs continuous compliance monitoring by a persistent emissions monitoring system or alternative system to estimate emissions from other major stationary sources.⁸⁵³ As a result of implementation of the provisions, acid rain reduced in North of America (as an expected achievement of agreement) during the 1990s. In December 2000, Canada and the US decided to establish an Ozone Annex to the Agreement to reduce transboundary flows of ground-level ozone, which is

⁸⁴⁹ Byrne (n 762) 61.

⁸⁵¹ For a detailed discussion on the transboundary air pollution in the North America see James Bonar-Bridges, 'Solving Smog Outsourcing: Domestic and International Solutions for Curbing Transboundary Sulfur Emissions' (2016) 22 *Hastings W.-Nw. J. Env't'l L. & Pol'y* 213.

⁸⁵² Authentic English, '1991 Canada-US Quality Agreement' (1991) 1852. Article XV

⁸⁵³ *ibid.* Article IV, Annex 1

one of the main contributions to smog, in addition they are currently focused on providing an additional Annex to control particulate matter emissions.⁸⁵⁴

5.2.1. Sulphur Dioxide

Under the 1991 Agreement, the United States and Canada agreed to achieve certain objectives about sulphur dioxide emissions. The United States agreed on reduction of annual Sulphur dioxide emissions by approximately ten million tons from 1980 levels by the year 2000. The United States succeeded in fulfilling its commitments under the national Acid Rain Program (ARP) and the regional Clean Air Interstate Rule (CAIR) to decrease emissions of SO₂ and NO_x caused by electric power sector.⁸⁵⁵ The Acid Rain Program for reduce the sulphur dioxide of power plants applied the Cap-and-trade policies. These policies limit number of emitting emissions and give permission to put a price on them and trade with one another as needed. Cap-and-trade policies encourage states and companies to allocating the best available technologies due to the emission reduction cost and emission permits.⁸⁵⁶

According to sections 409 and 405 of the 1990 Clean Air Act of the United States, the USA had to arrive at a permanent national emission cap of 8.95 million tons of sulphur dioxide per year for electric utilities by 2010. The United States was required to adopt new or revised standards or such other action under the Clean Air Act as the Administrator of the U.S. Environmental Protection Agency (EPA) considers appropriate to the extent required by section 406 of the Clean Air Act Amendments of 1990, aimed at limiting Sulphur dioxide emissions from industrial sources in the event that the Administrator of EPA determines that annual sulphur dioxide emissions from industrial sources may reasonably be expected to exceed 5.6 million tons per year. Moreover, Canada agreed on the reduction of sulphur dioxide emissions in the seven easternmost Provinces to 2.3 million tons per year by 1994 and to establish a cap on Sulphur dioxide emissions in the seven easternmost Provinces at 2.3 million tons per year from 1995 to

⁸⁵⁴ Sands and others (n 336) 272.

⁸⁵⁵ Canada-US Air Quality Committee and International Joint Commission, 'Canada- United States: Air Quality Agreement-Progress Report 2016' (2017) 5.

⁸⁵⁶ Jean-paul Hettelingh and Maximilian Posch, 'Critical Load Exceedances under Equitable Nitrogen Emission Reductions in the EU28' (2019) 211 *Atmospheric Environment* 113, 113.

December 31, 1999. Further, Canada had to establish a permanent national emissions cap of 3.2 million tons per year by 2000.

In 2014, the US national Acid Rain Program had reduced sulphur dioxide emissions of electric generating units by 80 percent from 1990 levels. National Sulphur dioxide emissions from all sources including industrial and commercial boilers and refining, decreased by 79 percent from 1990.⁸⁵⁷

In Canada, as of 2014, total emissions of sulphur dioxide decreased by 63 percent from 1990 levels. The main contributors of SO₂ emissions in Canada caused by three industrial sectors including the non-ferrous smelting and refining industry, the upstream petroleum industry (including the exploration and production of crude oil), and electric power generation which had 76 percent of national SO₂ emissions in 2014.⁸⁵⁸ The province of Ontario has most contribution to implement the agreement and reduce of SO₂ emissions.⁸⁵⁹

5.2.2. Nitrogen Oxides

Under the 1991 Agreement the United States agreed to a reduction of total annual emissions of nitrogen oxides by approximately 2 million tons from 1980 emission levels by 2000. Same as the sulphur Dioxide, the reduction was required by The Clean Air Act and under establishment of emission standards for electric utility boilers to control stationary sources. The Act also established emissions standards from old and new light duty trucks to control mobile sources, light duty vehicles and heavy-duty trucks.⁸⁶⁰ Canada agreed as an interim requirement to reduce by the year 2000, annual national emissions of nitrogen oxides from stationary sources: a: by 100,000 tones below the year 2000 forecast level of 970,000 tones; b: to develop by January 1, 1995, further annual national emission reduction from stationary sources to be achieved by 2000 and/or 2005. Although Canada adopted specified emissions standards to limit emissions

⁸⁵⁷ Committee and Commission (n 855) 7.

⁸⁵⁸ *ibid* 5.

⁸⁵⁹ Antoni L Zbieranowski and Julian Aherne, 'Long-Term Trends in Atmospheric Reactive Nitrogen across Canada: 1988-2007' (2011) 45 *Atmospheric Environment* 5853, 5861.

⁸⁶⁰ Authentic English (n 852). Annex I, Section 2a

from mobile sources including light, medium and heavy duty vehicles.⁸⁶¹ In the United States by 2014, power plant emissions of nitrogen oxides had decreased by 73 percent from 1990 levels.⁸⁶² In Canada between 1990 and 2010, total emissions of nitrogen oxides from power plants and transportation decreased by 18 percent.⁸⁶³ Also, 55 percent of total NOx emissions of Canada generated from transportation sources, and 9 percent from electric power generation.⁸⁶⁴

5.2.3. Ozone

The Canada and United States agreed on the Ozone Annex in 2000. The Ozone Annex has addressed ozone problems and ozone transboundary pollutions with the goal of control and reduction of emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) that cause the ground-level ozone and that contribute to transboundary air pollution. The main sources of contributing NOx and VOC emissions to ozone are stationary and mobile sources, solvents, paints, and consumer products. The US and Canada have decreased ozone concentrations under regulatory and non-regulatory programs and also individual national plans. The reports indicated the annual average fourth-highest daily maximum 8 hours of ozone concentration on border of the US and Canada for 1995-2014.⁸⁶⁵

Each party ascertained 'Pollution Emission Management Areas' (PEMAS) on The Ozone Annex. About Canada, the scope of agreement extends on the area of 301,330 km² that covers all of the Canadian southern territory of about the 48th parallel beginning east of Lake Superior to the Ottawa River, and south of the corridor that extends from the central and southern Ontario southern Quebec City. For the United States, the area comprising the States of Connecticut, Delaware, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New York, New Jersey, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin, and the District of

⁸⁶¹ *ibid.* Annex I, section 2b

⁸⁶² Committee and Commission (n 855) 7.

⁸⁶³ Sands and others (n 336) 273.

⁸⁶⁴ Committee and Commission (n 855).

⁸⁶⁵ *ibid.* 12.

Columbia is covered by the agreement.⁸⁶⁶ Both countries committed to attain ozone air quality standards. The USA established the National Ambient Air Quality Standards for Ozone under the 1990 Clean Air Act. For Canada, the related standard is the Canada-Wide Standard (CWS) for Ozone agreed between the Canadian federal and provincial governments.⁸⁶⁷ Ozone Annex specified obligations for each country to reduce NOx and VOCs emissions. Ozone Annex was expected to achieve the ozone air quality standards by 2010, with estimated annual NOx reductions for Canada in the PEMA from 1990 levels by 39% in 2007 and 44% in 2010, and annual VOCs emissions in the PEMA from 1990 levels by 18% in 2007 and 20% in 2010. In the case of the USA, the NOx emissions reduction was estimated in the PEMA from 1990 levels by 35% by 2007, and 43% by 2010 and ozone season VOC emissions in the PEMA from 1990 levels, by 39% in 2007 and 36% in 2010.⁸⁶⁸ The results of the Ozone Annex standards were reduction of NOx and VOCs emissions by 40 percent and 30 percent, respectively, in the Canadian PEMA. And in the US PEMA, The NOx emissions were reduced 42 percent and VOCs 37 percent.⁸⁶⁹

Both countries were successful reducing acid rain and controlling ozone, but still need to continue to successfully comply with their commitments, and ensure no transboundary impacts threaten the human health and the environment. The Agreement could be developed to address additional transboundary pollution problems such as particulate matter (PM), and also expanding the geographical scope.⁸⁷⁰

5.3. The ASEAN Agreement on Transboundary Haze Pollution

The people of Indonesia, Singapore and Malaysia has been exposed to haze pollution and serious health threats. Therefore the members of the Association of Southeast

⁸⁶⁶ 'Canada-US Air Quality Agreement: Ozone Annex' <<https://www.canada.ca/en/environment-climate-change/services/air-pollution/publications/canada-united-states-quality-agreement-ozone-annex.html>> accessed 4 August 2018. Part II

⁸⁶⁷ Sands and others (n 336) 273.

⁸⁶⁸ 'Canada-US Air Quality Agreement: Ozone Annex' (n 866). Part IV

⁸⁶⁹ Canada-US Air Quality Committee and International Joint Commission, 'Canada-United States Air Quality Agreement Progress Report 2012' 70 <4/5/2018>.

⁸⁷⁰ Jean O Melious, 'The Canada-US Air Quality Agreement and Its Impact on Air Quality' [2013] Air Quality Management: Canadian Perspectives on a Global Issue 317, 323.

Asian Nations (ASEAN) have been trying to regulate and solve the problem of haze pollution for decades.⁸⁷¹

The Association of Southeast Asian Nations (ASEAN) recalled the 1990 Kuala Lumpur Accord and determined to apply the 1995 ASEAN Cooperation Plan on Transboundary Pollution. The 1997 Regional Haze Action Plan and the Hanoi Plan of Action was established with the aim of preventing and monitoring transboundary haze pollution.⁸⁷² The 2002 ASEAN Agreement on Transboundary Haze Pollution agreed between the governments of the ASEAN members in response to widespread haze caused particularly by Indonesian forest fires in the late 1990s. Indonesia was the serious source of such pollutants and main reason for creating this agreement, but only ratified the Agreement in 2014 under pressure from other countries in the region.⁸⁷³ The purposes of the 2002 ASEAN Agreement on Transboundary Haze Pollution are to prevent, monitor, and mitigate land and forest fires to control ‘transboundary haze pollution’ through concerted national efforts, and regional and international cooperation with law-oriented approach.⁸⁷⁴ The Agreement under Article 1 defines haze pollution as:

“smoke resulting from land and/or forest fire which causes deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property, and impair or interfere with amenities and other legitimate uses of the environment.”

The Agreement under Article 3 requires Parties to take certain principles into account to attain the objectives. The Agreement provides provisions in line with the fundamental principles of international environmental law including the principle of State sovereignty, the no harm principle and the precautionary principle. Article 3 paragraph

⁸⁷¹ Daniel Heilmann, ‘After Indonesia’s Ratification: The ASEAN Agreement on Transboundary Haze Pollution and Its Effectiveness as a Regional Environmental Governance Tool’ (2015) 34 *Journal of Current Southeast Asian Affairs* 95, 95.

⁸⁷² ‘ASEAN Agreement on Transboundary Haze Pollution’.

⁸⁷³ Sands and others (n 336) 274.

⁸⁷⁴ ‘ASEAN Agreement on Transboundary Haze Pollution’ <https://www.jus.uio.no/english/services/library/treaties/06/6-03/asean_transboundary_pollution.xml> accessed 10 April 2019.

1 emphasized Parties have right to exploit their own resources pursuant to their own environmental and developmental policies based on the Charter of the United Nations and the sovereignty principle. Parties are responsible to ensure that activities within their jurisdiction or control do not cause damage to the environment and harm to human health of other states or beyond their jurisdiction area. This provision is based on the principle of 'no harm' that says States have to conduct activities within their territories to protect against serious consequence for other States and ensure protection of the global environment.⁸⁷⁵

Parties also are required to manage the use of their natural resources, in an ecologically sound and sustainable manner. All stakeholders, in addressing transboundary haze pollution, should involve as a party, including local communities, non-governmental organizations, farmers and private enterprises. The Agreement also requires parties to take precautionary measures, and cooperate monitoring and preventing transboundary haze pollution, where there are threats of serious or irreversible damage, even without full scientific certainty (the precautionary principle).⁸⁷⁶

Under the Agreement, ASEAN Coordinating Centre for Transboundary Haze Pollution Control (ACC) was established with the aim of facilitating cooperation and coordination among the Parties in managing the impact of land and/or forest fires in particular haze pollution arising from such fires.⁸⁷⁷ The Centre may provide assistance, in the case of an emergency situation, through coordinating the provision of assistance by other Parties of the Agreement.⁸⁷⁸ In spite of transboundary effects of firefighting pollutants, according to sovereignty jurisdiction, such assistance has to be provided by request and consent of the party in the emergency situation.⁸⁷⁹

⁸⁷⁵ Heilmann (n 871) 103, 104.

⁸⁷⁶ 'ASEAN Agreement on Transboundary Haze Pollution' <<http://haze.asean.org/asean-agreement-on-transboundary-haze-pollution-2/>> accessed 12 April 2019.

⁸⁷⁷ *ibid.*

⁸⁷⁸ Sands and others (n 336) 275.

⁸⁷⁹ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 22/58.

Parties agreed to cooperate in monitoring and preventing and mitigating the transboundary haze pollution (caused by land or forest fire), by controlling the sources of fires, including by the identification of fires, development of monitoring, assessment and early warning systems, exchange of information and technology, and the provision of mutual assistance. Moreover, parties should take legislative and administrative measures to implement their obligations under the Agreement. Whenever a party that is or may be affected by transboundary haze pollution ask for information and consultations, other parties are required to respond immediately and without any delay, in order to minimize the adverse effects.⁸⁸⁰

Under the 2002 Agreement, specific obligations were initiated for monitoring, providing data, preparedness and preparation to response plans, technical cooperation, scientific research and activities to prevent haze pollution. The measures Parties shall promote a “zero burning policy” and also ensure that legislative, administrative and other relevant measures control open burning and ban land clearing using fire.⁸⁸¹

The Conference of Parties is created to appraise implementation of the Agreement, and in case of necessity to adopt protocols and amendment. As well as the ‘ASEAN Coordinating Centre for Transboundary Haze Pollution Control’ is established for the purposes of facilitating co-operation and co-ordination among the Parties in managing the impact of land and/or forest fires in particular haze pollution arising from such fires.⁸⁸²

The ASEAN Agreement on Transboundary Haze Pollution could not be completely effective and successful due to late ratification of the Agreement by Indonesia as a major

⁸⁸⁰ ‘ASEAN Agreement on Transboundary Haze Pollution’ (n 872). Article 4

⁸⁸¹ Sands and others (n 336) 275.

⁸⁸² Elly Kristiani Purwendah and Dewa Gede Sudika Mangku, ‘The Implementation of Agreement on Transboundary Haze Pollution in The Southeast Asia Region for ASEAN Member Countries’ (2018) 9 International Journal of Business, Economics, and Law 10.

haze polluter. As well as lack of enforcement mechanism, for example no specific sanction considered for parties that failed to implement the obligations.⁸⁸³

In contrast Jerger argued that the ASEAN Agreement with the 'managerial model' would be effective at mitigating transboundary haze pollution by increasing transparency, coordination among the Parties, data collection, and reliance on non-State actors. The managerial model enhances cooperation between the parties by focusing their attention on common goals to be achieved over time. However, the 'traditional approach' ensure effectiveness of the agreements by a clear target, mandatory measures and imposing sanctions to on non-compliant parties.⁸⁸⁴

5.4. Aircraft Emissions: ICAO Convention

The 1944 Convention on International Civil Aviation (ICAO Convention) signed in Chicago, the United States.⁸⁸⁵ 192 countries are members and ratified the ICAO Convention by 2019.⁸⁸⁶ Aircraft emissions make a considerable contribution to global atmospheric problems and climate change, some analysis illustrate after road transport, "the biggest contributor to climate change is aviation".⁸⁸⁷ Annex 16 to the 1944 ICAO Convention, was provided to establish rules and recommended practices on "Air Craft Engine Emission". The standards were adopted in 1980, to make a compatible situation between development of civil aviation and protection of environment. In 1983 the ICAO Council established the Committee on Aviation Environmental Protection as a technical committee to assist the Council in addressing the environmental impact of aviation. Article 37 States that all Parties was asked to collaborate in securing the highest practicable degree of uniformity in regulations standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which

⁸⁸³ Heilmann (n 871) 112.

⁸⁸⁴ David B Jerger Jr, 'Indonesia's Role in Realizing the Goals of ASEAN's Agreement on Transboundary Haze Pollution' (2014) 14 Sustainable Dev. L. & Pol'y 35, 38, 39.

⁸⁸⁵ Convention on International Civil Aviation (adopted 7 December 1944), (entered into force 4 April 1947) 15 UNTS 295 (Chicago Convention) (n 337).

⁸⁸⁶ 'ICAO' <<https://www.icao.int/about-icao/pages/member-states.aspx>> accessed 20 June 2018.

⁸⁸⁷ Lee Chapman, 'Transport and Climate Change: A Review' (2007) 15 Journal of transport geography 354, 356.

such uniformity will facilitate and improve air navigation.⁸⁸⁸ Any party which finds the international standards or procedure incompatible with its own regulation and practices, shall immediately notify Contracting States.⁸⁸⁹ The international standards provide rules for vented fuel and emissions certification, like emissions limits for smoke, hydrocarbons, carbon monoxide and oxides of nitrogen for subsonic and supersonic aircrafts manufactured after 1 January 1986, and standard techniques for measurement and evaluation, and compliance procedures.⁸⁹⁰ The ICAO Assembly at 38th session provided a Global Market Based Measure (GMBM) scheme to reduce carbon (CO₂) from international aviation. ICAO has also addressed the impacts of aviation industry, and annual increasing of total CO₂ emissions by the 2020 level in the form of Global Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).⁸⁹¹

5.5. The 2013 Minamata Mercury Convention

Following the 1988 Aarhus Heavy Metals Protocol to the LRTAP Convention, and the voluntary actions of 2003 UNEP Governing Council, an intergovernmental negotiating committee started to work on global legally binding instrument on mercury in 2010. The Minamata Convention in 2013 concluded to set out measures to control and where feasible to reduce emissions to air and releases to the water from mercury and mercury compounds with the aim of protecting the human health and the environment from anthropogenic emissions. The Minamata Convention came into force 16 August 2017.⁸⁹²

The Minamata Convention includes measures on controlling the mercury sources like primary mining, supply and trade of mercury and mercury compounds, controlling and restricting use of mercury and mercury compounds in products and in manufacturing

⁸⁸⁸ 'Convention on International Civil Aviation'
<https://www.icao.int/publications/Documents/7300_cons.pdf> accessed 27 June 2018.

⁸⁸⁹ Civil and Organization (n 338).

⁸⁹⁰ Sands and others (n 336) 275.

⁸⁹¹ RG Asher and others, 'ICAO Resolution 39A3' (2009) 34 *Clinical and Experimental Dermatology* 741.

⁸⁹² See more information at: <<http://www.mercuryconvention.org/Convention/Text>> accessed 27 June 2018.

processes. The Convention also addresses the disposal of mercury waste, as well as artisanal and small-scale gold mining (ASGM).⁸⁹³

The annual mercury emission by ASGM sectors is estimated 37,7 percent,⁸⁹⁴ that is a considerable amount of globally mercury distribution. Nearly 68 percent of the mercury emissions in southern hemisphere become from ASGM.⁸⁹⁵ The ASGM sector is responsible for the release of 1,000 tons of mercury to the atmosphere annually,⁸⁹⁶ The scientific evidence illustrates that the ASGM is not considered as a main global source of atmospheric ocean perturbation and causes more local impacts, comparing to other anthropogenic sources like coal-fired plants and cement factories with long-range hemispheric transport of mercury.⁸⁹⁷

Moreover, the Convention includes emissions control and atmospheric emissions of mercury reduction measures. Each Party with relevant sources is required to set out national standards to control emissions and achieve its target within 4 years of the date of entry into force of the Convention for the Party. Article 8(3) requires Parties with new sources to use best available techniques which may use emission limit values, and best environmental practices to control and, where feasible, reduce emissions within 5 years of the date of entry into force of the Convention for the Party. The Convention offers flexibility in existing sources. Under its rules, each Party has ten-year's time to take one or more measures, which are offered by the Convention according to its national circumstances, and the economic and technical feasibility and affordability of the measures. Options open to parties consist of:

⁸⁹³ David C Evers and others, 'Evaluating the Effectiveness of the Minamata Convention on Mercury: Principles and Recommendations for next Steps' (2016) 569 *Science of the Total Environment* 888, 889.

⁸⁹⁴ F Steenhuisen and SJ Wilson, 'Development and Application of an Updated Geospatial Distribution Model for Gridding 2015 Global Mercury Emissions' (2019) 211 *Atmospheric Environment* 138, 148 <<https://doi.org/10.1016/j.atmosenv.2019.05.003>>.

⁸⁹⁵ *ibid* 143.

⁸⁹⁶ United Nations Environment Programme, 'Towards a Mercury-Free Future in Mongolia and the Philippines' <<https://www.unep.org/news-and-stories/press-release/towards-mercury-free-future-mongolia-and-philippines>> accessed 10 February 2021.

⁸⁹⁷ Michael S Bank, 'The Mercury Science-Policy Interface: History, Evolution and Progress of the Minamata Convention' *Science of The Total Environment* 137832, 2.

- (a) A quantified goal for controlling and, where feasible, reducing emissions from relevant sources;
- (b) Emission limit values for controlling and, where feasible, reducing emissions from relevant sources;
- (c) Use of the best available techniques and best environmental practices to control emissions from relevant sources;
- (d) A multi-pollutant control strategy that would deliver co-benefits for control of mercury emissions;
- (e) Alternative measures to reduce emissions from relevant sources.

Parties are permitted to apply the same or different measures in respect to different source categories to attain reasonable progress in reducing emissions over time. Parties are also required to establish an inventory of mercury emissions from relevant sources within five years after the Convention enter into force, which will help with fulfillment and monitoring of the obligations under the Minamata Convention.⁸⁹⁸ National information can fill the lack of access to relevant datasets and resources. However, some of them are not transparent and useable inventories. For example, 58 ton of emissions are reported by vinyl chloride monomer production in China, but there are no exact locations for this sector so all of this amount is considered as diffuse emissions.⁸⁹⁹ Some experts believe that the reporting system in the Minamata Convention will improve a greatly the access to the systematic information on mining sectors locations, gravity and mercury use. Albeit local and national information is not accurate and transparent enough.⁹⁰⁰

Annex D of the Minamata Convention expressed point sources of emissions, and requires Parties to control their emissions, consisting of coal-fired power plants; coal-fired industrial boilers; smelting and roasting processes used in the production of non-

⁸⁹⁸ Sands and others (n 336) 277.

⁸⁹⁹ Steenhuisen and Wilson (n 894) 148.

⁹⁰⁰ *ibid.*

ferrous metals like lead, zinc, copper, and industrial gold; waste incineration facilities; cement clinker production facilities.⁹⁰¹

The topic of air pollution from facilities and especially the power plants was important and difficult to settle during the negotiations of the Convention, as they are the big emission contributors and still many developing countries are dependent on them.⁹⁰²

The 2018 UNEP reported that an estimated 24% of global emissions are caused by stationary combustion of fossil fuels and biomass, 21% from coal burning, 15% from non-ferrous metal production, 11% from cement production and 2% from ferrous metal production. Also, emissions from waste that include mercury-added products comprise about 7% of the 2015 global inventory.⁹⁰³

The UNEP in 2013 estimated 1,960 metric tons of global mercury emission had been released into the atmosphere, and around 1,000 metric tons into the water from human activities by 2010.⁹⁰⁴ According to 2018 UNEP report, the global atmospheric mercury emissions have increased to 2220 metric tons by 2015, which is 20% more than 2010 estimation. However, atmospheric emissions were significantly reduced by European countries and North America; the 2013 UNEP estimated that a rise in global atmospheric mercury emission is expected due to rapidly industrialization in Asia, including China as a big contributor.⁹⁰⁵

Mercury emissions can be transported far from the source on wind and ocean currents and be deposited into soils, waterways or plants. In the aquatic environment

⁹⁰¹ United Nations Environment Programme, 'MINAMATA CONVENTION ON MERCURY TEXT AND ANNEXES' (2019) 61 <<http://www.mercuryconvention.org/Portals/11/documents/Booklets/COP3-version/Minamata-Convention-booklet-Sep2019-EN.pdf>> accessed 20 August 2020.

⁹⁰² Kessler (n 29) 306.

⁹⁰³ UN Environment (n 100) 2.

⁹⁰⁴ Kessler (n 29) 305.

⁹⁰⁵ See more information at: <<https://wedocs.unep.org/bitstream/handle/20.500.11822/27579/GMA2018.pdf?sequence=1&isAllowed=y>> accessed 21 August 2020

microorganisms transforms Mercury into methylmercury which is the most toxic form and causes food poisoning from contaminated seafood.⁹⁰⁶

The all-time legacy effects of anthropogenic mercury emissions on global cycling are notable because of worldwide health concerns. Since the mercury emissions transfer from surface reservoirs to the subsurface ocean over a couple of years or decades and can persist there for decades or even centuries. Therefore, even an aggressive mercury reduction in primary anthropogenic emissions cannot stabilize ocean concentrations at present levels and needs to decrease more than usual.⁹⁰⁷

Sixty percent of present-day atmospheric deposition from surface reservoirs re-emitted from legacy anthropogenic, compared to 27% from primary anthropogenic emissions, and 13% from natural sources.⁹⁰⁸ In the last report by UNEP in 2018 the estimation for primary anthropogenic emissions and natural sources changed to 30% and 10% respectively.

5.6. The Ozone Depletion regime: the Vienna Convention and the Montreal Protocol

The ozone layer contains high concentrations of ozone (O₃ molecules) in the Earth's stratosphere. Ninety percent of atmospheric O₃ is found in the stratosphere, however it is still small amount comparing to the other gases in the stratosphere. The ozone (O₃) is mostly situated at altitudes of 25 km over the equator and 15 km over the poles. The ozone layer is supposed to protect the Earth's stratosphere by providing a shield against harmful exposure and absorb ultraviolet radiation from the sun and to control the temperature structure of the stratosphere. Serious levels of ultraviolet B (UVB) radiation have been found over Antarctica, and mountainous regions of Europe, there have also been some damages to phytoplankton in Antarctica discovered. Furthermore, Ozone at

⁹⁰⁶ Feiyue Wang and others, 'How Closely Do Mercury Trends in Fish and Other Aquatic Wildlife Track Those in the Atmosphere? – Implications for Evaluating the Effectiveness of the Minamata Convention' (2019) 674 *Science of the Total Environment* 58, 67 <<https://doi.org/10.1016/j.scitotenv.2019.04.101>>.

⁹⁰⁷ Helen M Amos and others, 'Legacy Impacts of All-Time Anthropogenic Emissions on the Global Mercury Cycle' (2013) 27 *Global Biogeochemical Cycles* 410, 419.

⁹⁰⁸ *ibid* 418.

low levels acts as a greenhouse gas and damages human health and environment in lower altitude, it increases allergen and irritant exposure, and has adverse effect on plant growth. The severe depletion of the ozone layer was occurring over the Antarctic in the southern hemisphere spring by the 1960s, it is known as the “ozone hole”. Although significant thinning and progressive ozone depletion was observed in the northern hemisphere by 1990s. In the last thirty years the anthropogenic pollutants cause the depletion of ozone layer by introducing certain gases and chemicals include chlorofluorocarbon (CFCs) and halons. When these gases come into contact with the ozone layer in the stratosphere, some interactions which break up the ozone molecules arise and ozone depletion occurs. Chlorofluorocarbon has been used in considerable amounts as refrigerants, air conditioner coolants, aerosol spray-can ingredients and in manufacture of Styrofoam.⁹⁰⁹

The International Law Commission of the United Nations, with the aim of preventing more depletion of the ozone layer and limiting the destructive elements, provided a legal regime including the 1985 Vienna Convention for The Protection of Ozone Layer, and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer. Both treaties received universal ratification by 196 States.

5.6.1. The 1985 Vienna Convention

The 1985 Vienna Convention was the first international treaty that addressed an exclusive environmental issue with a focus on the global atmospheric concern, which was open to participation by all industrialized nations and developing countries.⁹¹⁰ The Vienna convention was negotiated for five years following the studies preceding it within both international and national organizations and, in particular, of the World Plan of Action on the Ozone Layer of the United Nations Environment Program.⁹¹¹

The objective of this Convention is to provide appropriate measures to ‘protect human health and the environment against adverse effects resulting or likely to result from

⁹⁰⁹ Sands and others (n 336) 278.

⁹¹⁰ Galizzi (n 765) 8.

⁹¹¹ Sands and others (n 336) 279.

human activities which modify or are likely to modify the ozone layer'.⁹¹² The Framework Convention contained four categories of measures including cooperative monitoring, research, policy development, and implementation of international regime.⁹¹³ The Vienna Convention does not have a certain target and timetable, but it asked Parties to take 'appropriate measures' compatible with legal, scientific and technical means at their disposal and their capabilities. The cooperation of Parties leads to the implementation of the convention, and control, limit, reduce or prevent human activities that have or are likely to have adverse effects resulting from modification of the ozone layer.⁹¹⁴

Articles 3 and 4, and also Annex I, II of Vienna Convention detailed the type of research and systematic observations in this regard. It also addresses requirements of cooperation in legal, scientific, and technical fields, including facilitation of the exchange of scientific, technical, socio-economic, commercial and legal information relevant to the convention and the national regulation. Moreover, Parties shall take into account the needs of developing countries.⁹¹⁵ The principle of common but differentiated responsibility even before its articulate in the Rio Declaration was exerted in the Convention following the resistance of developing countries for a fairer environmental treaty.⁹¹⁶

The secretariat prepares and transmits reports based upon information received from Parties to the Conference of the Parties, on their implementation measures. The Conference of the Parties has functions, including adoption of protocols, additional annexes and amendment to protocols and annexes. Such annexes shall be restricted to scientific, technical and administrative matters and considered as an integral part of the Vienna Convention or its protocol. The Conference of the Parties although has the right

⁹¹² United Nations, 'Vienna Convention for the Protection of the Ozone Layer (Adopted 22 March 1985) 1513 UNTS 293' (n 707).

⁹¹³ Galizzi (n 765) 8.

⁹¹⁴ United Nations, 'Vienna Convention for the Protection of the Ozone Layer (Adopted 22 March 1985) 1513 UNTS 293' (n 707). Article 2

⁹¹⁵ *ibid.*

⁹¹⁶ Galizzi (n 765) 8.

to take 'any additional action that may be required for the achievement of the purposes of the Convention'.⁹¹⁷

5.6.2. The 1987 Montreal Protocol

Scientists from British Antarctic Survey and NASA in 1985 discovered a hole in the ozone layer over the entire Antarctic continent. International political and scientific endeavors undertaken to control the amount of ozone-destroying substances.⁹¹⁸

Subsequently the first and only protocol on the Vienna Convention, the 1987 Montreal Protocol provided measures to reduce ozone-destroying substances. The Protocol like the Vienna Convention is a global agreement with universal participation. 197 Parties to the protocol is one of the significant elements of its success. The Montreal Protocol was a successful international environmental agreement, which could survive the ozone layer.⁹¹⁹ Almost all the developed and developing States were motivated to participate in the Montreal Protocol due to its flexibility and new measures drawn from science and an agreement on finance and technology which helped with performance and achieving the target.⁹²⁰

The Montreal Protocol set out specific legal obligations to limit and reduce the calculated level of consumption and production of controlled substances. The 1987 Protocol adopted different Adjustments and Amendments with universal support in 1990, 1992, 1995, 1997, 1999, 2007 and the most recent amendment in 2016. The Montreal Protocol has regulations on Control Measures, Calculation of Control Level,

⁹¹⁷ United Nations, 'Vienna Convention for the Protection of the Ozone Layer (Adopted 22 March 1985) 1513 UNTS 293' (n 707). Articles 5-10

⁹¹⁸ 'The Ozone Hole' <<https://www.bas.ac.uk/data/our-data/publication/the-ozone-layer/>> accessed 1 July 2020.

⁹¹⁹ For analyzing the Montreal Protocol as a successful model for the solving complex transnational environmental problems see Frederike Albrecht and Charles F Parker, 'Healing the Ozone Layer: The Montreal Protocol and the Lessons and Limits of a Global Governance Success Story', Great Policy Successes (Oxford University Press 2019). The chapter examines how to attract sufficient participation, how to promote compliance and manage non-compliance, how to strengthen commitments over time, how to neutralize or co-opt potential 'veto players', how to make the costs of implementation affordable, how to leverage public opinion in support of the regime's goals, and, ultimately, how to promote the behavioral and policy changes needed to solve the problems and achieve the goals the regime was designed to solve.

⁹²⁰ Elizabeth R DeSombre, 'The Experience of the Montreal Protocol: Particularly Remarkable, and Remarkably Particular' (2000) 19 UCLA J. Envtl. L. & Pol'y 49, 76.

Control of Trade with Non-Parties, and also the Special Situation of Developing Countries.⁹²¹

The first amendments of the Montreal Convention started from the second meeting of the Parties in London in 1990. The important alterations were in the preamble part which considered the “developmental needs of developing countries”, the requirements of “additional financial sources and access to relevant technologies”, and “transfer of alternative technologies relating to Controlled Emission”. Article 1 of the 1990 amendment provided new definitions of “Controlled Substance”, “Production” and “Transitional Substance”. Article 2 was amended to provide new regulation on transfer of calculated levels of productions between parties. Moreover, new regulations were adopted on financial arrangements and transfer of technology and information.⁹²²

The 1992 Adjustments and Amendments were adopted in the fourth meeting of the Montreal Protocol in Copenhagen. The meeting established a new timetable for phasing out substances including, CFCs, halons, other fully halogenated CFCs, carbon tetrachloride, and trichloroethane (Methyl Chloroform).⁹²³ Also, the 1992 amendments added three new controlled substances to the Montreal Protocol, hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons and methyl bromide. The 1992 amendments later, listed further trade restrictions, new reporting requirements, developed the Implementation Committee, and prepared a suggestive list of measures to apply against noncompliant Parties, and introduced the Multilateral Fund on a permanent basis.⁹²⁴

The 1997 Montreal Amendment introduced a new timetable for phasing out the use of methyl bromide. Also, Article one of this Amendment provided a new licensing system

⁹²¹ United Nations, ‘1987 The Montreal Protocol’ (1989) 1522.

⁹²² Nations Unies, ‘The 1990 Amendment on Montreal Protocol’.

⁹²³ Document Information, ‘The 1992 Amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer, Copenhagen, 25 November 1992’.

⁹²⁴ Sands and others (n 336) 281.

that enables customs and police offices to track export and import trades of controlled substances.⁹²⁵

The 1999 amendment established new controls and limits on productions on Group I, Annex C substances. In addition, under Article 2I and Group III of Annex C added new controlled measures for bromochloromethane which asked Parties to ban production and consume of bromochloromethane substances by first of January 2002, except for “essential uses”, which permitted by the Protocol’s Meeting of Parties. Moreover, it provided new regulation on reporting on the annual amount of the controlled substances listed in Annex E used for quarantine and pre-shipment.⁹²⁶

The last achievement of the 1987 Montreal Protocol is the Kigali Amendment in 2016 through a forum, where countries, industries, non-governmental organizations, and scientists with the different negotiating techniques are brought together by the United Nations.⁹²⁷ Article 2J has limited and controlled the production and consumption of Hydrofluorocarbons (HFCs). Accordingly, developed countries are required to phase out using of HFCs by January 1, 2019. According to Article 5(1), Parties have to freeze consumption level of HFCs by 2024, with considering exceptional incompliance until 2028. It has expected by all Parties to consume no more than 15-20 percent of their perspective baselines, for developed countries by 2036 and for developing countries by 2045-2047. The 2016 Amendment is a major achievement for regulation of ozone depletion and preventing global warming. Since the HFCs are considered as a strong greenhouse gas which contribute in climate change and global warming.⁹²⁸

Whereas the regulations on “controlled substances” were the most important and complicated part of the Montreal Protocol, it was necessary to clarify and the notion of Article 2 which divided to ten Sub-Articles including Article 2A to Article 2I. Also, Annex

⁹²⁵ the 1997 Amendment on Montreal Protocol, the 1997 Amendment on Montreal Protocol 1999.

⁹²⁶ the 1999 Amendment on Montreal Protocol 1999.

⁹²⁷ Tina Birmpili, ‘Montreal Protocol at 30: The Governance Structure, the Evolution, and the Kigali Amendment’ (2018) 350 *Comptes Rendus Geoscience* 425, 429.

⁹²⁸ Sands and others (n 336) 281.

A provided two groups of “controlled substances” including chlorine substances in group I, and halon substances in group II. Furthermore, the ozone depleting potential of each substance categorized in the two groups. Subsequent Amendments also established new categories of controlled substances in Article 2C to 2J, and additional annexes of B, C, D and F to fulfill and implement the Montreal Protocol objectives and to attain the target of Vienna Convention. Article 2 and pursuant Amendments of the Montreal Protocol adopted provisions to limit and reduce consumption and production, and also phase out the specified controlled substances.

Article 2A of the 1987 Montreal Protocol established regulations on CFCs substances listed in Annex A, Group I. Consequently, production of the CFCs is entirely prohibited by all parties, except the case of “essential uses” that are permitted by other parties.⁹²⁹ Article 2B established regulations for the Halons listed in Group II of Annex A. Article 2C under the 1990 Amendment, established new provisions which required Parties to limit the calculated level of consumption and production of controlled substances in Annex B, Group I, including “Additional CFCs”. Moreover, the 1990 Amendment regulated the “Carbon Tetrachloride” under Article 2C, Group II of Annex B. The 1990 Amendments controlled the “Methyl chloroform” under Article 2E, and Group III of annex B.

According to Article 5(1), the obligations for the special situation of developing countries are different. For instance, they can apply different baseline years and extended periods to achieve the purpose of the Montreal Protocol.⁹³⁰

Under Article 6, all the industrial and developing countries have to assess the control measures every four years on the basis of available scientific, environmental, technical and economic information. All Parties were required by several Adjustments and Amendments to speed up the timetable for phasing out of controlled substances by imposing differentiated obligations.

⁹²⁹ *ibid* 283.

⁹³⁰ Nations (n 921).

Article 2(5) of the 1987 Montreal Protocol is regulated on transfer of production. Article 2(5bis) established by the 1992 Amendments, that allow any non-Article 5(1) party to transfer to another party any amount of its calculated level of consumption. The provisions set out under Articles 2A to 2F and 2H and 2J. Article 2(6) provides rules for any party not operating under Article 5 to complete facilities for the production of Annex A or Annex B controlled substances. Article 2(8) ask any Parties that are Member States of a regional economic integration organization may to “jointly fulfil” their obligations on consumption of controlled substances, their total combined calculated level of consumption does not exceed the levels required by protocol. All these operations shall be notified to the Secretariat by each of the Parties that has to deal with the transfer or full out facilities.

Further, in 2016 Parties agreed to phase down hydrofluorocarbons (HFCs) and replace low-global warming potential (GWP) and energy-efficient substitutes to protecting the ozone layer while also preventing climate change and exacerbating the greenhouse effect. The Montreal Protocol has taken an important first step to mitigate greenhouse gases and provides a great example of how multilateral efforts can enable global actions to combat climate change.⁹³¹

5.7. The Climate Change Regime: the UNFCCC, the Kyoto Protocol and the Paris Agreement

5.7.1. 1992 United Nations Framework Convention on Climate Change

Commonly international negotiations in the environmental field appeared in a legally binding treaty in the shape of softer framework conventions and harder legal instruments like protocols within their regime, such as ozone regime, biodiversity regime and climate regime. The constructivist-oriented and rationalist scholars cite the Vienna convention and its Montreal Protocol and deduce that the framework convention approach works in the climate regime due to internationalization and

⁹³¹ Mark W Roberts, ‘Finishing the Job: The Montreal Protocol Moves to Phase down Hydrofluorocarbons’ (2017) 26 *Review of European, Comparative & International Environmental Law* 220, 230.

monitoring norm, as well as cooperative research, transparency and information exchange.⁹³²

By raising the global concerns regarding climate change, General Assembly established an Intergovernmental Negotiating Committee to adopt measures on common concern of climate change caused by humankind. As a result, by recognizing the concerns that human activities have been substantially increasing the atmospheric concentrations of greenhouse gases, and that these increases enhance the natural greenhouse effect, and by taking into account that this will result on average in an additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind, adopted on 9 May 1992 and opened for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992.⁹³³ The United Nation Framework Convention on Climate Change in 1992 is a legally binding treaty containing minimal commitments based on the principle of 'common but differentiated responsibilities and capabilities'.

The Framework Convention requires ratification and is characterized as hard law, however according to the continuum approach and Chinkin view, the Framework Convention is considered a 'legal soft law' as it is hard law with imprecise and vague content.⁹³⁴ Although the Convention does not obligate States to comply with certain limitations on greenhouse gas emissions, it acknowledges the climate change as a serious threat and provides a basic framework for future action.⁹³⁵ Usually on high uncertainty issues non-legally binding agreements are preferred, however in the case of climate change (the UNFCCC and Kyoto protocol) which is a global concern also with the high risk of opportunism States have chosen the legal form of international

⁹³² Vihma (n 497) 156, 157.

⁹³³ General Assembly United Nations United Nations Framework Convention on Climate Change, 9 May 1992, S. Treaty Doc No. 102-38, 1771 UNTS 107, [UNFCCC] (n 360).

⁹³⁴ Vihma (n 497) 147.

⁹³⁵ Daniel Bodansky, 'The United Nations Framework Convention on Climate Change: A Commentary' (1993) 18 Yale J. Int'l L. 451, 455.

agreement.⁹³⁶ The framework is associated with shallow substance and flexibility to balance the risk of uncertainty.⁹³⁷

The UNFCCC takes a 'top-down' approach and determines the problem and sets out some global goals and obligations to all states according to a burden-sharing principle, without any quantified obligation.⁹³⁸ It establishes the general framework addressing climate change as follows: 1) general terms to stabilize greenhouse gas concentrations in the Atmosphere at a safe level that would prevent dangerous anthropogenic interference with the climate system. Moreover, limit anthropogenic emissions of greenhouse gases, protecting and enhancing greenhouse gas sinks and reservoirs by developed countries according to soft targets and timetables; 2) a number of guiding important principles of inter- and intra-generational equity, common but differentiated responsibilities, sustainable development, cost-effectiveness, and precautionary measures; 3) a financial mechanism to provide resources to grant and certain costs; 4) and two subsidiary bodies to the Conference of Parties.⁹³⁹

According to differentiated specific commitments, relating to emissions by sources and removal by sinks of greenhouse gases not controlled by the Montreal Protocol, and financial commitments, parties are required to implement the measures that are divided to three categories included in Annex I and II: developing countries, developed countries, and countries in transition.⁹⁴⁰

⁹³⁶ Raustiala had analyzed international agreements with a functional approach including the topic of climate change agreements. See Kal Raustiala, 'Form and Substance in International Agreements' (2005) 99 *American journal of international law* 581, 593.

⁹³⁷ *ibid* 601.

⁹³⁸ Adrian Macey, 'The Atmosphere, the Paris Agreement and Global Governance' (2017) 13 *Policy Quarterly* 26, 27.

⁹³⁹ Sands and others (n 336) 300.

⁹⁴⁰ Jiuping Xu, Liming Yao and Yi Lu, *Innovative Approaches towards Low Carbon Economics* (Springer 2014) 75.

5.7.2. The 1997 Kyoto Protocol to the United Nation Framework Convention on Climate Change

In line with the Article 2 of the UNFCCC that states its ultimate objective, which is to stabilize the concentration of greenhouse gases in the Atmosphere "at a level that would prevent dangerous anthropogenic (human) interference with the climate system." The Kyoto Protocol to the UNFCCC was adopted on 11 December 1997 as a result of UNFCCC negotiations for establishing mitigation policies and entered into force on 16 February 2005. The legally binding 1997 Kyoto protocol limited emissions targets and timetables for 'developed countries' which relied on soft law decisions of the Conference of Parties serving as the Meeting of the Parties to the Kyoto Protocol.⁹⁴¹ The Conference of Parties and meeting of parties (COP/MOP) in the view point of Chinkin and the continuum approach is considered 'delegated soft law'. The COP/MOP decisions can be seen as a type of soft law that "take note" of parties' actions and do not, *an sich*, require ratification, although national constitutions of some countries requires ratification for the content of any type of an international instrument.⁹⁴²

The negotiations in the first Conference of the Parties to UNFCCC in Berlin determined to inadequacy of the commitments of Article 4 of the Convention.⁹⁴³ The Kyoto Protocol set binding measures and a timetable to achieve the mitigation target via reducing six greenhouse gas emissions (Annex A: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and per fluorocarbons) by only developed country parties (Annex B).⁹⁴⁴

⁹⁴¹ Jacob Werksman and Kirk Herbertson, 'The Aftermath of Copenhagen: Does International Law Have a Role to Play in a Global Response to Climate Change?' (2010) 25 Maryland Journal of International Law 109, 112, 113.

⁹⁴² Vihma (n 497) 149.

⁹⁴³ For tracing the evolution of the climate regime under Kyoto Protocol and significant COP decisions see Lavanya Rajamani, 'From Berlin to Bali and beyond: Killing Kyoto Softly?' (2008) 57 The International and Comparative Law Quarterly 909.

⁹⁴⁴ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 27.

Considering the major share of industrialized countries in concentration of GHG emissions, Kyoto Protocol has divided the member States into two major categories of industrialized and developing countries. Under the Protocol, Annex B parties were required to reduce 5.2 percent of greenhouse emissions below 1990 levels in the first commitment period of 2008 to 2012.⁹⁴⁵ However, the EU attempted for adoption of mandatory and coordinated 'policies and measures'. The Protocol later was confronted the resistance by some Annex I Parties like the US, Canada and Australia and therefore taken more flexible approach.⁹⁴⁶ Accordingly, each Annex I party was required to attain its quantified emission limitation and reduction commitments under Article 3 to the Kyoto Protocol and shall implement policies and measures in accordance with its national circumstances. There are different ways under Article 2 of the Protocol for parties to meet their commitments, for instance: the enhancement of energy efficiency, the protection and enhancement of sinks and reservoirs of greenhouse gases and the promotion of sustainable forms of agriculture etc.⁹⁴⁷

The Kyoto Convention innovated the "flexibility mechanism" toward the cost-effective implementation of emission reduction commitments and encourage widespread participation.⁹⁴⁸ The flexibility mechanisms had both appreciated and critical aspects. These mechanisms provide mitigation incentives for countries to meet their commitment. However, this mechanism to some extent enabled Annex B countries to cheat and not comply with the environmental integrity.⁹⁴⁹

Kyoto Protocol provided three mitigations mechanisms: the first mechanism under Kyoto Protocol is the Joint Implementation (JI) that only involves Annex I parties by investing projects in another developed country aimed to earn anthropogenic emission reduction units. However, Kollmuss and Schneider claimed that three-quarters of the

⁹⁴⁵ A Ghezloun and others, 'The Post-Kyoto' (2013) 36 Energy Procedia 1, 2.

⁹⁴⁶ Sands and others (n 336) 309.

⁹⁴⁷ Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 11 December 1997, entered into force 16 February 2005) 2303 UNTS 148 (n 361).

⁹⁴⁸ J Gupta, 'Stretching Too Far: Developing Countries and the Role of Flexibility Mechanisms beyond Kyoto' (2009) 28 Stanford Environmental Law Journal 311, 331.

⁹⁴⁹

emission reduction units based on Kyoto units from JI projects were unlikely to represent additional emissions reductions.⁹⁵⁰ The JI mechanism in resulted perverse effects for Annex B countries in transition according to “hot-air” regulation.⁹⁵¹

The second flexible initiative is the Clean Development Mechanism (CDM), which needs the collaboration of developing countries, who can benefit from emission reduction projects of developed countries in line with achieving sustainable development. Moreover, developed countries can earn saleable emission reduction credits and achieve the compliance in the first commitment period. The Kyoto Protocol under Article 12 emphasized that the clean development mechanism should be supervised by an executive board.

According to the concept of additionality⁹⁵² The executive board should prevent from a non-additional project to achieve the environmental integrity objective. Some analysis illustrates that the process of overseen before 2008 was not exact, as a result, many of energy related projects in non-Annex B parties could be as non-additional projects. There was asymmetry information between project participants and the CDM executive board that required strict monitoring.⁹⁵³ The Kyoto Protocol determined that the emission reductions from projects must be certified by designated operational entities. Accordingly, the validation of proposed clean development mechanism was by

⁹⁵⁰ Anja Kollmuss, Lambert Schneider and Vladyslav Zhezherin, ‘Has Joint Implementation Reduced GHG Emissions? Lessons Learned for the Design of Carbon Market Mechanisms’ 128.

⁹⁵¹ Akihisa Kuriyama and Naoya Abe, ‘Ex-Post Assessment of the Kyoto Protocol – Quantification of CO₂ Mitigation Impact in Both Annex B and Non-Annex B Countries-’ (2018) 220 *Applied Energy* 286, 292 <<https://doi.org/10.1016/j.apenergy.2018.03.025>>.

⁹⁵² Additionality is the property of an activity being additional. A proposed activity is additional if the recognized policy interventions are deemed to be causing the activity to take place. The occurrence of additionality is determined by assessing whether a proposed activity is distinct from its baseline. See Michael Gillenwater, ‘What Is Additionality’ [2012] *Greenhouse Gas Management Institute Discussion Paper* (January 2012, accessed 4/6/2012)< <http://ghginstitute.org/2011/03/24/defining-additionality> 3.

⁹⁵³ Kuriyama and Abe (n 951) 288.

designated operational entities according to information of project design documents.⁹⁵⁴

Despite the fact that CDM was not successful in environmental integrity and did not help developing countries through the sustainable development, it had significant impacts on offset market, awareness and understanding about clean technologies, and future action on climate change in developing countries.⁹⁵⁵

The third mechanism under Kyoto Protocol was the international Emissions Trading (ET) by developed countries and countries in transition (Annex B parties).⁹⁵⁶ The parties are allowed to trade any unused emission permits in the carbon market to meet implementation of their commitments under the Protocol.⁹⁵⁷ Whereas the emission trading mechanism is more modest and cost efficient rather than project-based mechanisms (CDM and JI), it was expected that to be more welcomed by Annex B countries. Nevertheless, it was not used significantly and the CDM have been embraced between countries with targets.⁹⁵⁸ However some analysis on carbon trading after the Kyoto Protocol have shown more than \$10 billion was traded across all markets in 2005, \$30 million in 2006, and \$64 billion in 2007.⁹⁵⁹

⁹⁵⁴ Lambert Schneider, 'Is the CDM Fulfilling Its Environmental and Sustainable Development Objectives? An Evaluation of the CDM and Options for Improvement' [2007] Öko-Institut Report prepared for the World Wildlife Fund, Berlin 19.

⁹⁵⁵ *ibid* 73.

⁹⁵⁶ For a detailed examination of relation between the atmospheric degradation measures and the international trade regulations and specifically the carbon market under the Kyoto protocol and involving the WTO regulations see Thomas Cottier, Olga Nartova and Sadeq Z Bigdeli, *International Trade Regulation and the Mitigation of Climate Change: World Trade Forum* (Cambridge University Press 2009) 50.

⁹⁵⁷ Gupta (n 948) 332–334.

⁹⁵⁸ Michael Grubb, 'Full Legal Compliance with the Kyoto Protocol's First Commitment Period – Some Lessons' 673 677.

⁹⁵⁹ Liverman has argued that by choosing the market solution of trading carbon have been created a new and surreal commodity, unfairly allocated pollution rights to nation states based on 1990 emission levels, and established a new set north–south relations and carbon transactions in the name of sustainable development. Diana M Liverman, 'Conventions of Climate Change: Constructions of Danger and the Dispossession of the Atmosphere' (2009) 35 *Journal of historical geography* 279, 295.

Regarding the non-compliance situation, the Kyoto Protocol adopted two mechanisms, facilitative and enforcement approaches, with emphasize on binding consequences. The Conference of the Parties held in Morocco in 2001 (COP 7) established a mechanism to examine non-compliance by Annex I countries. In case of non-compliance, the enforcement branch can impose a penalty equal to 1.3 time with non-complying part of commitments, that will add to the second commitment period. Moreover, the non-compliant party must develop a compliance action plan and its eligibility to sell permits must be suspended.⁹⁶⁰ Although the enforcement mechanism was never applied as the Kyoto Protocol was replaced with 2015 Paris Agreement and there was no second commitment period.⁹⁶¹ Moreover, the protocol under Article 5 asked parties to establish a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases. Also, Article 7 required parties to provide and submit their annual inventories to incorporate the supplementary information necessary to demonstrate compliance with its commitments under this Protocol. Non-compliance with those articles would result in suspended eligibility to sell permits and participation in the triple Kyoto Mechanisms.⁹⁶²

The Copenhagen Conference (COP 15) held in 2009, according to mandate of the Bali Road Map, a framework for climate change mitigation beyond 2012.⁹⁶³ The COP failed due to many obstacles such as avoidance of the US and China as the two major emitters,

⁹⁶⁰ Cathrine Hagem and others, 'Enforcing the Kyoto Protocol: Sanctions and Strategic Behavior' (2005) 33 *Energy Policy* 2112, 2112.

⁹⁶¹ for discussing alternate approaches to climate agreement compliance approaches, including: entering agreed terms into domestic law; enforcement via escrow account mechanisms (the nature of the account and whether in the US funds or some other type of currency are discussed), with those in non-compliance forfeiting their share of the account to those in compliance; using trade as a retaliatory mechanism, either justified under the World Trade Organization (WTO, 1947, General Agreement on Tariffs and Trade (GATT) Article XX) or otherwise; opting for a more passive enforcement system such as the creation of a climate regulatory rating system; or, lastly, retreating from the goal of limiting warming to 2°C and falling back on the de facto enforcement regime of weakened country credibility should they not meet their treaty commitments. See Sean Walsh and John Whalley, 'Compliance Mechanisms in Global Climate Regimes: Kyoto and Post-Kyoto', *THE GLOBAL DEVELOPMENT OF POLICY REGIMES TO COMBAT CLIMATE CHANGE* (World Scientific 2014).

⁹⁶² Murase, 'Fifth Report on the Protection of the Atmosphere, International Law Commission, Seventieth Session, UN Doc A/CN.4/711, (New York, 30 April–1 June 2018; Geneva, 2 July–10 August 2018)' (n 644) 22.

⁹⁶³ Werksman and Herbertson (n 941) 113.

to accept legally binding obligations, reluctance of some other countries to make 'targets and timetables' commitments, as well as difficulties to agree on burden-sharing criteria and interpreting of CBDR principle.⁹⁶⁴ The outcome was only political commitments to a soft law that parties can add, modify or withdraw their submitted pledges or actions from without any restriction. The agreement required action on the part of all States and more States committed under the 'Copenhagen Accord'⁹⁶⁵ to mitigation reduction action than under the Kyoto Protocol which only places obligations on Annex I parties.⁹⁶⁶ Despite all the advantages and disadvantages of hard and soft law characteristics in climate regime, in the context of growing parallelism among developed and developing countries and a trade-off between hard law characteristics and effectiveness of the regime, Vihma argued that "The political context of parallelism and the drive towards "hard law" outcomes will make states hyper-cautious about what they commit to, potentially leading to decreased ambition, and possibly, an absence of a major player such as the US or China or Russia."⁹⁶⁷

The Cancún Conference (COP 16) hold in Mexico in 2010, the focus in Cancun was on a two-track negotiating process aiming to enhance long-term cooperation under the Convention and the Protocol.⁹⁶⁸ Among other points, the Cancun meeting agreed to commit to a maximum temperature rise of 2 degrees Celsius above pre-industrial levels, and to consider lowering that maximum to 1.5 degrees in the near future. It was also agreed that by 2012 a technology mechanism would be made fully operational to boost the innovation, development and spread of new climate-friendly technologies; to establish a Green Climate Fund to provide financing to projects, programs, policies and other activities in developing countries via thematic funding windows; on the Cancun

⁹⁶⁴ Macey (n 938) 27, 28. For example, basing the burden-sharing on per capita emissions, as many advocate, would directly oppose the two most populous countries, China and India; it suits the latter but not the former.

⁹⁶⁵ 'Decision 2/CP.15, Copenhagen Accord, UN Doc. UNFCCC/CP/2009/1 I/Add.i, 30 March 2010, at 4 [Copenhagen Accord, 2009]'.

⁹⁶⁶ See Joeri Rogelj and others, 'Analysis of the Copenhagen Accord Pledges and Its Global Climatic Impacts—a Snapshot of Dissonant Ambitions' (2010) 5 Environmental research letters 34013.

⁹⁶⁷ Vihma (n 497) 163; Barrett, Carraro and De Melo (n 748) 160.

⁹⁶⁸ International Institute for Sustainable Development (IISD), 'SUMMARY OF THE CANCUN CLIMATE CHANGE CONFERENCE' (2010) <<https://enb.iisd.org/vol12/enb12498e.html>> accessed 7 January 2021.

Adaptation Framework, which included setting up an Adaptation Committee to promote the implementation of stronger, cohesive action on adaptation.⁹⁶⁹ However, the agreements left many controversial issues such as the future (or lack thereof) of the Kyoto Protocol, the legal form and architecture of the future legal regime, and the extent of differential treatment between developed and developing States, remains to be authoritatively resolved.⁹⁷⁰

The assessment of Cancun would not be complete without considering the main reasons for Bolivia's opposition to the adoption of the outcomes of the meeting. These criticisms have clarified the shortcomings of the final agreement very well. First, Bolivia opposed the voluntary "pledge and review" approach, preferring binding commitments by developed nations. Secondly, Bolivia scorned decisions to continue carbon market mechanisms such as the CDM without binding mitigation commitments, contending that this would further dilute clearly meagre mitigation. Bolivia also noted that the mechanisms have already been identified to be off-the-path that would stabilize climate change, by limiting the global average temperature increase to the 2 C goal.⁹⁷¹

The Cancun Agreements had perceptible success as the meeting produced the basis for the most comprehensive and far-reaching international response to climate change the world had ever seen to reduce carbon emissions and build a system which made all countries accountable to each other for those reductions.⁹⁷²

The Durban Conference (COP 17) held in South Africa in 2011, decided to work on the details of second period of the commitments. The Durban Conference aimed to adopt a new 'universal' legal agreement on climate change 'applicable to all' including

⁹⁶⁹ 'Cancún Climate Change Conference - November 2010' <<https://unfccc.int/process-and-meetings/conferences/past-conferences/cancun-climate-change-conference-november-2010/cancun-climate-change-conference-november-2010-0>> accessed 15 December 2020.

⁹⁷⁰ Lavanya Rajamani, 'The Climate Regime in Evolution: The Disagreements That Survive the Cancun Agreements' [2011] *Carbon & Climate L. Rev.* 136, 146. See also Lavanya Rajamani, 'The Cancun Climate Agreements: Reading the Text, Subtext and Tea Leaves' (2011) 60 *International & Comparative Law Quarterly* 499.

⁹⁷¹ Soledad Aguilar, 'Outcomes of the Cancún Conference' (2011) 41 *Envtl. Pol'y & L.* 10, 13.

⁹⁷² 'Cancún Climate Change Conference - November 2010' <<https://unfccc.int/process-and-meetings/conferences/past-conferences/cancun-climate-change-conference-november-2010/cancun-climate-change-conference-november-2010-0>> accessed 15 December 2020; See also Jo Tyndall, 'From Cancun to Katowice: A Remarkable Journey' (2019) 44 *New Zealand International Review* 22.

developing and developed parties as soon as possible, and no later than 2015.⁹⁷³The negotiation under ‘the Durban Platform on Enhanced Action’ on legal form and nature of future agreement beyond the year 2020 after serious debates between India and EU and some other countries resulted to the necessarily ambiguous and legally imprecise wording of “agreed outcome with legal force” instead of “a Protocol, another legal instrument or agreed outcome with legal force under the Convention applicable to all”.⁹⁷⁴

In regard to elimination of the terms ‘protocol’, ‘legal instrument’ and ‘applicable to all’ from the decision of the Durban meeting had (was) conceived to constrain the negotiations on climate regime to a non-ratifiable instrument, also in terms of nature and extent of responsibility in favor of developing countries.⁹⁷⁵ However, in the view of the Alliance of Small Island States, the EU and other developed countries, the agreement makes a ratifiable treaty in legally binding and hard law form.⁹⁷⁶ After the Durban Conference Canada, Japan and the Russian Federation made it clear that they had no intention to extend their commitment and taking any new obligations in the second period of the Kyoto Protocol. Later, Canada declared on 12 December 2011 that it would formally withdraw from the Kyoto Protocol.⁹⁷⁷

The Doha Conference in 2012(COP18) adopted an amendment to the Kyoto Protocol and prescribed precise commitments for annex I parties during the second commitment period. However, some developed countries decided that their commitments would not be prescribed in the amendment. Indeed, this amendment set binding commitments to

⁹⁷³ ‘Durban Climate Change Conference - November 2011’ <<https://unfccc.int/process-and-meetings/conferences/past-conferences/durban-climate-change-conference-november-2011/durban-climate-change-conference-november-2011>> accessed 6 March 2020.

⁹⁷⁴ Lavanya Rajamani, ‘Deconstructing Durban’ (*Indian Express*, 2011) <<http://archive.indianexpress.com/news/deconstructing-durban/887892/2>>. accessed 6 March 2020

⁹⁷⁵ Vihma (n 497) 159.

⁹⁷⁶ Byrnes and Lawrence (n 508) 45.

⁹⁷⁷ Yu Hu and Carlos Rodríguez Monroy, ‘Chinese Energy and Climate Policies after Durban: Save the Kyoto Protocol’ (2012) 16 *Renewable and Sustainable Energy Reviews* 3243, 3244.

the member countries of European Union and other eight countries.⁹⁷⁸ Although, the Doha Amendment has not yet entered into force.⁹⁷⁹

The Warsaw Conference in 2013 (COP 19) discussed the key headlines of the desired agreement to be adopted at the twenty-first Conference of the Parties, which was held in Paris in 2015. The Warsaw Conference decided to invite “all Parties” to elaborate their intended nationally determined contributions and to communicate them well in advance of the twenty-first conference, without prejudice to the legal nature of the contributions.⁹⁸⁰ Also the ensuing debates at COP 18 in 2012 on the issue of loss and damage,⁹⁸¹ the Warsaw Conference established ‘the Warsaw International Mechanism for Loss and Damage’ associated with Climate Change Impacts, to address loss and damage in developing countries that are particularly vulnerable to the adverse effects of climate change.⁹⁸² The Mechanism carries out three types of functions as following: enhancing knowledge and understanding of comprehensive risk management approaches; strengthening dialogue, coordination, coherence, and synergies among relevant stakeholders; and enhancing action and support as to enable countries to take action to address loss and damage.⁹⁸³ However Kugler and Sariago have argued that even though the notion of “loss and damage” could formally be a legal concept, it is substantially useless with regard to reparation under international law because it is too

⁹⁷⁸ Erin C Pischke and others, ‘From Kyoto to Paris: Measuring Renewable Energy Policy Regimes in Argentina, Brazil, Canada, Mexico and the United States’ (2019) 50 *Energy Research and Social Science* 82, 83 <<https://doi.org/10.1016/j.erss.2018.11.010>>. accessed 10 January 2021.

⁹⁷⁹ ‘2012 Doha Amendment’ <https://unfccc.int/kyoto_protocol> accessed 20 March 2020.

⁹⁸⁰ Wolfgang Sterk, ‘Warsaw Groundhog Days: Old Friends, Positions and Impasses Revisited All Over Again at the 2013 Warsaw Climate Conference’ 1, 6.

⁹⁸¹ For analysis of a multi-actor negotiation in the context of the UNFCCC and role of the Alliance of Small Island States (AOSIS) during the negotiations in 2012 in Doha see Ali Arshad and others, ‘The Alliance of Small Island States (AOSIS) during the COP 18 Negotiations’ (2019) 13 *European Journal of International Management* 678.

⁹⁸² UNFCCC, ‘Warsaw International Mechanism for Loss and Damage Associated with Climate Change Impacts (WIM)’ (2013) <<https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage-ld/warsaw-international-mechanism-for-loss-and-damage-associated-with-climate-change-impacts-wim>> accessed 10 January 2021.

⁹⁸³ For a detailed examination of Loss and Damage from the Impacts of Climate Change under the UNFCCC see Ohdedar (n 584).

ambiguous. They support the doctrine of “climate change damage” that could be useful with regard to reparation under International Public Law.⁹⁸⁴

While the Kyoto Protocol was the first international mechanism aiming to mitigate GHGs there are serious criticisms over the effectiveness of the Protocol. On one hand the United States as the major contributor in GHG emissions has not joined the Protocol⁹⁸⁵ and Canada later withdrew from the protocol; and on the other hand even in the case of full compliance of parties, the mitigation policies were far from ambitious. The preamble of the UNFCCC refers to the historical responsibility of the developed States that contributed the most in the production of GHG emissions. Therefore, while recognizing the developing countries’ rights on the economic and social development, the convention put the mitigation policies burden on developed nations. However, it could be argued that in cases of countries like China and Brazil, this framework has led to a considerable expansion of the GHG emission production.⁹⁸⁶ The statistics illustrate that the Annex I countries have experienced a steady production of the GHG emission during 1990-2011. At the same time, the non-annex I countries have faced a 3 percent annual increase in GHG emissions.⁹⁸⁷ It can be said that the historical responsibility principle shall be only applied to the issue of compensation, and the mitigation responsibility shall extend to the developing countries, especially by emphasizing on the use of new carbon reduction technologies in the procedure of economic and industrial development.⁹⁸⁸

The Kyoto Protocol with top-down approach did not make enough ambition for mitigation emission by Parties. This was required to set appropriate emission reduction

⁹⁸⁴ Kugler and Sariago have proposed a definition of ‘climate change damage’ understood as a residual damage, whether material, moral or environmental, that might lead to reparation under international public law. Noémie Rachel Kugler and Pilar Moraga Sariago, “Climate Change Damages”, Conceptualization of a Legal Notion with Regard to Reparation under International Law’ (2016) 13 Climate Risk Management 103, 110.

⁹⁸⁵ Werksman and Herbertson (n 941) 113.

⁹⁸⁶ Jose Goldemberg and Patricia Guardabassi, ‘Burden Sharing in the Implementation of the Climate Convention’ (2015) 81 Energy Policy 57 <<http://dx.doi.org/10.1016/j.enpol.2015.02.015>>.

⁹⁸⁷ *ibid* 58.

⁹⁸⁸ *ibid* 59,60. In regard to States responsibility on compensation, mitigation, and weaknesses of the UNFCCC regime see Lana Goral, ‘Climate Change and State Responsibility-Migration as a Remedy?’

targets to attain the real emission reduction impacts.⁹⁸⁹ Sufficient emission caps would provide domestic mitigation incentives and prevent increasing emissions as happened to Annex B parties with economies in transition.⁹⁹⁰ Despite to all criticisms, for a fair examination of the Kyoto Protocol's effectiveness would be better to compare the current emissions and the expected business as usual (BAU) emissions of the industrial countries in the absence of the protocol. Looking at it this way the Kyoto Protocol was successful as at least preventing a worse situation and increasing emission levels in industrial countries which was expected to higher emission levels.⁹⁹¹ Miyamoto and Takeuchi claimed that the Kyoto Protocol had indirect effects on climate change by impact of the international diffusion of renewable energy technologies. The patent applications increased in Annex B countries, further influenced some countries without any commitments such as: Brazil, China, India and Mexico.⁹⁹² Despite many deficiencies and shortcomings in the Kyoto Protocol that made barriers through environmental integrity and real reduction GHG emissions, Grubb argues that the committed parties especially developed countries had totally compliance with the Kyoto Protocol in first period commitments of 2012. This 100% compliance shows the international law is relevant, though it does not mean enough impact on climate change and secure its harm damages.⁹⁹³

5.7.3. The Paris Agreement

The Paris Agreement is the first ever 'universal' climate change agreement, adopted at the Paris climate Conference (COP21) in December 2015, and entered into force in November 2016.⁹⁹⁴ The Agreement is the milestone in climate change regime that

⁹⁸⁹ Kuriyama and Abe (n 951) 293.

⁹⁹⁰ *ibid* 287.

⁹⁹¹ Nada Maamoun, 'The Kyoto Protocol: Empirical Evidence of a Hidden Success' (2019) 95 *Journal of Environmental Economics and Management* 227, 230 <<https://doi.org/10.1016/j.jeem.2019.04.001>>.

⁹⁹² Mai Miyamoto and Kenji Takeuchi, 'Climate Agreement and Technology Diffusion: Impact of the Kyoto Protocol on International Patent Applications for Renewable Energy Technologies' (2019) 129 *Energy Policy* 1331, 1337 <<https://doi.org/10.1016/j.enpol.2019.02.053>>.

⁹⁹³ Grubb (n 958) 674.

⁹⁹⁴ 'What Is the Paris Agreement?' <<https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement>> accessed 5 June 2020.

succeed to bring 196 parties together to transform their development trajectories so that they set the world on a course towards sustainable development.

The Agreement under Article 2.1 aims to 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 to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty.⁹⁹⁵

During the Paris negotiation developed countries had a considerable desire for soft law in respect of their commitments in the climate regime. The transformation towards soft law had started since the Bali meeting (COP 13) and 'Bali Action Plan' in 2007. Thereafter in the Cancun (COP 16) and Durban (COP 17) decisions were changed the language of 'commitments' to 'targets' and 'promote comparability' to 'ensuring comparability'.⁹⁹⁶ Subsequently, despite to the controversial negotiations over the legal form of the Agreement, following to Durban mandate and within the definition of the VCLT, the Agreement formed as a legally binding (hard law) treaty.⁹⁹⁷

Macey argues that tendencies from Bali meeting moved to softer obligation and less delegation on developed country commitments, and harder obligation, delegation and precision on major developing country reporting and transparency.⁹⁹⁸ As a result, the Paris agreement has a 'hybrid' nature, legally binding obligations and provisions under

⁹⁹⁵ The 1.5°C goal formed during the Paris negotiation following to efforts of the High Ambition Coalition (including the small island states, African developing countries, the EU, Mexico Canada Brazil and the United States.) Sands and others (n 336) 320.

⁹⁹⁶ Vihma (n 497) 160.

⁹⁹⁷ Daniel Bodansky, 'The Legal Character of the Paris Agreement' (2016) 25 Review of European, Comparative & International Environmental Law 142, 150.

⁹⁹⁸ Vihma (n 497) 160.

the agreement like to provide the ‘nationally determined contribution’, and non-legally binding provisions like content of NDCs.⁹⁹⁹

The flexibility of agreement in achieving the target through the NDCs can encourage parties to adopt policies that are more ambitious. However, lack of an enforcement mechanism can raise problems in achieving the targets. Nevertheless, it should not be ignored that more than imposing international enforcement (which may be in form of imposing soft or hard sanctions by other governments on countries failed to achieve NDCs’ targets, and objectives of the agreement), the bottom-up nature of the agreement provides the legal enforcement mechanism at the national levels.¹⁰⁰⁰

Byrnes & Lawrence argued that the parties’ self-interest and self-differentiation in the Paris Agreement may lead to unjust NDCs outcome. Moreover, due to the legal form of mitigation commitments, which are in form of non-binding and soft law obligations out of the core Paris Agreement could be caused more unjust result far to meet the needs of international and intergenerational justice in the climate change.¹⁰⁰¹ As Daniel Bodansky’s in 2012 had predicted the Agreement is a shift from a contractual or prescriptive function for the regime towards a new facilitative function that “starts from what countries are doing on their own, and seeks to find ways to reinforce and encourage these”. Thus, the greatest loophole of the Paris Agreement is the implementation gap. A detailed examining of the greatest environmental justice instruments developed from Stockholm to Rio to Paris illustrate a disappointing trend of abundant soft laws lumped up as expressions of serious desires for global environmental justice.¹⁰⁰²

⁹⁹⁹ Macey (n 938) 29.

¹⁰⁰⁰ Rob Bailey and Shane Tomlinson, ‘Post-Paris: Taking Forward the Global Climate Change Deal’ [2016] Chatham House. Briefing. April 3.

¹⁰⁰¹ Byrnes and Lawrence (n 508) 66.

¹⁰⁰² Kwame Richard Klu & Kwame Yaro Appiah, ‘The Environmental Legal Trilogy- From Stockholm To Rio To Paris: Some Global Responses To The Problem Of Climate Change Towards Achieving Sdgs’ The Africa Center For Sdgs Research And Policy Journal 1, 42–43.

The preamble paragraph of the Agreement addresses the issues related to climate change. Also, for the first time, the relationship between human right and climate change regime has been acknowledged.¹⁰⁰³ The Agreement reads: “climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity”.

Moreover, there are other unprecedented concepts mentioned in the preamble of the agreement including:

- The intrinsic relationship that climate change actions, responses and impacts have with equitable access to sustainable development and eradication of poverty;
- The fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change;
- The imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities;
- The importance of ensuring the integrity of all ecosystems, including oceans, and the protection of biodiversity, recognized by some cultures as Mother Earth;
- The importance for some of the concept of "climate justice", when taking action to address climate change;

¹⁰⁰³ Dietzel believes towards protecting the human right to health the Paris Agreement presents no more than a small step forward, and does not represent policy which protects the right to health of present and future generations. He suggests First, policy makers must discuss whether the loose compliance measures outlined in the Paris Agreement could be strengthened to create a political context where emissions are likely to be kept in check. Second, in the run up to implementation, policy makers should aim to more clearly set out the responsibilities of developed and less developed countries. Third and finally, the INDCs, as they stand, put the human right to health at substantial risk, and should be revised by policy makers as a matter of urgency. See Alix Dietzel, ‘The Paris Agreement–Protecting the Human Right to Health?’ (2017) 8 Global Policy 313.

- The importance of the engagements of all levels of government and various actors, in accordance with respective national legislations of Parties, in addressing climate change;
- That sustainable lifestyles and sustainable patterns of consumption and production, with developed country Parties taking the lead, play an important role in addressing climate change;

According to Article 2.2 the Agreement will reflect “equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances”. The additional phrase ‘in the light of different national circumstances’ generates a new understanding and evolution of the CBDRs principle that gives rise to more flexibility than the ‘firewall’ between developed and developing countries obligations under the Kyoto Protocol.¹⁰⁰⁴ The Paris Agreement with a bottom-up approach provides a ‘self-differentiation’ and more freedom for parties which was basically perused to avoid same tensions during the Copenhagen negotiations.¹⁰⁰⁵

Moreover, to achieve the long-term temperature goals, set out in Article 2.1, the first part of Article 4.1 recognizes to reach ‘global peaking’ as soon as possible, with a longer timetable for developing countries in the light of ‘different national circumstances’.¹⁰⁰⁶

The lack of definition between ‘developed’ and ‘developing’ countries may cause the Paris Agreement to face the same problems under the Annexes of the UNFCCC and Kyoto protocol. The analysis of the top 50 emitters based on different approaches (including the South-North Dialogue, Sao Paulo Proposals, Greenhouse Development

¹⁰⁰⁴ Jacqueline Peel, ‘Foreword to the TEL Fifth Anniversary Issue: Re-Evaluating the Principle of Common but Differentiated Responsibilities in Transnational Climate Change Law’ (2016) 5 *Transnational Environmental Law* 245, 148, 149.

¹⁰⁰⁵ Bailey and Tomlinson (n 1000) 3.

¹⁰⁰⁶ Mayer traced the three relevant provisions on human right in the Paris Agreement as: A first series of provisions highlight certain affinities between the objectives of the climate regime and objectives related to the advancement of human rights. A second series of provisions calls for integrating particular human rights considerations within climate actions. A third series of provisions mentions human-rights-related considerations merely as a relevant “context” for actions against climate change and its impacts, without specifying in what ways these elements are relevant—whether, for instance, human rights could be conducive, or rather an obstacle, to climate actions. He argued the provisions are mostly vague and incantatory. Benoit Mayer, ‘Human Rights in the Paris Agreement’ (2016) 6 *Climate Law* 109, 115–117.

Rights and Historical Responsibilities proposals) illustrate that some of the non-Annex countries (Which are considered developing countries in the Kyoto Protocol) have higher responsibilities than many of Annex-I countries. Besides, some non-Annex countries in the UNFCCC such as Kuwait, China, the UAE, Singapore, Saudi Arabia, South Korea, Brazil and South Africa should be recognized as developed countries in the Paris Agreement rather than developing countries according to all proposals.¹⁰⁰⁷

The Nationally Determined Contributions (NDCs) main technique of the agreement are imposed to all parties to set out their pledges for climate action and attain the objectives of Article 2 by adopting the domestic mitigation measures.¹⁰⁰⁸

The Agreement requires parties to be ‘ambitious’ in providing NDCs and representing ‘a progression’ every five years, this ‘dynamic’ review mechanism will be filed emission gap to reduce the sufficient number of emissions towards net zero emissions by the second half of the century.¹⁰⁰⁹

The Agreement has taken the ‘targets and timetables’ and ‘long-term transition’ approaches respectively by the five- yearly NDCs review to monitoring the progress of reduction and over the long term achieving the target.¹⁰¹⁰ COP decisions (non-binding instrument) will be clarified parties obligations in respect to particular elements in their NDCs, methodology, scope and coverage, appropriate base year, fairness and ambition, in the light of Parties national circumstances, and how they contribute towards achieving the objective of the Agreement.¹⁰¹¹

¹⁰⁰⁷ Izzet Ari and Ramazan Sari, ‘Differentiation of Developed and Developing Countries for the Paris Agreement’ (2017) 18 Energy Strategy Reviews 175, 176, 179.

¹⁰⁰⁸ ‘The Paris Agreement and NDCs’ <<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/nationally-determined-contributions-ndcs>> accessed 1 June 2020.

¹⁰⁰⁹ Bailey and Tomlinson (n 378) 5; See Christina Voigt and Felipe Ferreira, ‘“Dynamic Differentiation”: The Principles of CBDR-RC, Progression and Highest Possible Ambition in the Paris Agreement’ (2016) 5 Transnational Environmental Law 285.

¹⁰¹⁰ Macey (n 938) 30.

¹⁰¹¹ Peter Lawrence and Daryl Wong, ‘Soft Law in the Paris Climate Agreement: Strength or Weakness?’ (2017) 26 Review of European, Comparative & International Environmental Law 276, 280.

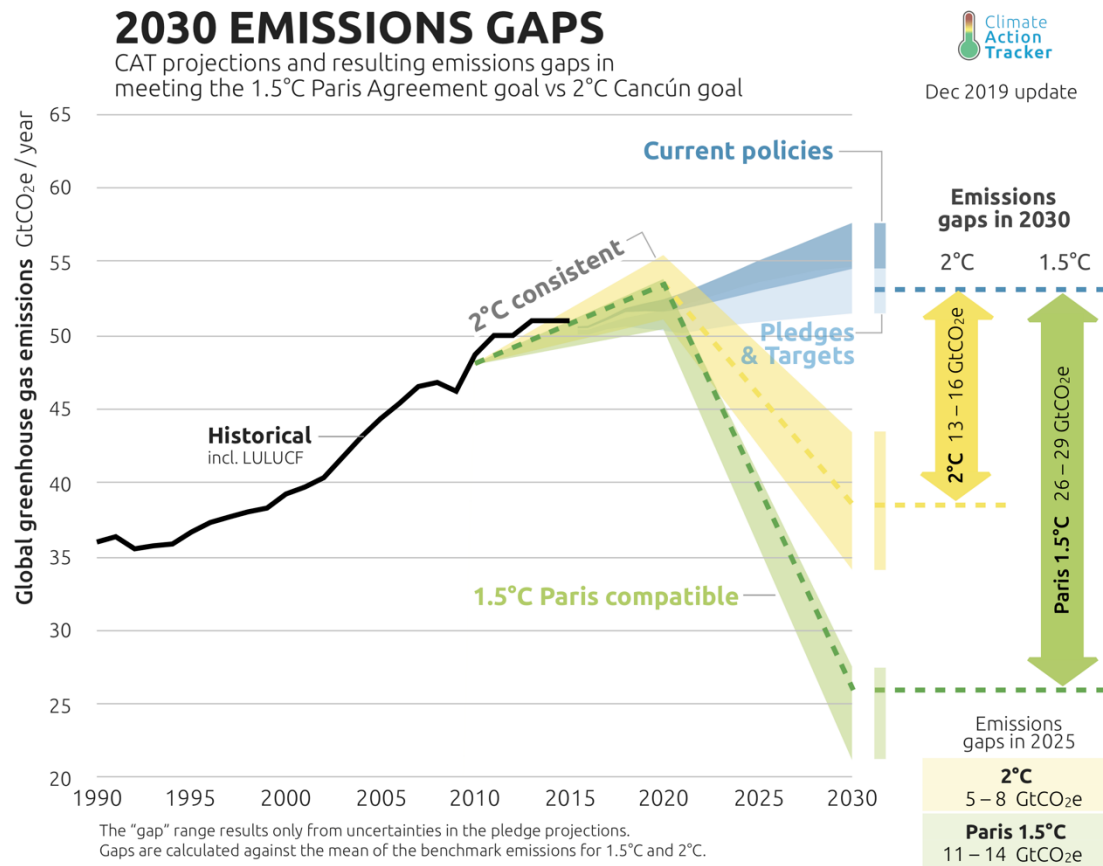
However, the content of NDCs depends on the preference of each party. Providing information in order to facilitate clarity, transparency and understanding also follows the same pattern. Parties shall account for their nationally determined contributions and promote environmental integrity, transparency, accuracy, completeness, comparability and consistency, and ensure the avoidance of double-counting.¹⁰¹² For example, to avoid the double-counting the transparency framework will apply only to states and ignore the non-states actions as they may already be counted in national targets.¹⁰¹³

The parties accepted to update NDCs with the highest possible ambition and represent a progression beyond the current NDCs and contribute towards meeting the Paris Agreement's 1.5°C warming limit. However, according to the latest country's targets updated by 2020 for 2030 and some early proposed for mid-century net-zero targets, probably the amount of emission reduction is not sufficient for 2030 targets, therefore consequently would not be aligned with pathways that can meet mid-century net-zero targets, thus as the IPCC SR1.5 determined the ability to limit warming to 1.5°C is compromised.¹⁰¹⁴

¹⁰¹² Sands and others (n 336) 322.

¹⁰¹³ Bailey and Tomlinson (n 1000) 4.

Figure 6. Emissions gap under different scenarios till 2030



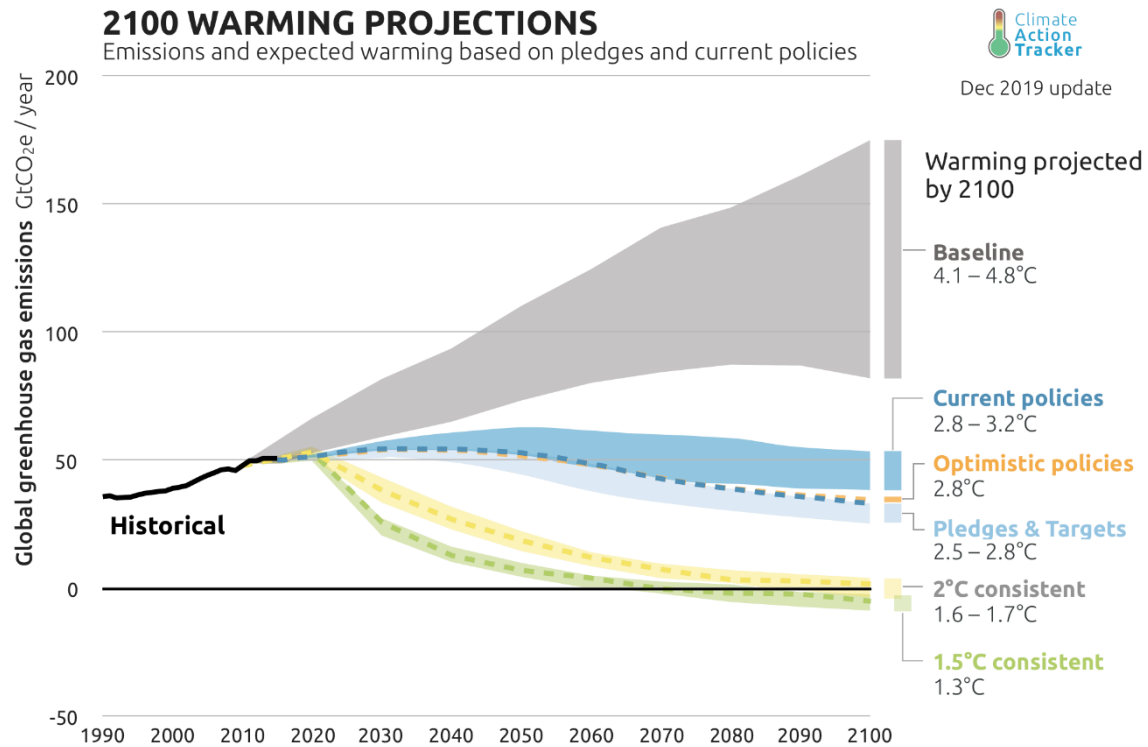
Source: <https://climateactiontracker.org>¹⁰¹⁵

This could be due to a very soft compliance mechanism that the Agreement designed by a measurable, reportable and verifiable view (MRV).¹⁰¹⁶ Under Article 15, the compliance mechanism works by a committee that shall be expert-based and facilitative in nature and function in a manner that is 'transparent', 'non-adversarial' and 'non-punitive'. The committee shall pay particular attention to the respective national capabilities and circumstances of Parties and operate under the modalities and procedures adopted by the COP decisions.

¹⁰¹⁵ '2030 Emission Gaps' <<https://climateactiontracker.org/global/cat-emissions-gaps/>> accessed 18 June 2020.

¹⁰¹⁶ Macey (n 938) 28, 29.

Figure 7. Emissions gap under different scenarios till 2100



Source: <https://climateactiontracker.org>¹⁰¹⁷

Zahar believes that the bottom-up compliance mechanism of the Paris Agreement should be suspended and go back to the Enforcement Branch of Kyoto Protocol including the processes of International Assessment and Review (IAR) and International Consultation and Analysis (ICA).¹⁰¹⁸

Similarly, Lawrence and Wong have argued that the Paris Agreement with the nature of voluntary non-binding NDCs without any kind of sanctions would be dysfunctional to meet the objectives of agreement and solve the problem of climate change. The Agreement faces lack of political desire to adopt binding obligations and change of behavior such as ozone agreements, World Trade Organization agreements and arms

¹⁰¹⁷ '2030 Emission Gaps' (n 1015).

¹⁰¹⁸ Alexander Zahar, 'A Bottom-up Compliance Mechanism for the Paris Agreement' (2017) 1 Chinese Journal of Environmental Law 69, 98.

control treaties. Therefore, they suggested to move the Agreement towards binding mandatory obligations (hard law) by COP decisions or better by political declaration.¹⁰¹⁹

Parties under Article 4.2 are required to take national mitigation measures in the light of 'different national circumstances. Therefore, the agreement asked developed country Parties to continue taking the lead by undertaking economy-wide absolute emission reduction targets, as well as developing country Parties should continue enhancing their mitigation efforts and are encouraged to move over time towards economy-wide emission reduction or limitation targets. Also, Article 4.6 states: "The least developed countries and small island developing States may prepare and communicate strategies, plans and actions for low greenhouse gas emissions development reflecting their special circumstances". This view tried to eliminate distinctions between countries and take into account 'diverse national circumstances'. Therefore under Article 4.19 Parties are asked to formulate and communicate long-term low greenhouse gas emission development strategies. Moreover, the Agreement under Article 4.15 requires developed countries to consider the concerns of parties with economies most affected by the impacts of response measures, particularly developing country Parties. The Agreement under Article 4.5 required developed country parties to support developing country parties to implement the Agreement by financial resources, technology development and capacity-building actions. Developed countries have been required to allocate a USD 100 billion climate finance per year by 2020 and to extend this until 2025 to support adaptation and mitigation in developing countries towards their collective goal. The 2019 OECD report on developed countries' climate finance for climate action in developing countries illustrated that developed countries are making progress on climate finance and the indications are that the upward trend will continue. Climate finance to developing countries reached USD 71.2 billion in 2017, up from USD 58.6 billion in 2016.¹⁰²⁰

¹⁰¹⁹ Lawrence and Wong (n 1011) 282, 286.

¹⁰²⁰ 'Paris Agreement' <https://ec.europa.eu/clima/policies/international/negotiations/paris_en> accessed 15 June 2020.

Parties, including regional economic integration organizations and their member States, can agree to act jointly in implementing mitigation commitments and shall notify the secretariat of the terms of that agreement, including the emission level allocated to each Party within the relevant time period, when they communicate their NDCs. Each Party to a joint implementation agreement including parties acting jointly in the framework of a regional economic integration organization shall be responsible for its emission level as set out in the agreement. Moreover creating 'coalition of willing' and 'climate club' among small numbers of like-minded governments and non-state actors can help to find particular and practical ways for transform towards common targets and collective goals in line with the NDCs of members. The potential areas to drive transformation change include innovation and R&D, carbon trading, forest and land-use change, common efficiency standards, and dietary change.¹⁰²¹ Nordhaus believes to be a functional climate coalition it has to be enforced by sanctions to achieve substantial abatement.¹⁰²²

Towards net removal of carbon from the atmosphere, the Agreement aimed to achieving a balance between anthropogenic emissions by sources and removals by 'sinks' of greenhouse gases. The Agreement in preambular paragraph recognizes 'the importance of the conservation and enhancement, as appropriate, of sinks and reservoirs of the greenhouse gases' based on the UNFCCC. The Agreement did not provide new mechanism and incorporated to REDD+ mechanism and endorsed other relevant COP decisions.¹⁰²³

Article 5.2 encouraged parties to take action to implement and support through results-based payments, REDD+ activities and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of incentivizing, as appropriate, non-carbon benefits associated with such approaches.

¹⁰²¹ Bailey and Tomlinson (n 1000) 8.

¹⁰²² William Nordhaus, 'Climate Clubs: Overcoming Free-Riding in International Climate Policy' (2015) 105 *American Economic Review* 1339, 1368.

¹⁰²³ Sands and others (n 336) 323, 324.

The Paris Agreement with a “Crème Brûlée” approach¹⁰²⁴ has a trade-off between a hard law agreement with assurance ambition and effectiveness and a soft law agreement with more participation. The Agreement with a dynamic view succeeded overcoming the reluctance of governments to join an international treaty to meet the common concern of climate change by imposing non-binding obligations and bottom-up process on all Parties (without any distinction to developed and developing countries) and achieving a universal participation accord with contributions from the major emitters like US and China. However, the Agreement would be a gamble for future generation and the global ecological system in absence of an effective compliance mechanism.¹⁰²⁵

A detailed examination of the greatest environmental justice instruments developed from Stockholm to Rio to Paris illustrate a disappointing trend of abundant soft laws lumped up as expressions of serious desires for global environmental justice. The greatest loophole of the Paris Agreement is the implementation gap. Thus, the Agreement has been faced with different comments.

¹⁰²⁴ For further see: Jonathan Pickering and others, ‘Global Climate Governance between Hard and Soft Law: Can the Paris Agreement’s “Crème Brûlée” Approach Enhance Ecological Reflexivity?’ (2019) 31 *Journal of Environmental Law* 1; See also, Lavanya Rajamani, ‘The 2015 Paris Agreement: Interplay between Hard, Soft and Non-Obligations’ (2016) 28 *Journal of Environmental Law* 337.

¹⁰²⁵ Lawrence and Wong (n 1011) 286.

PART III. JUDICIAL PROTECTION OF THE ATMOSPHERE

Chapter 6. Main International Jurisprudence

Negotiation and adjudication tend to represent alternative ways of addressing environmental problems. Throughout most of its history, international environmental law has developed primarily through negotiations. However, the pace of the Court's environmental decision-making has increased in recent years.

There are several judicial decisions by international courts and tribunals dealing with the atmosphere. The *Trail Smelter* case of 1938 and 1941 laid the ground for the development of the international law on the transboundary air pollution. *Trail Smelter* remains a leading case even today affirming the customary principle of "good neighborliness" in bilateral arrangements between neighboring countries. The case is representative of the traditional type of international environmental dispute in the sense that the causes and effects of the environmental damages are identifiable and, in the sense, that territorial state is under obligation to the exercise due diligence over the activities of the individuals and companies within its territory, in order to ensure that these activities do not cause harm to other States and their nationals.

Following the *Trail Smelter* operation, the *Nuclear Test* case *Australia v. France*¹⁰²⁶, *New Zealand v. France*¹⁰²⁷ in 1973 brought to the International Court of Justice. Also, the ICJ in its advisory opinion on the *Legality of the Threat or Use of Nuclear Weapons* in 1996 referred to the general obligation of States to refrain from causing significant environmental damage beyond the borders.¹⁰²⁸

¹⁰²⁶ International Court of Justice, 'Nuclear Tests, *Australia v France*, Judgment on Admissibility, [1974] ICJ Rep 253, ICGJ 133 (ICJ 1974), 20th December 1974' <<https://www.icj-cij.org/en/case/58>> accessed 21 March 2018.

¹⁰²⁷ International Court of Justice, 'Nuclear Tests, *New Zealand v France*, Admissibility, Judgment, [1974] ICJ Rep 457, ICGJ 137 (ICJ 1974), 20th December 1974' <<https://www.icj-cij.org/en/case/59>> accessed 21 March 2018.

¹⁰²⁸ International Court of Justice, 'Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ICJ GL No 95, [1996] ICJ Rep 226, ICGJ 205 (ICJ 1996), 8th July 1996'.

The *Gabcikovo-Nagymaros Project* case¹⁰²⁹ between Slovakia and Hungary in 1997, case was essentially concerned with the use of an international watercourse and was not directly related to the atmosphere. The ICJ nonetheless touched on several issues relevant to the topic, the findings of which could also be applicable to the protection of the atmosphere. The Court addressed the issue of environmental harm in broader perspective.¹⁰³⁰ The *Pulp Mills on the River Uruguay* case (Argentina v. Uruguay),¹⁰³¹ which primarily concerned the river's water quality, the court referred to the issue of alleged air pollution to the extend relevant to the river's aquatic environment.¹⁰³² Although these cases are not directly dealing with atmospheric issues, they are of significant importance because of the references the court made on its decision regarding of customary international rules. Chapter 4 discusses the role that these customary norms could play in atmospheric protection.

The Case concerning *Aerial Herbicide Spraying* (Ecuador V. Colombia) did not render to the decision by the court, it had references for the protection of the Atmosphere in proceedings and orders.¹⁰³³ Also, the WTO case on the United States Standards for Reformulated and Conventional Gasoline in 1996 in the so-called gasoline case raised the important question of the compatibility of countries domestic law (in this case the US Clean Air Act of 1990) with the trade provisions of the WTO.¹⁰³⁴ Finally, the 2011 Air

¹⁰²⁹ International Court of Justice, 'Gabcikovo-Nagymaros Project, Hungary v Slovakia, Judgment, Merits, ICJ GL No 92, [1997] ICJ Rep 7, [1997] ICJ Rep 88, (1998) 37 ILM 162, ICGJ 66 (ICJ 1997), 25th September 1997' (n 726).

¹⁰³⁰ For instance, the Court addressed the principles sustainable development and environmental impact assessment. See Prue Taylor, 'The Case Concerning the Gabcikovo-Nagymaros Project: A Message from the Hague on Sustainable Development' (1999) 3 NZJ Env'tl. L. 109. Erika L Preiss, 'The International Obligation to Conduct an Environmental Impact Assessment: The ICJ Case Concerning the Gabcikovo-Nagymaros Project' (1999) 7 NYU Env'tl. LJ 307.

¹⁰³¹ International Court of Justice, 'Pulp Mills on the River Uruguay (Arg. v. Uru.), GL No. 135 ,2010 I.C.J. (Apr. 20)' (n 698).

¹⁰³² Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 32.

¹⁰³³ International Court of Justice, 'Aerial Herbicide Spraying (Ecuador v. Colom.), GL No. 138,2010 I.C.J. (Order of June 25)' <<https://www.icj-cij.org/en/case/138>> accessed 12 March 2018.

¹⁰³⁴ On 23 January 1995, only days after the WTO and its new dispute settlement procedure came into being, Venezuela complained to the Dispute Settlement Body that the United States was applying rules that discriminated against gasoline imports. Venezuela said this was unfair because US gasoline did not have to meet the same standards — it violated the "national treatment" principle and could not be justified under exceptions to normal WTO rules for health and environmental conservation measures. For

Transport Association of America and Others vs. Secretary of State for Energy and Climate Change also is one of the most important international cases. Some of the aforementioned cases and their key legal elements will be duly addressed in this Chapter.

6.1. Trail Smelter case

The *Trail Smelter* case between Canada and United States was about damages done to crops, pastureland, trees, and agriculture in United States from Sulphur dioxide emissions from a Canadian smelting plant located in Trail, British Columbia. In 1896 the plant started to operation and American farmers suffered damage. In 1903, the emission exceeded 10,000 tons a month and in 1930, 300 tons 350 tons of Sulphur in addition to other chemical residues flowed into air.¹⁰³⁵ After 1925 damages significantly increased, the case brought to US-Canada International Joint Commission established under the 1909 Boundary Waters Treaty. In February 1931, the Commission awarded the United States \$350,000USD to compensate for harms and loss caused by smelting plant in the period up to January 1932. However, all the attempts of the International Joint Commission to resolve the dispute was unsuccessful. In February 1933, the US complained that further damages were appearing, and in April 1935 the two countries signed a convention bringing the case to an arbitral tribunal and determined three arbitrators and two scientists.¹⁰³⁶ The arbitrators pursuant to article IV of the Convention considered law and practice existing in federal states (like Georgia v Tennessee case), in addition to international law and practice. The final decision of arbitral tribunal in 1941, “no State has the right to use or permit the use of territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.”¹⁰³⁷ The arbitral award issued under the no-harm principle of the general norms of international law, according to which states

more information on this case see World Trade Organization, ‘Venezuela, Brazil versus US: Gasoline, the WTO Case on the United States Standards for Reformulated and Conventional Gasoline’ (1996) <https://www.wto.org/english/tratop_e/dispu_e/2-9.pdf> accessed 29 November 2018.

¹⁰³⁵ Shelton, *International Environmental Law* (n 770) 182.

¹⁰³⁶ Sands and others (n 336) 254.

¹⁰³⁷ Shelton, *International Environmental Law* (n 770) 184.

must insure that activities within their jurisdiction do not cause significant cross-boundary environmental damage.¹⁰³⁸ This award was carried into the 1972 Stockholm Declaration of the United Nations Conference on the Human Environment and the 1992 Rio Declaration on Environment and Development.

The *Trail Smelter* case is an example of the traditional type of international environmental dispute, since the causes and effects of environmental harm is identifiable.¹⁰³⁹ Also, the principle of prevention no harm principle as the fundamental basis of this case was affirmed, a territorial State is under an obligation to exercise due diligence over the activities of individuals and companies within its territory in order to ensure that the activities do not cause harm to other States and their nationals.¹⁰⁴⁰ Moreover, the tribunal regarding future damages recognized the customary principle of good neighborliness or *sic utere tuo ut alienum non laedas*, in bilateral arrangements between neighboring countries in International Law. The tribunal found a solution to balance the interests of parties. Canada has the right to allow Smelters to operate on its territory, while the United States has a right to protect its territory and citizens from the harmful consequences of smoke and ash. However, the prevention principle and good neighborliness principle seem to be distinct, many authors believe the two are related in many important respects.¹⁰⁴¹

6.2. Nuclear Testing case

France executed some atmospheric nuclear tests on Mururoa Atoll in the South Pacific region between 1966 and 1972. Moreover, it had plans to product more serious tests in May 1973. According to 1963 Test Ban Treaty¹⁰⁴², any nuclear weapon tests and

¹⁰³⁸ Mayer, 'The Relevance of the No-Harm Principle to Climate Change Law and Politics' (n 631) 81.

¹⁰³⁹ For track the relationship between *Trail Smelter* and the 2001 ILC Draft Articles on State Responsibility for Internationally Wrongful Acts and State Liability see Mark Drumbl, 'Trail Smelter and the International Law Commission's Work on State Responsibility for Internationally Wrongful Acts and State Liability' [2003] Washington & Lee Public Law Research Paper.

¹⁰⁴⁰ Murase, 'First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)' (n 20) 29.

¹⁰⁴¹ Jaye Ellis, 'Has International Law Outgrown Trail Smelter?' [2006] Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration 56, 11.

¹⁰⁴² Treaty banning nuclear weapon tests in the Atmosphere, in outer space and under water, 5 August 1963, 480 UNTS 43, (Entered into force 10 October 1963),[PTBT] (n 287).

explosions in the Atmosphere, outer space and under the water banned by 1973, more than 110 parties joined on this treaty comprising China, the former Soviet Union, the United Kingdom and the United States that owned nuclear weapons with the exception of France. Before the ICJ stopped these and other nuclear tests in the Pacific, Australia and New Zealand made a claim against France which was based on a theory of 'trespass', i.e., that the radionuclides produced by the testing entered into the airspace of Australia and New Zealand thereby causing harm to persons and property.¹⁰⁴³ The applicants asked the ICJ to express that conduct of further atmospheric nuclear weapons tests would be in conflict with applicable rules of international law and France was not to continue more testing.

Australia claimed that the Nuclear Weapons Tests would:

1. violate its right to be free from atmospheric nuclear weapons tests by any country;
2. allow the deposit of radioactive fallout on its territory and airspace without its consent;
3. allow interference with ships and aircraft on the high seas and in the superjacent airspace, and the pollution of the high seas by radioactive fallout, thereby infringing the freedom of the high seas.¹⁰⁴⁴

The New Zealand application asked the Court to declare that the conduct by the French Government of nuclear tests in the South Pacific region that gave rise to radioactive fallout constituted a violation of New Zealand's rights under international law, and these rights would not be violated by any further such tests. The rights for which New Zealand sought protection included rights owed *erga omnes* and rights owed specifically to New Zealand. They were the rights that no nuclear tests that gave rise to radioactive fallout

¹⁰⁴³ Jon M Van Dyke, 'Liability and Compensation for Harm Caused by Nuclear Activities' (2006) 35 Denv. J. Int'l L. & Pol'y 13, 17.

¹⁰⁴⁴ International Court of Justice (ICJ), 'Nuclear Tests (Australia v. France), Application Instituting Proceedings' (1973) 26,28 <<https://www.icj-cij.org/public/files/case-related/58/13187.pdf>>. in respect to freedom of the seas and their pollution by radioactive fallout see Uwe Jenisch, 'Nuclear Tests and Freedom of the Seas' (1974) 17 German YB Int'l L. 177.

be conducted; the right to preservation from unjustified artificial radioactive contamination of the terrestrial, maritime, and aerial environment.¹⁰⁴⁵

Through the oral pleadings in support of the request for interim measures Australia asserted the existence of an emerging rule of customary international law prohibiting nuclear tests by reference to Principles 6, 7 and more directly Principle 21 of the Stockholm Declaration.¹⁰⁴⁶ Mr. Ellicott, Counsel for Australia assumed Principle 21 is absolute and without qualification and prohibits “State conduct tending towards pollution and the creation of hazards to human health and the environment and in particular a rule prohibiting the conduct of atmospheric nuclear tests”.¹⁰⁴⁷ Principle 21 states:

“States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction”.

Accordingly, Australia argued that atmospheric nuclear tests are unlawful by virtue of a general rule of international law, and that all States, including Australia, have the right to call upon France to refrain from carrying out this sort of tests. As well as the Applicant alleged that France breached the duty of good neighborliness and had violated the

¹⁰⁴⁵ International Court of Justice (ICJ), ‘Nuclear Tests (New Zealand v. France), Application Instituting Proceedings’ (1973) 7,8 <<https://www.icj-cij.org/public/files/case-related/59/9447.pdf>>.

¹⁰⁴⁶ Principle 6 deals with the discharge of toxic substances into the environment, principle 7 refers to the pollution of the seas. Assembly, ‘United Nations Conference on the Human Environment (Stockholm Declaration), A/RES/2994, 15 December 1972’ (n 328).

¹⁰⁴⁷ International Court of Justice (ICJ), ‘Nuclear Tests (Austl. v. Fr.), Oral Arguments on the Request for the Indication of Interim Measures of Protection’ (1973) 185 <<https://www.icj-cij.org/public/files/case-related/58/058-19730521-ORA-01-00-BI.pdf>>.

sovereignty of Australia by the risky act of nuclear tests which caused a dangerous level of fallout on its territory.¹⁰⁴⁸

Further the pleading put forward in the case by Australia and New Zealand, the oral exchanges have been held between some of the judges and counsel for the two applicant States. Australia argued that “the 1963 Test Ban Treaty embodied and crystallized an emergent rule of customary international law banning atmospheric nuclear tests, as the Treaty have generated a rule which, if it were not originally binding on all States, has since become a general rule of international law accepted as such by the *opinio juris* of the international community. “Indeed, the rule may well have assumed the status of a rule of *jus cogens*”.¹⁰⁴⁹

During the oral hearings Australia was asked by the president of the ICJ, whether Australia took this view that it is an automatically legal cause of action in international law without any other requirement if “any natural causes of chemical or other matter from one state’s territory transmit to the other State’s territory, air space or territorial sea”.

In response, Australia argued that, the merely nominal harm and damage for normal and natural use of states of their territories are not cause for a claim and complaint. In modern industrial society, some inconveniences are tolerated because of the community benefit. It is important to recognize the equivalence between community benefit of ‘nominal harm or damage’ and the individual right from a serious harm or damage. However, the ICJ avoided to proceeding the issue based on the France unilateral declaration, one of the dissident judges took the opportunity to cite the award of the *Trail Smelter* which is approved widely due to the ‘no harm’ principle.¹⁰⁵⁰

¹⁰⁴⁸ *ibid* 187.

¹⁰⁴⁹ International Court of Justice(ICJ), ‘Nuclear Tests (Australia v. France), Oral Arguments on Jurisdiction and Admissibility’ (1974) 502 <<https://www.icj-cij.org/public/files/case-related/58/058-19740704-ORA-01-00-BI.pdf>>. for the examining of the legality or illegality of atmospheric tests of nuclear weapons by France see Anthony A D’Amato, ‘Legal Aspects of the French Nuclear Tests’ (1967) 61 Am. J. Int’l L. 66.

¹⁰⁵⁰ Sands and others (n 336) 256.a

Following the unilateral declaration by France that it would stop further atmospheric tests, there was not any objection by Australia and New Zealand so the case has been dismissed from the court.¹⁰⁵¹ The ICJ decision to not follow up the case was based on the principle of 'good faith', as ICJ assumed international obligations through the unilateral declarations are binding.¹⁰⁵²

In the following of these cases the International Law Association (ILA) and the Institute de Droit International (IDI) tried to make some rules of customary law in reference to transboundary or any air pollution that has the possibility to occur serious and significant harm. Article 3(1) of the ILA's 1982 Montreal Draft Rules on Transboundary Pollution required States "to prevent ... transfrontier air pollution to such an extent that no substantial injury is caused in the territory of other States". Article 4 explains that "States shall refrain from causing trans frontier pollution by discharging into the environment substances generally considered as being highly dangerous to human health".¹⁰⁵³ Further, Article 2 of the IDI in its 1987 resolution on transboundary air pollution states "in the exercise of their sovereign right to exploit their sources pursuant to their own environmental policies, states shall be under a duty to take all appropriate and effective measures to ensure that their activities or those conducted within their jurisdiction or under their control cause no transboundary air pollution".¹⁰⁵⁴ According to these rules, which are not that strict, States must first accept them as customary law. Second, States must undertake regulations in their sovereign practice and jurisdiction to prevent of adverse impact on the atmosphere in terms of transboundary and atmospheric harm and degradation.¹⁰⁵⁵

¹⁰⁵¹ International Court of Justice (ICJ), 'Nuclear Tests Case (Australia v. France), Procedure(s): Questions of Jurisdiction and/or Admissibility' (1974) 271, 272 <<https://www.icj-cij.org/public/files/case-related/58/058-19741220-JUD-01-00-EN.pdf>>.

¹⁰⁵² Petersen (n 685) 306.

¹⁰⁵³ ILA, 'Montreal Conference Resolutions, 60 Int'l L Ass'n Rep Conf 1'.

¹⁰⁵⁴ Annuaire de l'Institut de Droit International (n 390).

¹⁰⁵⁵ Sands and others (n 336) 257.

6.3. Legality of the Threat or Use of Nuclear Weapons

the *Legality of the Threat or Use of Nuclear Weapons* advisory opinion was requested by general assembly in 1996. The International Court of Justice questioned in respect to the use of nuclear weapons and environmental damage including the atmospheric environment. The Court based on various international treaties and instruments included: Additional Protocol I of 1977 to the Geneva Conventions of 1949,¹⁰⁵⁶ the Convention of 18 May 1977 on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques,¹⁰⁵⁷ as well as Principle 21 of the Stockholm Declaration of 1972 and Principle 2 of the Rio Declaration of 1992,¹⁰⁵⁸ recognized "that the environment is under daily threat and that the use of nuclear weapons could constitute a catastrophe for the environment [and] ... that the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn." Also, the Court affirmed that "[t]he existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment".¹⁰⁵⁹ However, it qualified its position by saying the following:

"The Court does not consider that the treaties in question could have intended to deprive a State of the exercise of its right of self-defense under international law because of its obligations to protect the environment. Nonetheless, States must take environmental considerations into account when assessing what is necessary and proportionate in the pursuit of legitimate military objectives. Respect for the

¹⁰⁵⁶ Article 35, paragraph 3, of additional protocol I prohibits the employment of "methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment"

¹⁰⁵⁷ Article 1 of the convention prohibits the use of weapons which have "widespread, long-lasting or severe effects" on the environment.

¹⁰⁵⁸ The principles express the common conviction of the States concerned that they have a duty: "to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction".

¹⁰⁵⁹ International Court of Justice, 'Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ICJ GL No 95, [1996] ICJ Rep 226, ICGJ 205 (ICJ 1996), 8th July 1996' (n 1028) para 29.

environment is one of the elements that go to assessing whether an action is in conformity with the principles of necessity and proportionality.”¹⁰⁶⁰

The Court noted furthermore that: “Articles 35, paragraph 3, and 55 of Additional Protocol I provide additional protection for the environment. Taken together, these provisions embody a general obligation to protect the natural environment against widespread, long-term and severe environmental damage; the prohibition of methods and means of warfare which are intended, or may be expected, to cause such damage; and the prohibition of attacks against the natural environment by way of reprisals. These are powerful constraints for all the States having subscribed to these provisions.”¹⁰⁶¹

The significant point in this case is impact of customary international law in the 1996 ICJ’s Advisory Opinion, that approved by the international Law Commission’s draft Article on Prevention of Transboundary Harm.¹⁰⁶² Article 3 of 2001 Draft articles on Prevention of Transboundary Harm from Hazardous Activities based on the fundamental principle *sic utere tuo ut alienum non laedas*, indicates “the States of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof.”¹⁰⁶³ Albeit, it does not mean despite all efforts and appropriate measures of states that any serious harm and damage can be completely ensured against.

6.4. Aerial Herbicide Spraying case

The *Aerial Herbicide Spraying* (Ecuador V. Colombia) case was squarely concerned with alleged transboundary air pollution. In March 2008, Ecuador instituted proceedings against Colombia with respect to the aerial spraying (by Colombia) of toxic herbicides at locations near, at and across its border with Ecuador. In its application, Ecuador stated that “the spraying has already caused serious damage to people, to crops, to animals, and to the natural environment on the Ecuadorian side of the frontier, and poses a grave

¹⁰⁶⁰ *ibid* 30.

¹⁰⁶¹ *ibid* 31.

¹⁰⁶² Sands and others (n 336) 211.

¹⁰⁶³ International Law Commission, ‘Draft Articles on Prevention of Transboundary Harm from Hazardous Activities’ (2001) 153.

risk of further damage over time”,¹⁰⁶⁴ and requested the Court to “adjudge and declare that: (a) Colombia has violated its obligations under international law by causing or allowing the deposit on the territory of Ecuador of toxic herbicides that have caused damage to human health, property and the environment; and that (b) Colombia shall indemnify Ecuador for any loss or damage caused by its internationally unlawful acts, namely the use of herbicides, including by aerial dispersion”. However, the case was removed from the Court’s list on September 13, 2013 at the request of Ecuador since an agreement had been reached between the parties regarding, *inter alia*, Colombia’s discontinuance of aerial spraying and the creation of a joint commission.¹⁰⁶⁵

The first wave of International Environmental Law happened after the *Trail Smelter* and *Nuclear Tests* cases, and the second one after the *ICJ's Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons*. Following the *Pulp Mills* case and the ILC’s draft Articles on Prevention, the *Aerial Herbicide Spraying* case provided a perfect opportunity for the ICJ to utilize the two-step analysis process established in *Pulp Mills* for both procedural and substantive violations of international law and make the new wave. However, the withdrawal of the case prevented atmospheric protection law from developing in light of this case.¹⁰⁶⁶

6.5. Air Transport Association of America and Others vs. Secretary of State for Energy and Climate Change case

The case C-366/10 *Air Transport Association of America and Others v. Secretary of State for Energy and Climate Change*¹⁰⁶⁷ involved a reference for a preliminary ruling from the High Court of Justice Queen's Bench Division (Administrative Court) in the United Kingdom. Air Transport Association of America, American Airlines, Inc., Continental

¹⁰⁶⁴ ‘Aerial Herbicide Spraying Case, Application Instituting Proceeding Bby Ecuador, 31 March 2008’ <<https://www.icj-cij.org/public/files/case-related/138/14474.pdf>> accessed 20 January 2021.

¹⁰⁶⁵ Murase, ‘First Report on the Protection of the Atmosphere, International Law Commission, Sixty-Sixth Session, UN Doc A/CN.4/667, (5 May-6 June and 7 July-8 August 2014)’ (n 20) 33.

¹⁰⁶⁶ See Jessica L Rutledge, ‘Wait a Second-Is That Rain or Herbicide-The ICJ’s Potential Analysis in Aerial Herbicide Spraying and an Epic Choice between the Environment and Human Rights’ (2011) 46 *Wake Forest L. Rev.* 1079.

¹⁰⁶⁷ *Case C-366/10, Air Transport Ass’n of Am & Others v Sec’y of State for Energy and Climate Change, (2011)*.

Airlines, Inc., and United Airlines, Inc. (ATA and Others) challenged the domestic measures implementing Directive 2003/87/EC¹⁰⁶⁸ as amended by Directive 2008/101/EC,¹⁰⁶⁹ which includes airlines within the EU's Emissions Trading Scheme (hereinafter ETS). On the basis of the ETS introduced by it, each aircraft operator is allowed to emit pollutants only in the amount which is determined by emission allowances allocated to them. All airlines – including those from third countries – will have to acquire and surrender emission allowances for their flights for a period of one year from and to European aerodromes. Penalties for infringement of emission limits can extend to an operating ban.¹⁰⁷⁰ The Directive applies to all flights which arrive at or depart from an aerodrome situated in the territory of a Member State to which the Treaty applies shall be included.¹⁰⁷¹

The questions referred to the Court of Justice of the European Union in Luxembourg (hereinafter, CJEU) related to whether the contested Directive (2008 Directive) was compatible with international law. In particular, the referring Court asked whether the EU ETS, insofar as it applies to flights taking place outside the airspace of EU Member States, violates the EU's obligations under customary international law, the Chicago Convention¹⁰⁷², the Open Skies¹⁰⁷³ Agreement and the Kyoto Protocol.¹⁰⁷⁴

It posed four questions in its referral:

¹⁰⁶⁸ 'Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 Establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community and Amending Council Directive 96/61/EC'.

¹⁰⁶⁹ 'Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 Amending Directive 2003/87/EC so as to Include Aviation Activities in the Scheme for Greenhouse Gas Emission Allowance Trading within the Community'.

¹⁰⁷⁰ *ibid* art 16.

¹⁰⁷¹ *ibid* Annex I.

¹⁰⁷² Convention on International Civil Aviation (adopted 7 December 1944), (entered into force 4 April 1947) 15 UNTS 295 (Chicago Convention) (n 337).

¹⁰⁷³ Air Transport Agreement, Apr. 30, 2007, Between the European Community and its Member States, on the one Hand, and the United States of America, on the Other Hand, O.J. 2007 L134/4, (entered into force Mar. 30, 2008) (revised June 2010) [Open Skies].

¹⁰⁷⁴ Jed Odermatt, 'Case C-366/10 Air Transport Association of America and Others v. Secretary of State for Energy and Climate Change' (2013) 20 Colum J Eur L 143' 146, 147.

- (1) Were the claimant corporations entitled to rely on any or all of (a) the four customary norms, or (b) the provisions of the Chicago Convention, the Kyoto Protocol, or the Open Skies Agreement as benchmarks against which to judge the Directive's validity?
- (2) Was the Directive invalid for contravening one or more of those customary norms "if and in so far as it applies the [ETS] to those parts of flights . . . which take place outside [Union] airspace"?
- (3) Was the Directive invalid for contravening one or more of the treaty provisions "if and in so far as it applies the [ETS] to those parts of flights . . . which take place outside [Union] airspace"? and
- (4) Did the Directive contravene any treaty norms by unilaterally applying the ETS to international aviation activities generally governed by the standards found in global conventions or promulgated by ICAO? (Para. 45)¹⁰⁷⁵

The Court of Justice upheld the Directive. It first held, in answer to Question (1), that the claimant corporations were entitled to rely on only some of the treaty and customary norms. With respect to the Chicago Convention, the Court noted that, while all twenty-seven member States are party to it, the Union itself is not, and so is not bound by it. This status is not affected by the Union's implied duty. The Court therefore concluded that it could not examine the validity of the Directive in light of the Chicago Convention "as such". Although the Union is party to the Kyoto Protocol, and although that protocol mandates quantified greenhouse gas reductions, flexibilities in its provisions persuaded the Court that it "cannot . . . be considered to be unconditional and sufficiently precise so as to confer on individuals the right to rely on it in legal proceedings in order to contest the validity of [the Directive]". Since, in contrast, the Open Skies Agreement, by which the Union is also bound, "establishes certain rules designed to apply directly ... to airlines and thereby to confer upon them rights. The Court concluded that it could assess the Directive's validity in light of its provisions, notably Articles 7, 11, and 15 (paras. 84, 86–100). These articles are in similar form to, or incorporate by reference, Chicago

¹⁰⁷⁵ Glen Plant, 'Air Transport Association of America V. Secretary of State for Energy and Climate Change' (2013) 107 *American Journal of International Law* 183, 185 <https://www.cambridge.org/core/product/identifier/S0002930000000117/type/journal_article> accessed 6 March 2021.

Convention/ICAO standards. The Court then found that the principles of customary international law recognizing (1) the sovereignty of States over their airspace, (2) the illegitimacy of claims to sovereignty over the high seas, and (3) the freedom to fly over the high seas had been codified by the Chicago Convention, and that no State had objected to their application, so that they could be relied upon to test the Directive's validity. It found insufficient evidence, however, for the existence of the fourth claimed principle, that States of registration exercised exclusive jurisdiction regarding aircraft flying over the high seas.¹⁰⁷⁶

The Court then proceeded to examine Questions (2) to (4), concerning the substantive compatibility of the Directive with the relevant principles and rules. Determining first the Directive's "*scope ratione loci*," the Court observed that it was not intended to apply as such to aircraft flying over the territories of Union member states or third states, but only to flights as they are on the ground during arrivals at or departures from an EU airport, where upon their operator incurs an obligation to report the emissions relevant to each entire flight (paras. 114 –20). Noting, second, that the three customary law principles "are, to a large extent, connected with the territorial scope of [the ETS]" (para. 121), the Court reasoned that, to fulfill the EU duty to respect international law, the Directive must "be interpreted, and its scope delimited, in the light of the relevant rules of the international law of the sea and . . . of the air" (para. 123). As the application of the Directive is founded on the physical presence in the Union of aircraft, it followed that it could be said to infringe on neither the principle of territoriality nor the sovereignty of third states (para. 125). Finally, the Court held that the Directive was not invalid in the light of Article 15(3) of the Open Skies Agreement. It found no evidence of any breach of the environmental standards of the ICAO or the Chicago Convention, which the first sentence of Article 15(3) requires the parties' unilateral environmental measures to follow ("unless differences have been filed"), and no indication that the ETS would be contrary to the latest guiding principles for the design and implementation of

¹⁰⁷⁶ *ibid* 185,186.

environmental market-based measures (MBMs) set out in the annex to ICAO Assembly Resolution A37-19 (paras. 148 –51).¹⁰⁷⁷

The judgment concerns a well-intentioned regional effort to deal with the serious and growing threat of global climate change: international aviation has the fastest annual growth rate in greenhouse gas emissions of any industrial sector. After years of fruitless ICAO negotiations, the unilateral European Union effort to fill the regulatory gap is perhaps understandable even, from an environmentalist perspective, laudable: extending the Directive's application beyond intra-EU flights might well minimize carbon leakage and maximize environmental benefits. The action of the Union, however, exposed it to various political and potential legal challenges at the interstate level. It raised serious issues of sovereignty and jurisdiction, as well as trade relations, including with respect to taxation and unilateral environmental regulation of foreign corporations offering services in EU territory. This proceeding was anything but frivolous and offered a serious challenge on its own merits. The claimant airlines hoped that their action would encourage the United States to bring an interstate action, but despite widespread state opposition and some retaliatory measures, no state legal action has yet been brought.¹⁰⁷⁸

The ruling held that the Directive was a valid piece of law that was complementary to international law. In response, the US House of Representatives called the EU Directive "ill-based and illegal", and passed a bill forcing US airlines not to obey it. China, India and Russia also openly contested the Directive and at a meeting in Moscow in February 2012, agreed on an action plan against it. The action plan would include "barring airlines from participating in the Brussels plan; filing a formal complaint at the UN's civil aviation body – the ICAO; imposing levies or charges on EU airlines as a countermeasure; and stopping talks with EU carriers on new routes". The pressure imposed by the EU Directive on the international community resulted in the decision by the ICAO at the 38th Assembly meeting in October 2013 to adopt more concrete measures aimed at regulating greenhouse gas emissions in binding legal form. The Assembly agreed to

¹⁰⁷⁷ *ibid.*

¹⁰⁷⁸ *ibid* 187,188.

begin working on global market-based measures for aviation emissions at the 2016 session, and to create an international framework on the basis of those measures by 2020.¹⁰⁷⁹

Chapter 7. *Actio Popularis* to Protect the Atmosphere

As has been addressed in chapter 2, also based on UNEP, there exist four global commons, namely: the High Seas; the atmosphere; Antarctica; and Outer Space.¹⁰⁸⁰ The global commons under the principle of Common Heritage of Mankind establish that some areas belong to all humanity and the resources therein are available for everyone's use and benefit, taking into account future generations and the needs of developing countries. Consequently, all humankind would be designated the beneficiary, not all States or national governments.¹⁰⁸¹ Environmental damage to global commons affects the rights of all humankind to those global commons. It constitutes a violation of such rights and as such any aggrieved person should be able to bring an action against the responsible party. Such action could then be brought through the application of the *actio popularis* principle.¹⁰⁸²

Also, Sands believes that significant harms to the global commons, particularly egregious violations of environmental obligations relating to the common concern and common heritage of humankind or rights protected by treaties might be successfully invoked for an *actio popularis*. Furthermore, he cautions that many international organizations are not likely to favor the *actio popularis* concept and that no cases have successfully relied upon this.¹⁰⁸³

¹⁰⁷⁹ Sikorska (n 522) 139,140.

¹⁰⁸⁰ See UNEP, 'IEG of the Global Commons' <<https://cil.nus.edu.sg/wp-content/uploads/2015/12/Ses4-7.-UNEP-Division-of-Environmental-Law-and-Conventions-Global-Commons.pdf>> accessed 18 February 2021.

¹⁰⁸¹ Aimate Jorge and Lineekela Usebiu, 'THE STATUS OF THE ACTIO POPULARIS UNDER INTERNATIONAL ENVIRONMENTAL LAW IN CASES OF DAMAGE TO GLOBAL COMMONS' (2019) 3 International Journal of Law, Humanities & Social Science 60, 61.

¹⁰⁸² *ibid* 66.

¹⁰⁸³ Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press 2012) 150.

The protection of the atmosphere is one of the most demanding global environmental problems humankind is facing today. Complex international regimes have been developed to combat it through legal framework such as for climate change.¹⁰⁸⁴ However, Guideline 3 of the ILC report on Protection of the Atmosphere imposes a specific obligation on States to protect the Atmosphere.¹⁰⁸⁵ General character of such an obligation may arise some question as to its enforceability in the absence of a *sui generis* for its protection. Furthermore, character of the obligation denote that all States can be considered as the beneficiary of this obligation.

Accordingly, the main question that this chapter seeks to answer is how international law can be applied jurisdictionally to 'all States' and even 'all mankind'. The feasibility of *actio popularis* when such an obligation is violated by a member of international community will be addressed. Any answer to this question requires providing an answer to a broader question i.e., the feasibility of *actio popularis* in International Law.

The feasibility of an *actio popularis* in international law is a matter of debate.¹⁰⁸⁶ Thus, for providing a proper answer to the question raised, the chapter begins with some brief notes on the origin of *actio popularis* and definition of *actio popularis* in International Law. Then it continues to discuss the feasibility of an *actio popularis* in International Law in general and for protection of the atmosphere in particular.

¹⁰⁸⁴ Kreuter-Kirchhof (n 444) para 1.

¹⁰⁸⁵ The Guideline provides that: "States have the obligation to protect the Atmosphere by exercising due diligence in taking appropriate measures, in accordance with applicable rules of international law, to prevent, reduce or and control atmospheric pollution and atmospheric degradation." See: Murase, 'Report of the International Law Commission to UNGA, Seventieth Session, Supp No. 10, UN Doc A/73/10, (30 April–1 June and 2 July–10 August 2018)' (n 656) 159.

¹⁰⁸⁶ On the feasibility and differences of *actio popularis* and Class Action under international law see William J Aceves, 'Actio Popularis-The Class Action in International Law' [2003] U. Chi. Legal F. 353.

7.1. The application of *actio popularis*

Actio popularis has its origins in Roman law. The weakness of the institutions then in place, notably the police and magistrates and blurred between private and public law allowed its emergence and development.¹⁰⁸⁷

In Roman law, *actio popularis* was defined as a legal mean enabling any citizen to denounce before a judge fact relating to public order or public property. Thus, the concept of *actio popularis* in Roman law means the attribution to all Roman citizens of the right to defend collective or common interests in a court, regardless of direct injury to the person invoking *actio popularis*.¹⁰⁸⁸ Indeed this is the essence of *actio popularis* in all legal systems and there would minor differences in its application.¹⁰⁸⁹

Actio popularis has been embraced in domestic laws of various countries. Amongst the European countries, which have legislatively prescribed the right to bring *actio popularis* claims are Spain, Estonia, Slovenia, Netherlands, Lithuania, and Italy.¹⁰⁹⁰ The laws of these countries vest the right of action in public interest either in any member of the public or in a particular group of persons or entities, mostly NGOs, which act on behalf of the public as a whole.¹⁰⁹¹ Likewise, in Latin American countries procedural development led to *Actio popularis* to protect the environment.¹⁰⁹² Also in the Caribbean legal framework application of *Actio popularis* and public legal standing to challenge and bring proceedings in cases of violations of environmental access rights is

¹⁰⁸⁷ Louis de Gouyon Matignon, 'The Definition of Actio Popularis' (2020) <<https://www.spacelegalissues.com/the-definition-of-actio-popularis/>> accessed 15 August 2020.

¹⁰⁸⁸ Ibid.

¹⁰⁸⁹ for overviewing of *actio popularis* as understood in Roman law and applied in modern legal systems see Farid Ahmadov, 'The Right of Actio Popularis before International Courts and Tribunals' (St Anne's College University of Oxford 2018) 13–26.

¹⁰⁹⁰ For examining the role of *actio popularis* in environmental governance of Netherlands see Jonathan Verschuuren, 'The Role of the Judiciary in Environmental Governance in the Netherlands' [2008] THE ROLE OF THE JUDICIARY IN ENVIRONMENTAL GOVERNANCE: COMPARATIVE PERSPECTIVES, Louis Kotze, Alexander Paterson, eds., Kluwer Law International.

¹⁰⁹¹ Ahmadov (n 1089) 18.

¹⁰⁹² Belen Olmos Giupponi, 'Fostering Environmental Democracy in Latin America and the Caribbean: An Analysis of the Regional Agreement on Environmental Access Rights' (2019) 28 Review of European, Comparative & International Environmental Law 136, 138.

one of the core elements of ensuring access to justice that have been upheld in various cases lodged before domestic courts.¹⁰⁹³

The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters adopted on 25 June 1998 in Aarhus. The Aarhus Convention in Europe establishes a number of rights of the public (individuals and their associations) with regard to the environment. The Parties to the Convention are required to make the necessary provisions so that public authorities (at national, regional or local level) will contribute to these rights to become effective.¹⁰⁹⁴ For instance, toward an accessible public justice for environmental issues the Convention has tried to enact *actio popularis* in domestic law. Article 9(3) of the Convention states each Party shall ensure that members of the public have access to administrative or judicial procedures to challenge acts and omissions by private persons and public authorities which contravene provisions of its national law relating to the environment.¹⁰⁹⁵

Further, the Escazú Agreement on 4 March 2018 was adopted by 24 countries.¹⁰⁹⁶ The Agreement is the first ever legally binding treaty on environmental rights in Latin America and the Caribbean region. Also known as the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters.¹⁰⁹⁷ The objective of the Escazú Agreement is to guarantee the full and effective implementation in Latin America and the Caribbean of the rights of access to environmental information, public

¹⁰⁹³ Economic Commission for Latin America and the Caribbean (ECLAC) and Caribbean Court of Justice Academy of Law (CCJ Academy of Law), 'Ensuring Environmental Access Rights in the Caribbean: Analysis of Selected Case Law (LC/TS.2018/31/Rev.1)' [2018] Santiago 43.

¹⁰⁹⁴ European commission, 'The Aarhus Convention' <<https://ec.europa.eu/environment/aarhus/>> accessed 21 February 2021.

¹⁰⁹⁵ United Nations Economic Commission for Europe, Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 2161 UNTS 447, 38 ILM 517 (1999) 1998.

¹⁰⁹⁶ 'Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (4 March 2018) LC/CNP10.9/5, [Escazú Agreement]'.

¹⁰⁹⁷ World Resources Institute, 'THE ESCAZÚ CONVENTION:A HISTORIC STEP FORWARD FOR ENVIRONMENTAL RIGHTS IN LATIN AMERICA AND THE CARIBBEAN' <https://unece.org/fileadmin/DAM/env/pp/wgp/WGP-22/Other_material/Updated_LAC_P10_Two-Page_Final_6.12.2018.pdf> accessed 21 February 2021.

participation in the environmental decision-making process and access to justice in environmental matters, as well as the creation and strengthening of capacities and cooperation, contributing to the protection of the right of every person of present and future generations to live in a healthy environment and to ensure the sustainable development.¹⁰⁹⁸

Regarding access to justice, the Escazú Agreement also offers important tools in the context of climate change. According to article 8, each Party shall guarantee access to judicial and administrative mechanisms to challenge and appeal, with respect to substance and procedure of any decision, action or omission related to the access to environmental information and to public participation in the decision-making process, as well as any other decision, action or omission that affects or could affect the environment adversely or violate laws and regulations related to the environment. In turn, considering its circumstances, each Party shall have competent State entities with access to expertise in environmental matters; effective, timely, public, transparent and impartial procedures that are not prohibitively expensive; broad active legal standing in defense of the environment; the possibility of ordering precautionary and interim measures; measures to facilitate the production of evidence of environmental damage, when appropriate and as applicable, such as the reversal of the burden of proof and the dynamic burden of proof; and mechanisms for redress, where applicable.¹⁰⁹⁹

The above mentioned that access to environmental information could be interpreted as the main requirement for insuring the necessary awareness for individuals and their associations in taking the appropriate action to protect the environment. Further, enacting the *actio popularis* mechanism will provide accessible justice in case of an environmental harm or damage.

7.2. Definition of *actio popularis* in International Law

Actio popularis in International Law literature is defined as a right of action belonging to the international community as a whole or to any person, usually arising from a violation

¹⁰⁹⁸ Economic Commission for Latin America and the Caribbean/United Nations High Commissioner for Human Rights (ECLAC/OHCHR), 'Climate Change and Human Rights: Contributions by and for Latin America and the Caribbean (LC/TS.2019/94)' [2019] Santiago 48.

¹⁰⁹⁹ *ibid* 50.

of an *erga omnes* obligation.¹¹⁰⁰ According to the International Court of Justice in its ruling in *South West Africa case actio popularis*, as a formal definition, may be defined as “a right resident in any member of a community to take legal action in vindication of a public interest”.¹¹⁰¹

It should be remembered that taking legal action is a measure of formal character which can be considered as a top example of invocation of international responsibility under the Draft Articles on Responsibility of States for Internationally Wrongful Acts (ARSIWA)¹¹⁰² as ILC put it in its commentary to article 42. Although the Commission has not defended the concept but in its commentary to article 42 it holds that “invocation should be understood as taking measures of a relatively formal character for example, the raising or presentation of a claim against another State or the commencement of proceedings before an international court or tribunal.”¹¹⁰³ Thus, *actio popularis* may be defined as a right to invocation of international responsibility in the form of commencement of proceedings before an international court or tribunal under article 42 and 48 of ARSIWA.

¹¹⁰⁰ Aaron X Fellmeth and Maurice Horwitz, *Guide to Latin in International Law* (Oxford University Press 2009) 12. For the applicability of universal standing upon the Latin phrases of *erga omnes* and *jus cogens* in the world of affairs see Alfred P Rubin, ‘Actio Popularis, Jus Cogens, and Offenses Erga Omnes?’, *International Humanitarian Law: Origins* (Brill Nijhoff 2003). Also the Institute of International Law (Institut de Droit International) in 2005 confirmed the linkage between violation of a *erga omnes* obligation and possibility of standing before the ICJ or other courts by a resolution entitled “Obligations *erga omnes* in international law”. The resolution under Article 1 has been defined the obligation *erga omnes* as: “an obligation under general international law that a State owes in any given case to the international community, in view of its common values and its concern for compliance, so that a breach of that obligation enables all States to take action; or an obligation under a multilateral treaty that a State party to the treaty owes in any given case to all the other States Parties to the same treaty, in view of their common values and concern for compliance, so that a breach of that obligation enables all these States to take action.” Giorgio Gaja, ‘Obligations and Rights Erga Omnes in International Law’ (2005) 71 *Annuaire de l’Institut de droit international* 119.

¹¹⁰¹ International Court of Justice(ICJ), ‘South West Africa (Liberia v. South Africa), Judgment of 18 July 1966’ para 88 <<https://www.icj-cij.org/public/files/case-related/47/047-19660718-JUD-01-00-EN.pdf>> accessed 20 August 2020.

¹¹⁰² International Law Commission, ‘Draft Articles on Responsibility of States for Internationally Wrongful Acts, Supp No. 10, U.N.DOC. A/56/10’ (n 566) ch IV.E.1.

¹¹⁰³ United Nations International Law Commission, *Yearbook of the International Law Commission, 53 Session* (Vol II, P, United Nations Publications 2001) 117.

7.3. Feasibility *actio popularis* in International Law

Actio popularis as a concept in International Law has long been debated. Gattini explains some of the conflicts that arise: “On the one hand, the analogy with the Roman law notion is particularly apt in International Law, due to some structural features of the latter, such as the lack of an attorney general and the impossibility of strictly distinguishing between a public action and a civil suit. On the other hand, some other traditional features of international law, such as the resilient bilateralism of relationships between States, seem resistant to the idea of *actio popularis*”.¹¹⁰⁴ Accordingly, the actual place of *actio popularis* in International Law should be determined before examining its feasibility for protection of the atmosphere.

7.3.1. International case Law approach to *actio popularis* : from deny to acceptance

World tribunals approach to *actio popularis* can be traced in various advisory and contentions decisions including the *Barcelona Traction* case and in the *South West Africa* case.¹¹⁰⁵

In the Advisory Opinion on the *Reparation for Injuries Suffered in the Service of the United Nations* case (Bernadotte case) of 1949 the Court held that: “only the parties to whom the international obligation is due can bring a claim in respect of its breach”.¹¹⁰⁶

In the Advisory Opinion on *Reservations to the Convention on the Prevention and Punishment of the Crime of Genocide* of 1951, the Court expressly said that in such a Convention: “the Contracting States do not have any interests of their own; they merely have one and all a common interest”.¹¹⁰⁷

¹¹⁰⁴ Andrea Gattini, ‘Actio Popularis’, *Max Planck Encyclopedias of International Law* (Oxford University Press 2019) <<https://opil.ouplaw.com/view/10.1093/law-mpeipro/e1167.013.1167/law-mpeipro-e1167?rskey=Wquosl&result=1&prd=OPII>>.

¹¹⁰⁵ For the link between the *erga omnes* obligations and *actio popularis* in ICJ see Malgosia Fitzmaurice, ‘Liability for Environmental Damage Caused to the Global Commons’ (1996) 5 Rev. Eur. Comp. & Int’l Envtl. L. 305, 306–307.

¹¹⁰⁶ Yuen-Li Liang, ‘Reparation for Injuries Suffered in the Service of the United Nations’ (1949) 43 The American Journal of International Law 460, 11–12.

¹¹⁰⁷ William W Bishop, ‘Reservations to the Convention on Genocide’ (1951) 45 The American Journal of International Law 579, 12. It seems necessary to mark a difference between the third Parties remedies in international law and the application of the *actio popularis* which is the subject of a common interest. For evaluation of the third Parties remedies in international law. see Jonathan I Charney, ‘Third State Remedies in International Law’ (1989) 10 Mich. J. Int’l L. 57.

These two advisory opinions of the Court denote that under certain circumstances, there is no need to prove an individual legal interest in instituting judicial proceedings.¹¹⁰⁸ These two advisory opinions of the court and the commentator comment on them is of prime importance in assessing the feasibility of *actio popularis* in international law in general and its feasibility for protecting the atmosphere in particular, since the latter advisory opinion shows that proving an individual interest is not a necessary prerequisite for bringing action before the Court. Therefore, it can be concluded that the court accepted what is form the essence for *actio popularis*.

In the *South West Africa* case of 1966, Liberia and Ethiopia wished to question the apartheid policy of South Africa in the former South West Africa (Namibia). However, the Court had opposed in 1962 the use of *actio popularis*, claiming that the applicant States were not entitled to act since none of their subjective rights had been infringed. The Court said that:

“But although a right of this kind may be known to certain municipal systems of law, it is not known to international law as it stands at present: nor is the Court able to regard it as imported by the "general principles of law" referred to in Article 38, paragraph 1 (c), of its Statute”¹¹⁰⁹

This statement by the court leads some authors to conclude that *actio popularis* did not entered in the realm of international law and there is no such a right in international law.¹¹¹⁰

In the *Barcelona Traction, Light and Power Company, Limited* (Belgium v. Spain) case of 1970 the Court stated that:

“When a State admits into its territory foreign investments or foreign nationals, whether natural or juristic persons, it is bound to extend to them the protection of the law and assumes obligations concerning the treatment to be afforded them. These obligations, however, are neither absolute nor unqualified. In particular, an essential distinction should be drawn between the obligations of a State towards the international

¹¹⁰⁸ See: Gattini (n 1104) para 12.

¹¹⁰⁹ International Court of Justice(ICJ), ‘South West Africa (Liberia v. South Africa), Judgment of 18 July 1966’ (n 1101) para 88.

¹¹¹⁰ Gattini (n 1104) para 13. For a contrary opinion see Carlos Espaliu Berdud, ‘Locus Standi of States and Erga Omnes Obligations in the Contentious Jurisdiction of the International Court of Justice’ (2020) 72 REDI 33, para 24.

community as a whole, and those arising vis-à-vis another State in the field of diplomatic protection. By their very nature the former is the concern of all States. In view of the importance of the rights involved, all States can be held to have a legal interest in their protection; they are obligations *erga omnes*.”¹¹¹¹

According to some authors the final sentence of this paragraph can arguably be construed both as a recognition of the legal interest to bring an action before international courts and tribunals but also as a right to invoke responsibility by other available means, e.g. countermeasures.¹¹¹² In other words, recognition of the notion of obligations *erga omnes*, by the ICJ in the famous dictum in paragraph 33 of the *Barcelona Traction* judgment of 1970, paved the way for a fundamental change in ICJ Approach to *actio popularis*.¹¹¹³

Others conclude that “provided that the Court has a basis of jurisdiction, in a dispute concerning an *erga omnes* obligation, the legal interest of the applicant State to sue is considered in re ipsa.”¹¹¹⁴ In contrast Ragazzi¹¹¹⁵ argued that: “[T]he concept of obligations *erga omnes* does not necessarily imply the existence of a sort of *actio popularis*. In other words, the concept of obligations *erga omnes* and *actio popularis*, ..., are distinct and independent of one another”.¹¹¹⁶

Also, In its decision in case *East Timor* (Portugal v. Australia), 1995,¹¹¹⁷ the ICJ recognized the right of self-determination as an obligation *erga omnes* and held that:

¹¹¹¹ International Court of Justice(ICJ), ‘Barcelona Traction, Light and Power Company, Limited (Belgium v. Spain) (New Application: 1962)’ (1970) 32.

¹¹¹² For the link between the *erga omnes* obligations and *actio popularis* in ICJ in respect to countermeasures and *jus cogens* see Harry D Gould, ‘Obligations Erga Omnes and the Actio Popularis’, *The Legacy of Punishment in International Law* (Springer 2010).

¹¹¹³ Gattini (n 1104) para 5.

¹¹¹⁴ *ibid* 14.

¹¹¹⁵ See Maurizio Ragazzi, *The Concept of International Obligations Erga Omnes* (Oxford University Press 1997).

¹¹¹⁶ Yoshifumi Tanaka, ‘Reflections on Locus Standi in Response to a Breach of Obligations Erga Omnes Partes: A Comparative Analysis of the Whaling in the Antarctic and South China Sea Cases’ (2018) 17 *The Law & Practice of International Courts and Tribunals* 527, 533.

¹¹¹⁷ On 22 February 1991, Portugal filed an Application instituting proceeding against Australia concerning “certain activities of Australia with respect to East Timor”, in relation to the conclusion, on 11 December 1989, of a treaty between Australia and Indonesia which created a Zone of Co-operation in a maritime area between “the Indonesian Province of East Timor and Northern Australia”. According to the

“However, Portugal puts forward an additional argument aiming to show that the principle formulated by the Court in the case concerning Monetary Gold Removed from Rome in 1943 is not applicable in the present case. It maintains, in effect, that the rights which Australia allegedly breached were rights *erga omnes* and that accordingly Portugal could require it, individually, to respect them regardless of whether or not another State had conducted itself in a similarly unlawful manner... However, the Court considers that the *erga omnes* character of a norm and the rule of consent to jurisdiction are two different things. Whatever the nature of the obligations invoked, the Court could not rule on the lawfulness of the conduct of a State when its judgment would imply an evaluation of the lawfulness of the conduct of another State which is not a party to the case. Where this is so, the Court cannot act, even if the right in question is a right *erga omnes*.”¹¹¹⁸ Nevertheless, the Court refused to exercise its jurisdiction, as a consequence of the doctrine of the ‘necessary third party’.

As it is clear from the cited paragraph of the case Portugal argued that the rights which Australia allegedly breached were rights *erga omnes* and that accordingly Portugal could require it, individually, to respect them regardless of whether or not another State had conducted itself in a similarly unlawful manner, the Court did not respond to this contention. The argument and the Court’s silence show that the Court has not rejected the very idea and essence of *actio popularis*. However, the court assumed the prerequisite of *action popularis* is a specific grant of the court jurisdiction.¹¹¹⁹ It means “substantive law developments towards the acceptance of the related concepts of obligations owed *erga omnes* ... have not been matched by procedural flexibility. Indeed, the ICJ explicitly distinguished between the *erga omnes* nature of the norm of self-determination and the jurisdictional requirement of consent”.¹¹²⁰

Application, Australia had by its conduct failed to observe the obligation to respect the duties and powers of Portugal as the Administering Power of East Timor and the right of the people of East Timor to self-determination. In consequence, according to the Application, Australia had incurred international responsibility vis-à-vis the people of both East Timor and Portugal. For Overview of the case see <https://www.icj-cij.org/en/case/84> (Last seen 13 September 2020).

¹¹¹⁸ International Court of Justice(ICJ), ‘Case Concerning East Timor (Portugal v. Australia)’ (1995) para 29 <<https://www.icj-cij.org/en/case/84/judgments>>. accessed 16 March 2020.

¹¹¹⁹ Gould (n 1112) 73, 75.

¹¹²⁰ Christine Chinkin, ‘The East Timor Case (Portugal v. Australia)’ (1996) 45 The International and Comparative Law Quarterly 712, 721.

7.3.1.1. Feasibility of *Actio popularis* Application in Environmental Disputes before International Courts

Various international courts and tribunals has expressed their position as to the place of *actio popularis* in international law. Function of an *actio popularis* can be identified in S.S. Wimbledon case in 1923. The suits against Germany were initiated by the United Kingdom, France, Italy and Japan. The two latter States had apparently no individual interest in the dispute. Germany drew the attention of the Court to the point but did not raise a formal objection. In their reply the four applicants argued that they all were “interested in the respect of the principle of free passage through the Kiel Canal and to the exact execution of the clauses of the Versailles Treaty”.¹¹²¹ For its part the Permanent Court of International Justice (PCIJ) dealt with the *locus standi* of the applicant States and found that “each of the four Applicant Powers has a clear interest in the execution of the provisions relating to the Kiel Canal, since they all possess fleets and merchant vessels flying their respective flags”.¹¹²²

However, in assessing the feasibility of *actio popularis* for protection of the Atmosphere ICJ approach to *actio popularis* is and its essence is of a prime importance since its ratio matter jurisdiction for adjudicating dispute regarding the atmosphere has not been contested in *Nuclear Tests* (Australia v. France) and *Aerial Herbicide Spraying* case (Ecuador v. Colombia).

As to the *Nuclear Tests* case (Australia v. France), “on 9 May 1973, Australia and New Zealand each instituted proceeding against France concerning tests of nuclear weapons which France proposed to carry out in the Atmosphere in the South Pacific region. France stated that it considered the Court manifestly to lack jurisdiction and refrained from appearing at the public hearings or filing any pleadings. By two Orders of 22 June 1973, the Court, at the request of Australia and New Zealand, indicated provisional measures to the effect, *inter alia*, that pending judgment France should avoid nuclear tests causing radioactive fall-out on Australian or New Zealand territory. By two Judgments delivered on 20 December 1974, the Court found that the Applications of

¹¹²¹ PERMANENT COURT OF INTERNATIONAL JUSTICE(PCIJ), ‘S.S. “Wimbledon” Case, (Britain et Al. v. Germany), PCIJ Series A01’ (1923) 16 33 <https://www.icj-cij.org/public/files/permanent-court-of-international-justice/serie_A/A_01/03_Wimbledon_Arret_08_1923.pdf> accessed 14 September 2020.

¹¹²² *ibid* 20.

Australia and New Zealand no longer had any object and that it was therefore not called upon to give any decision thereon. In so doing the Court based itself on the conclusion that the objective of Australia and New Zealand had been achieved inasmuch as France, in various public statements, had announced its intention of carrying out no further atmospheric nuclear tests on the completion of the 1974 series.”¹¹²³ It may be follows that the Court has jurisdiction in the cases involving protection of the Atmosphere.

In *Nuclear Tests* (Australia v. France) case of 1974 regardless of the fact that the court did not dealt with the feasibility of an *actio popularis* in this case, joint Dissenting Opinion of Judges Onyeama, Dillard, Jiménez de Aréchaga and Sir Humphrey Waldock is remarkable in this respect. They believe that:

“Although we recognize that the existence of a so-called *actio popularis* in international law is a matter of controversy, the observations of this Court in the *Barcelona Traction, Light and Power Company, Limited* case suffice to show that the question is one that may be considered as capable of rational legal argument and a proper subject of litigation before this Court.”¹¹²⁴

Bodansky on analyzing the contribution of the International Court of Justice to international environmental law has argued that “although *Barcelona Traction* involved an investment rather than an environmental dispute, it complements Corfu Channel’s focus on transboundary harms by articulating the concept of obligations *erga omnes* – that is, obligations owed not bilaterally between States but to the international community as a whole – which lays the foundation for protection of the global commons. The Court’s discussion in *Barcelona Traction* of obligations *erga omnes* did not include any environmental obligations in its list of examples, but obligations to protect global commons such as the atmosphere and the high seas would appear

¹¹²³ See International Court of Justice (ICJ), ‘Nuclear Tests (Australia v. France), Application Instituting Proceedings’ (n 1044).

¹¹²⁴ International Court of Justice (ICJ), ‘Nuclear Tests (Australia v. France), Joint Dissenting Opinion of Judges Onyeama, Dillard, Jiménez de Aréchaga and Sir Humphrey Waldock’ (1974) 312 para 117 <<https://www.icj-cij.org/public/files/case-related/58/058-19741220-JUD-01-07-EN.pdf>> accessed 20 September 2020.

excellent candidates for *erga omnes* status, since by their nature they involve the interests of the international community generally, not individual States”.¹¹²⁵

Another case that can be cited as an example in which the Court's ratio matter jurisdiction has not been objected is *Aerial Herbicide Spraying* case (Ecuador v. Colombia)¹¹²⁶ which removed from the Court's List by the order of President of the Court, due to Ecuador decision to not to continue the proceedings.¹¹²⁷

Furthermore, the 2011 Advisory Opinion of the Seabed Dispute Chamber of the International Tribunal for the Law of the Sea on *Activities in the Area* interpreted provisions of UNCLOS on the protection and preservation of the marine environment as entailing obligations *erga omnes*.¹¹²⁸ Supporting this view some authors believes that prevention of global environmental harm is certainly the concern of all States. Likewise, prevention of atmospheric pollution affecting areas beyond national jurisdiction is an obligation *erga omnes*.¹¹²⁹ As the legal status of the atmosphere and the marine environment are similar -common heritage of humankind- this advisory Opinion can support the protection of the atmosphere with obligations *erga omnes*.

7.3.1.2. Common Interest: A New Accepted Concept in the Recent Environmental Case Law

Recently In the Whaling in the Antarctic (Australia v. Japan: New Zealand intervening), with New Zealand intervening, in its application of 31 May 2010, Australia institute a

¹¹²⁵ Bodansky, 'The Role and Limits of the International Court of Justice in International Environmental Law' (n 704) 11.

¹¹²⁶ On 31 March 2008, Ecuador filed an Application instituting proceedings against Colombia in respect of a dispute concerning the alleged "aerial spraying [by Colombia] of toxic herbicides at locations near, at and across its border with Ecuador". Ecuador maintained that "the spraying has already caused serious damage to people, to crops, to animals, and to the natural environment on the Ecuadorian side of the frontier and poses a grave risk of further damage over time". It further contended that it had made "repeated and sustained efforts to negotiate an end to the fumigations" but that "these negotiations have proved unsuccessful". See International Court of Justice, 'Aerial Herbicide Spraying (Ecuador v. Colom.)', GL No. 138,2010 I.C.J. (Order of June 25)' (n 1033).

¹¹²⁷ See *ibid*.

¹¹²⁸ Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (Advisory Opinion) (Seabed Dispute Chamber of the International Tribunal for the Law of the Sea, Case No 17, 1 February 2011) ('Activities in [180]).

¹¹²⁹ Mayer, 'A Review of the International Law Commission's Guidelines on the Protection of the Atmosphere' (n 635) paras 35, 36.

proceeding against Japan¹¹³⁰, contending the violation of Article 8 International Convention on the Regulation of Whaling (hereinafter, ICRW).¹¹³¹ Australia invoked as the basis of the Court's jurisdiction the declarations made by both Parties under Article 36, paragraph 2, of the Court's Statute.¹¹³² Japan objected to the jurisdiction of the Court by virtue of a reservation by Australia relating to disputes concerning 'the exploitation of any disputed area of or adjacent to any such maritime zone pending its delimitation'.¹¹³³ However it did not raise the question of Australia's legal interest. The objections on jurisdiction were dismissed by the ICJ.¹¹³⁴ Accordingly, the Court implicitly recognized that obligations under the ICRW have an *erga omnes partes* character by accepting the locus standi of Australia. The Whaling in the Antarctic judgment appears to demonstrate that the *erga omnes partes* character of treaty obligations can be indirectly recognized through the establishment of the Court's jurisdiction and admissibility of the Applicant State's claims.¹¹³⁵ Again, this case the fact that the Court itself did not entered into the question of Australia's legal interest indicates that the Court implicitly accepted function of *actio popularis*.

Further, in the *Oil Platforms* case¹¹³⁶ between Iran and the United States, the ICJ decision offers a rare hint that the Court might accept that a state may claim through what is the functional equivalent of an *actio popularis* in the areas identified in *Barcelona Traction* case as obligations *erga omnes* (acts of aggression, genocide, slavery, and racial discrimination) that all States can be held to have a legal interest in protecting. Nonetheless, the Court would have not entertained such a claim in the case, given that the alleged Iranian attacks in the Court's view did not rise to the requisite level of an

¹¹³⁰ See 'Whaling in the Antarctic (Australia v. Japan: New Zealand Intervening), OVERVIEW OF THE CASE'.

¹¹³¹ Sonia E Rolland, 'Whaling in the Antarctic (Australia v. Japan: New Zealand Intervening)' (2014) 108 American Journal of International Law 496, para 30.

¹¹³² *ibid* 31.

¹¹³³ *ibid* 32.

¹¹³⁴ *ibid* 41.

¹¹³⁵ Tanaka (n 1116) 538.

¹¹³⁶ See International Court of Justice, 'Oil Platforms (Islamic Republic of Iran v. United States of America) , (Counter-Claim), 10 March' (1998) 190 <<https://www.icj-cij.org/public/files/case-related/90/090-19980310-ORD-01-00-EN.pdf>> accessed 20 January 2021.

aggression.¹¹³⁷ Indeed the Court avoided to expanding the limited *erga omnes* areas as might run the risk of opening the floodgates. However, Bekker thinks this concern is unwarranted if 'environmental aggression' is considered as included within 'acts of aggression' for purposes of the *actio popularis* doctrine.¹¹³⁸ He argues "it had accepted the actual or attempted sinking of oil tankers in an international shipping channel as "environmental aggression". The example of the United Nations Compensation Commission, which has awarded damages for environmental aggression by Iraq during the first Gulf War, suggests that this concept is a part of contemporary international law, and may be enforced by claimants having a legal interest."¹¹³⁹

In addition, some commentators reading the two sentences of the Court, its sentences in *South West Africa* and *Barcelona Traction*, concluded that in general, international law does not recognize *actio popularis*, except for breach of *erga omnes* obligations, since they create omnium rights and in the court's view all States have a legal interest to act when such an obligation is breached.¹¹⁴⁰ The Court has already referred to this notion explicitly and repeatedly, for instance concerning the Convention on genocide.¹¹⁴¹ The idea here is not to invoke a subjective right anymore, but rather an objective interest for the respect of legality. This leads directly to an *actio popularis*, even a limited one.¹¹⁴²

¹¹³⁷ Pieter HF Bekker, 'Protecting International Shipping Channels During Hostilities and the Oil Platforms Case: Actio Popularis Revisited' (2004) 29 Yale J. Int'l L. 323, 328.

¹¹³⁸ *ibid* 329.

¹¹³⁹ *ibid* 328.

¹¹⁴⁰ International Court of Justice(ICJ), 'Barcelona Traction, Light and Power Company, Limited (Belgium v. Spain) (New Application: 1962)' (n 1111) para 32. see also Robert J Araujo, 'Implementation of the ICJ Advisory Opinion-Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory: Fences [Do Not] Make Good Neighbors' (2004) 22 BU Int'l LJ 349; Alexander Orakhelashvili, 'Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory: Opinion and Reaction' (2006) 11 Journal of Conflict and Security Law 119.

¹¹⁴¹ Sandesh Sivakumaran, 'Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v Serbia and Montenegro)' (2007) 56 The International and Comparative Law Quarterly 695, para 31.

¹¹⁴² Sandrine Maljean-Dubois, 'Climate Change Litigation', *Max Planck Encyclopedias of International Law [MPIL]* (2019) para 29 <<https://opil.ouplaw.com/view/10.1093/law-mpeipro/e3461.013.3461/law-mpeipro-e3461?prd=MPIL>>. accessed 6 March 2020.

Following the uncertainty of the jurisprudence and different views to possibility of *actio popularis* in violation of an obligation *erga omnes* and *erga omnes partes*, the 2005 Resolution of the *Institut de droit international* in Article 3 states that:

“In the event of there being a jurisdictional link between a State alleged to have committed a breach of an obligation *erga omnes* and a State to which the obligation is owed, the latter State has standing to bring a claim to the International Court of Justice or other international judicial institution in relation to a dispute concerning compliance with that obligation”.¹¹⁴³

As a whole, it is difficult to draw from the ICJ jurisprudence a clear-cut answer as to the actual place of *actio popularis* in international law. Nevertheless, weighing of the Court rulings in various cases whether contentious or advisory shows that provided that the Court has a basis of jurisdiction, in a dispute concerning an *erga omnes* obligation, the legal interest of the Applicant State to sue is considered in *re ipsa*. Same criteria can be applied to the dispute concerning obligation *erga omnes partes* obligation, since there is no reason for precluding obligation *erga omnes partes* form the essence of *actio popularis*. Since these are said to be ‘collective obligations’, i.e. obligations binding on a group of states and established in a common interest, transcending the ‘sphere of the bilateral relations of the States parties’.¹¹⁴⁴ Thus, it is sufficient, in order to establish an interest to act, to be a Party to the treaty whenever it is impossible to single out third persons or Parties as creditors of the obligation.¹¹⁴⁵ The point was endorsed by ILC’s approach in Article 48 of ARSIWA as would be dealt with in the next section of this chapter.

To conclude on the ICJ position regarding the *actio popularis* it may be argued that once the standing requirements before the court are met, the enforcement of collective or community interests which exist under customary international law is permissible under optional clause declarations before the ICJ.¹¹⁴⁶

¹¹⁴³ Gaja (n 1100).

¹¹⁴⁴ For the latest comments of the ICJ on the *erga omnes partes* see International Court of Justice(ICJ), ‘Application of the Convention on the Prevention and Punishment of the Crime of Genocide (The Gambia v. Myanmar), Provisional Measures, 23 January 2020’ 1 paras 14–17 <<https://www.icj-cij.org/public/files/case-related/178/178-20200123-ORD-01-00-EN.pdf>> accessed 27 November 2020.

¹¹⁴⁵ Maljean-Dubois (n 1142) para 29.

¹¹⁴⁶ Ahmadov (n 1089) 229.

7.3.2. Actio Popularis in International Law: A Solid Basis for States' Intervention in favor of Atmosphere Protection

As shown before, *actio popularis* may be defined as a right to invocation of international responsibility in the form of commencement of proceedings before an international court or tribunal under articles 42 and 48 of ARSIWA. Article 48 of ARSIWA provides that:

1. Any State other than an injured State is entitled to invoke the responsibility of another State in accordance with paragraph 2 if:

- a) the obligation breached is owed to a group of States including that State, and is established for the protection of a collective interest of the group; or
- b) the obligation breached is owed to the international community as a whole.

Some authors believe that the notion of *actio popularis* is embedded in this Article.¹¹⁴⁷ The decision by the ILC to eliminate damage as an element of the internationally wrongful act supports the idea that a State may bring a claim before an international court or tribunal in the event of a legal injury and Article 48 is 'a deliberate departure' from the ICJ's judgment in the *South West Africa* of 1966.¹¹⁴⁸

The whole premise of Article 48 is to enable action in the collective interest to uphold multilateral arrangements that 'transcend the sphere of bilateral relations of the State parties.'¹¹⁴⁹ The premise of Article 48 is consistent with the essence of *actio popularis*.¹¹⁵⁰ However still some authors such as Verhoeven¹¹⁵¹ has been cautious "if all States parties to a treaty have a common interest to comply with the treaty, whether this would be sufficient to provide all States with the right to ask judges to determine the violation of the treaty without proper damage is a different question. Hence, Verhoeven hesitated

¹¹⁴⁷ Pierre-Marie Dupuy, 'Back to the Future of a Multilateral Dimension of the Law of State Responsibility for Breaches of "Obligations Owed to the International Community as a Whole"' (2012) 23 *European Journal of International Law* 1059, 1061.

¹¹⁴⁸ Gattini (n 1104) para 6.

¹¹⁴⁹ James Crawford, *State Responsibility: The General Part* (Cambridge University Press 2013) 647.

¹¹⁵⁰ For an overview of the breach of obligation *erga omnes* and legal position of States in light of Article 48 of the ARSIWA see Giorgio Gaja, "'States Having an Interest in Compliance with the Obligation Breached'" in Crawford James, Pellet Alain and Olleson Simon (eds), *The Law of International Responsibility* (Oxford: Oxford University Press 2010).

¹¹⁵¹ See Joe Verhoeven, 'Belgique Contre Sénégal Ou Quel Intérêt Pour Se Plaindre d'autrui? Cour Internationale de Justice, 20 Juillet 2012, Questions Concernant l'obligation de Poursuivre Ou d'extrader' (2013) 59 *Annuaire Français de Droit International* 3.

to admit that each State can institute proceedings before the ICJ in the absence of any special interest to that State".¹¹⁵² Also Dominicé¹¹⁵³ took the view that, even though some treaties allow not directly injured States to institute proceedings against a State responsible for a violation of an obligation *erga omnes* before the ICJ or another tribunal, the situation in general international law remains less clear.¹¹⁵⁴

On the other hand, some authors expressed doubts about the customary nature of the rights of States other than the injured one, including the entitlement to legal action, as codified in Article 48 ILC Articles on State Responsibility and labelled as a mere 'symbolic provision'.¹¹⁵⁵

Accordingly, we can conclude with some other authors that as far as a State takes action for the protection of an interest which transcends its own, the essence of *actio popularis* is fulfilled. Similarly, it would not make a difference whether the interest is one which appertains to the community as a whole, e.g. the protection of the global commons,¹¹⁵⁶ the maintenance of peace, or whether it follows from the concern of the community with regard to some specific issues, e.g. the protection of human rights¹¹⁵⁷ or minority rights.¹¹⁵⁸ Also Tams has expressed that even in the absence of an express clause recognizing standing, all States can institute proceedings if they seek to defend a small range of obligations protecting fundamental community values.¹¹⁵⁹

It should be noted that further to the cases specified in the ARSIWA, special rules may also determine which States may invoke responsibility in particular circumstances.

¹¹⁵² Tanaka (n 1116) 533.

¹¹⁵³ See Christian Dominicé, *A La Recherche Des Droits Erga Omnes* (Bruylant 2007).

¹¹⁵⁴ Tanaka (n 1116) 533.

¹¹⁵⁵ Gattini (n 1104) para 71.

¹¹⁵⁶ For a discussion on the applicability of the *actio popularis* to the outer limits of the continental shelf as another instances of collective interests and the global commons see Angeles Jimenez Garcia-Carriazo, 'The Protection of the Collective Interests as a Tool to Challenge the Outer Limits of the Continental Shelf' 283.

¹¹⁵⁷ For the application of *actio popularis* beyond the national level on human rights issues see Isabella Risini, 'The Inter-State Application Under the European Convention on Human Rights: More Than Diplomatic Protection', *The Influence of Human Rights on International Law* (Springer 2015).

¹¹⁵⁸ Gattini (n 1104) para 7.

¹¹⁵⁹ Christian J Tams, 'Individual States as Guardians of Community Interests' [2011] *From bilateralism to community interest: Essays in honour of Judge Bruno Simma*. Oxford University Press, Oxford 205, 386.

ARSIWA Article 55 (*lex specialis*) makes it clear that such special rules will take precedence.¹¹⁶⁰

In sum, feasibility of *actio popularis* for protecting obligation *erga omnes* has been endorsed by ICJ and its feasibility for protecting obligation *erga omnes partes* has been recognized by ILC. In other words, ILC in Article 48 of ARSIWA recognizes action in the collective interest to uphold multilateral arrangements that 'transcend the sphere of bilateral relations of the state parties. The only exception to this is existence of *lex specialis* that take precedence by virtue of Article 55 of ARSIWA.

As concluded above feasibility of *actio popularis* for protecting obligation *erga omnes* and obligation *erga omnes partes* has been recognized and the only exception to this is existence of *lex specialis* that take precedence by virtue of Article 55 of ARSIWA.

Now the question is whether a State can commence a proceeding where an obligation to protect the atmosphere is breached by another State claiming that such an obligation is an *erga omnes* one? It might be found that the answer to the question is in the ILC commentaries on 'Draft Guidelines on the Protection of the Atmosphere'. However, the ILC on clarifying this issue remains vague. The Commission in its commentary to draft Guideline 3 under the heading of 'Obligation to Protect the Atmosphere' as to the place of such obligation is of the view that:

"As presently formulated, the draft guideline is without prejudice to whether or not the obligation to protect the atmosphere is an *erga omnes* obligation in the sense of article 48 of the articles on responsibility of States for internationally wrongful acts, a matter on which there are different views. While there is support for recognizing that the obligations pertaining to the protection of the atmosphere from transboundary atmospheric pollution of global significance and global atmospheric degradation are obligations *erga omnes*, there is also support for the view that the legal consequences of such a recognition are not yet fully clear in the context of the present topic".¹¹⁶¹

Hence, some author is of the view ILC recognized the existence of an obligation of states to prevent global environmental harm, but it failed to draw the obvious conclusion: this

¹¹⁶⁰ Crawford (n 1149) 647.

¹¹⁶¹ Shinya Murase, 'Report of the International Law Commission to UNGA, Sixty-Eighth Session, UN Doc A/71/10, (2 May-10 June and 4 July-12 August 2016)' 286,287.

obligation is not incurred *vis-à-vis* another state but inevitably towards the international community as a whole.¹¹⁶²

Also, Shelton argues that, in its advisory opinion on the *Legality of the Threat or Use of Nuclear Weapons*, the ICJ implicitly recognized the existence of *erga omnes* environmental obligations¹¹⁶³ on the part of states:

“[T]he environment is not an abstraction but represents a living space, the quality of life and the very health of human beings, including generations unborn. The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment”.¹¹⁶⁴

Also 2005 resolution of the Institut de Droit International in its preamble states that “a wide consensus exists to the effect that the prohibition of acts of ..., obligations concerning the protection of basic human rights, ... ,obligations relating to the environment of common spaces are examples of obligations reflecting those fundamental values” (*erga omnes*).¹¹⁶⁵ As clarified in chapter 1.2 based on the IPCC and WHO reports the environmental harms and damages such as climate change and air pollution form a major threat to the welfare of both humans and the environment. Thus, can be argued protection of the atmosphere is considered an obligation *erga omnes* as it is a ‘common space’. Moreover, atmospheric harms hinder the enjoyment of fundamental rights such as the right to life that is another violation of *erga omnes* right. Accordingly, there is a strong feasibility of *actio popularis* for protection of the atmosphere as an *erga omnes* right.

However, emerging views that support the *erga omnes* characteristic of an obligation to protect the atmosphere could support feasibility of *actio popularis* for protection of the atmosphere due to their *erga omnes* nature. For example, some commentators believe

¹¹⁶² Mayer, ‘A Review of the International Law Commission’s Guidelines on the Protection of the Atmosphere’ (n 635) 35.

¹¹⁶³ Shelton, ‘Common Concern of Humanity’ (n 438) 34.

¹¹⁶⁴ International Court of Justice, ‘Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ICJ GL No 95, [1996] ICJ Rep 226, ICGJ 205 (ICJ 1996), 8th July 1996’ (n 1028) 241,242.

¹¹⁶⁵ Gaja (n 1100).

that according to the foundational Rio Principle 2 that “States have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States”, which can be considered as a form of idea of the responsibility of every State towards the international community,¹¹⁶⁶ Others believes that atmosphere protection is in the interest of all States.¹¹⁶⁷

On the other hand, there are some views supporting the significant harms to the global commons particularly those environmental obligations relating to the common concern and common heritage of humankind or rights protected by treaties might be successfully invoked for an *actio popularis*.¹¹⁶⁸ Whereas, several treaties specifically the Paris agreement as a universal binding accord acknowledged atmospheric degradation as a common concern of humankind, premise of the Article 48 of ARSIWA that mainly concerns obligations related to the protection of the environment¹¹⁶⁹ can be applied when an obligation protecting the atmosphere is breached.¹¹⁷⁰

In addition, the no harm rule endorsed by the ILC ‘Draft Articles on Prevention of Transboundary Harm from Hazardous Activities’ dedicates that a State likely to be affected by an activity involving the risk of causing significant transboundary harm could be able to demand from the State of origin compliance with obligations of prevention although the activity itself is not prohibited.¹¹⁷¹ This can be construed as an initial form of *actio popularis* for protection of the atmosphere. Furthermore, an invocation of Draft Articles on Prevention of Transboundary Harm from Hazardous Activities by a State likely to be affected is not a bar to a later claim by that State that the activity in question

¹¹⁶⁶ Röben Volker, ‘Air Pollution, Transboundary Aspects’, Max Planck Encyclopedias of International Law para 14.

¹¹⁶⁷ Kreuter-Kirchhof (n 444) para 28.

¹¹⁶⁸ Sands and others (n 336) 159. Supporting third view might also be found in the ILC’s previous classification of a ‘massive pollution’ of the atmosphere or of the seas as an international crime. See United Nations, Draft Articles on State Responsibility, Yearbook of the International Law Commission, 1980, Vol. II, Part 2, pt I.

¹¹⁶⁹ It follows from commentaries issued by the ILC that paragraph (a) of Article 48 concerns mainly obligations related to the protection of the environment. See: ARSIWA, p 126, para 7.

¹¹⁷⁰ For tracing the Article 48 of the ARSIWA and the notions of common concern, *erga omnes* and *actio popularis* see Alfred Rest, ‘State Responsibility/Liability’ (2010) 40 *Envtl. Pol’y & L.* 298.

¹¹⁷¹ International Law Commission, ‘Draft Articles on Prevention of Transboundary Harm from Hazardous Activities’ (n 1063) para Art. 2 Para 6.

is a prohibited activity. In such a case State responsibility could be engaged to implement the obligations, including any civil responsibly or duty of the operator.¹¹⁷²

Furthermore, when an anthropocentric perspective could not guarantee a right to a healthy environment, but just an environment that satisfies minimal health standards for humans,¹¹⁷³ the doctrine of *actio popularis* could be invoked by the biocentric approach towards protect the environment and the right of nature to ensure appropriate plaintiffs bring the rights of nature before court.¹¹⁷⁴ Ecuador was the first country that has legally recognized the right of nature, and gives all Ecuadorians legal standing to enforce the rights of nature.¹¹⁷⁵ However, still one of the problems seems to be the doctrine of standing for the protecting of nature before court. Thus, Ecuador could adapt an expanded *actio popularis* principle to give any person standing to bring an action to defend the rights of nature.¹¹⁷⁶ Some scholars have described particular rules relating to the protection of the environment as establishing obligations *erga omnes*. They believe that: “The obligation not to engage in wrongful deforestation that results in the release of carbon into the atmosphere and the loss of gas sequestration services is certainly an obligation *erga omnes*”.¹¹⁷⁷

¹¹⁷² *ibid* Art 2, Para 6.

¹¹⁷³ Joshua J Bruckerhoff, ‘Giving Nature Constitutional Protection: A Less Anthropocentric Interpretation of Environmental Rights’ (2007) 86 *Tex. L. Rev.* 615, 616.

¹¹⁷⁴ Nathalie Rühls and Aled Jones, ‘The Implementation of Earth Jurisprudence through Substantive Constitutional Rights of Nature’ (2016) 8 *Sustainability* 174, 12. Also see Christina Voigt, *Rule of Law for Nature: New Dimensions and Ideas in Environmental Law* (Cambridge University Press 2013) 209–221. For overviewing the nature's rights in a biocentric perspective see Susan Emmenegger and Axel Tschentscher, ‘Taking Nature’s Rights Seriously: The Long Way to Biocentrism in Environmental Law’ (1993) 6 *Geo. Int’l Evtl. L. Rev.* 545.

¹¹⁷⁵ Grant Wilson, ‘Envisioning Nature’s Right to a Stable Climate System’ (2020) 10 *Sea Grant L. & Pol’y J.* 60, 64. Since identification of the right of nature by Ecuador, dozens of courts in Ecuador have considered the Rights of Nature. In many instances, judges upheld nature's constitutional rights. One such instance was when the Vilcabamba River, as the named plaintiff, secured its own restoration after suffering harm due to a road construction project. Following the several decisions by courts based on the right of nature, in 2019 Colombia's Supreme Court of Justice issued a landmark decision addressing climate change in the country. With support from civil society group Dejusticia, twenty-five young persons sued the government, alleging violations of their human rights to life, health, and enjoyment of a healthy environment. These allegations were based on the government's failure to protect the Amazon against deforestation and other environmental degradation, which contributed to global climate change. *ibid* 64–66. Also for tracing the rights of nature and climate change litigation see United Nations Environment Programme, *Global Climate Litigation Report 2020 Status Review* (2020) 17.

¹¹⁷⁶ Rühls and Jones (n 1174) 12.

¹¹⁷⁷ *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua)*, dissenting opinion of Judge *ad hoc* Dugard (n 697) para 13.

**PART IV. EVOLUTIONS AND INNOVATIONS IN THE LEGAL
PROTECTION OF THE ATMOSPHERE. ATMOSPHERE AS AN
INTERGENERATIONAL RIGHT AND OBLIGATION, PROTECTION
BASED ON THE HUMAN RIGHTS FRAMEWORK**

Chapter 8. Protection of the Atmosphere Based on the Human Rights

Frameworks

Protection of the atmosphere is considered one of the most important concerns of environmental activists. In fact, as discussed, harms to the atmosphere could not be narrowed to the cause and effects of climate change. While greenhouse gas emissions as one cause of atmospheric harms overlaps with climate change, there are other specific concerns over the protection of the atmosphere including the protection of ozone layer and other instances of air pollution harms and effects on human health. In addition to climate change legal instruments, protection of the atmosphere requires specific legal mechanisms.

As discussed in the first part of the thesis, the scientific research proves that the effects of climate change and air pollution are impacting and will continue to impact the lives of many people across the world. This is even more important given the impact that climate change and atmospheric degradation has on human security, human habitation and, ultimately, on the fundamental human rights of all individuals. By highlighting the dire consequences for many human beings, increased attention to the overwhelming necessity to protect the global climate will result. This will indicate that appropriate remedial measures themselves depend upon the global cooperation of all States, acting together as part of the common concern of humankind. The concept of the common concern of humankind applies to both the protection from the adverse effects of climate change and to the protection of human rights. It requires that there be a bridge between human rights law and environmental law on these two fundamental concerns. The significance of the concept of common concern of humankind is that the international community collectively has an interest in the global atmosphere and a common responsibility to seek to achieve sustainable development.¹¹⁷⁸

¹¹⁷⁸ Horn and Freeland (n 12) 134. Laura Horn, 'The Implications of the Concept of Common Concern of a Human Kind on a Human Right to a Healthy Environment' (2004) 1 *Macquarie J. Int'l & Comp. Envtl. L.* 233, 258. Also Shelton noted, the common objectives and the view that humankind is part of a global system may reconcile the aims of human rights and environmental protection, since both ultimately seek to achieve the highest quality of sustainable life for humanity within the existing global system. However, potentially conflicting differences of emphasis still exist. For example the essential concern of humankind rights law is to sustain life globally by balancing the needs and capacities of the present with those of the

Despite the International Environmental Law sources, the existing human rights law has been contributing to protection of environment as a general concept and in some cases more specifically in protection of the atmosphere. This chapter seeks to provide an overview on those human rights law mechanisms that could provide a legal possibility for the protection of the atmosphere.

8.1. Creation of a right to the environment for human being

Despite the gradual improvement of the human rights instruments in the last few decades, the human rights approach has not been incorporated in the legal instruments pertaining to the environment as it is expected. As a result, to date there is neither a globally recognized international right to a healthy environment, nor an international human rights treaty which provides for an enforceable substantive right to a healthy environment. It is, however, more likely that environment-related human rights interests could be protected through and by means of other human rights-based *jus cogens* norms, to the extent that human rights concern in the environmental domain significantly overlap with other human rights issues¹¹⁷⁹ including the right to life, right to privacy and family life, etc. This is the same inside the European human right framework, however, despite the absence of an explicit right to a healthy environment in the European Convention on Human Rights and Fundamental Freedoms¹¹⁸⁰, the European Court of Human Rights has so far ruled on some 300 environment-related cases, applying concepts such as the right to life, free speech and family life to a wide range of issues including pollution, man-made or natural disasters and access to environmental information.¹¹⁸¹ Moreover, the majority of domestic constitutions now recognize the right to a healthy environment in one form or another, while regionally

future. Therefore, protection of nature at time may conflict with preservation of individual rights. This problem cannot be avoided by developing a right to environment, but developing such a rights for balancing purposes, rather than subordinating it to human rights, such as the right to property. Dinah Shelton, 'Human Rights, Environmental Rights, and the Right to Environment' (1991) 28 *Stan. j. Int'l L.* 103, 111.

¹¹⁷⁹ Kotzé and Muzangaza (n 681) 290.

¹¹⁸⁰ Council of Europe, 'European Convention for the Protection of Human Rights and Fundamental Freedoms, as Amended by Protocols Nos. 11 and 14, 4'.

¹¹⁸¹ Council of Europe, 'Protecting the Environment Using Human Rights Law' <<https://www.coe.int/en/web/portal/human-rights-environment>> accessed 19 January 2021.

the right is also entrenched in various human rights instruments. Many soft law instruments also offer a reference to the right to a healthy environment.¹¹⁸²

8.1.1. Universal sources in creation of a human right to the environment

As was explained, the absence of a globally recognized right to a healthy environment could not be read as the lack of relation between the protection of environment and human rights. Indeed, one of the most noteworthy aspects of human rights law over the last twenty years is that UN treaty bodies, regional tribunals, special rapporteurs' reports, and other human rights mechanisms have applied human rights law to environmental issues even without a stand-alone, justiciable human right to a healthy environment.¹¹⁸³ There are substantial universal instruments that made a reference to a human right to a healthy environment and more specifically to a right to a healthy atmosphere. Various components of the third-generation human right to a healthy environment have emerged under international law. The greater specificity of obligations and rights developing under international environmental law provides increasing protection not only for individual human beings against continued environmental degradation, but also for the natural ecosystems on which the continued health and vitality of the planet depend.¹¹⁸⁴ In the words of the Special Rapporteur, as protection of atmosphere and air pollution are the subjects relating to an anthropocentric view so there are a lot of possibilities in human rights law to contribute to this scope for human survival.¹¹⁸⁵ This chapter reviews the most important references in this context.

¹¹⁸² Kotzé and Muzangaza (n 681) 290.

¹¹⁸³ John H Knox and Ramin Pejan, *The Human Right to a Healthy Environment* (Cambridge University Press 2018) ch Introduction.

¹¹⁸⁴ James T McClymonds, 'Human Right to a Healthy Environment: An International Legal Perspective' (1992) 37 *NYL Sch. L. Rev.* 583, 633.

¹¹⁸⁵ Shinya Murase, 'Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)' 38.

8.1.1.1. Universal conventions and documents

a. Human right to the environment

The first document that identifies a relation between international human rights and international environmental law is the Stockholm Declaration.¹¹⁸⁶ Principle 1 of the Declaration focused on the rights assumed to persons and the obligations (duties) inflicted on States concerning the environment, providing that “man has the fundamental rights, right to freedom, equality and adequate conditions of life in an environment of a quality that permits a life of dignity and well-being”.¹¹⁸⁷ The notion of intergenerational equity in the Stockholm Declaration and also the concept of common concern of the atmosphere have recognized the right to participation of all States and their people and also present and future generations.¹¹⁸⁸ Despite its soft law nature, the Stockholm Declaration has had profound impacts on environmental law, constitutional law, and human rights law.¹¹⁸⁹ The influence of the inclusion of human right to a healthy environment on various regional instruments will be addressed in next chapter.

The other document that addresses common concerns about international human rights and environment is The Rio Declaration.¹¹⁹⁰ Principle 1 of this declaration expresses that “human beings are at the center of concerns for sustainable development” and “they are entitled to a healthy and productive life in harmony with nature”. This principle aims to develop international human rights law that merge concerns for environmental protection.¹¹⁹¹

b. Human right to the atmosphere

In addition to the aforementioned sources addressing a right to a healthy environment, there are some conventions that more specifically deal with a human right to a healthy and protected atmosphere. The 1979 Convention on Long-Rang Transboundary Air

¹¹⁸⁶ See: ‘Report of the United Nations Conference on the Human Environment, Stockholm’ (n 759).

¹¹⁸⁷ Sands and others (n 336) 814, 815.

¹¹⁸⁸ Leigh (n 427) 148.

¹¹⁸⁹ Knox and Pejan (n 1183) 17,18.

¹¹⁹⁰ Hens (n 547).

¹¹⁹¹ Sands and others (n 336) 812.

Pollution under Article 1 noticed that air pollution has deleterious effects of such a nature as to endanger human health, and under Article 2 enforced the parties to protect man and his environment.¹¹⁹² The Vienna Convention for Protection of the Ozone Layer under Article 2 asked parties to apply measures to protect humans.¹¹⁹³

The UNFCCC under Article 1 recognizes the harmful effects of climate change on human health and welfare. An analytical study on the relationship between human rights and the environment undertaken by the Office of the High Commissioner for Human Rights in 2011 emphasized that environmental degradation (including: air pollution, climate change and Ozone layer depletion) has the potential to affect the realization of human rights.¹¹⁹⁴

The Paris Agreement is the first international environmental treaty that explicitly reference human rights. Its preamble specifies that Parties “should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equality”.¹¹⁹⁵ Adelman argues, however, the inclusion of human rights in the Preamble to the Paris Agreement is a step forward, but is incommensurate with the scale and urgency of climate change.¹¹⁹⁶ For instance, some analysis have demonstrated that policy makers have not yet created a context where the right to health can be protected by keeping temperature changes below 2°C. Thus,

¹¹⁹² Convention On Long-Range Transboundary Air Pollution, 13 November 1979, 1302 UNTS 217, (Entry into force 16 March 1983), [LRTAP].

¹¹⁹³ United Nations, ‘Vienna Convention for the Protection of the Ozone Layer (Adopted 22 March 1985) 1513 UNTS 293’ (n 707).

¹¹⁹⁴ G. Assembly, ‘Human Rights Council Nineteenth session Agenda items 2 and 3 Annual report of the United Nations High Commissioner for Human Rights and reports of the Office of the High Commissioner and the Secretary-General’ (2011) 17 at para 15.

¹¹⁹⁵ Sébastien Duyck and others, ‘Human Rights and the Paris Agreement’s Implementation Guidelines: Opportunities to Develop a Rights-Based Approach’ (2018) 12 Carbon & Climate Law Review 191, 191.

¹¹⁹⁶ Sam Adelman, ‘Human Rights in the Paris Agreement: Too Little, Too Late?’ (2018) 7 Transnational Environmental Law 17, 17.

present and future generations remain at risk.¹¹⁹⁷ The implementation guidelines provide the first real test of Parties' commitment to achieve greater, better, and more equitable international cooperation on climate change. There are several entry points for incorporating a human rights-based approach into the Paris Agreement's implementation guidelines, namely: guidance for NDCs, adaptation communications, the transparency framework, the global stocktake, and the rules of the Article 6 mechanism.¹¹⁹⁸

8.1.2. Regional contribution for creation a right for human being

The right to a healthy environment was explicitly included in the African Charter on Human and People's Right,¹¹⁹⁹ the San Salvador Protocol,¹²⁰⁰ the Aarhus Convention,¹²⁰¹ and the Arab Charter on Human Rights.¹²⁰² Collectively, these regional treaties have been ratified by 120 nations.¹²⁰³ Furthermore, the 2018 Escazú Agreement in Latin America and the Caribbean countries, in its Article 1 states "The objective of the present Agreement is ... contributing to the protection of the right of every person of present and future generations to live in a healthy environment and to sustainable

¹¹⁹⁷ Dietzel (n 1003) 319.

¹¹⁹⁸ Duyck and others (n 1195) 202. Also, a series of the human rights council resolutions emphasizes the potential of states' existing human rights obligations to inform and strengthen climate change law- and policy-making, by promoting policy coherence, legitimacy and sustainable outcomes. In the first resolution the human rights council noted "climate change poses an immediate and far-reaching threat to people and communities around the world and has implications for the full enjoyment of human rights". Human Rights Council, 'Res 7/23, Human Rights and Climate Change, UN Doc A/HRC/Res/7/23' (2008). Human Rights Council, 'Res 10/4, Human Rights and Climate Change, UN Doc AHRC/Res/10/4' (2009). Human Rights Council, 'Res 18/22, Human Rights and Climate Change, UN Doc AHRC/Res/18/22' (2011). Human Rights Council, 'Res 26/27, Human Rights and Climate Change, UN Doc AHRC/Res/26/27' (2014); Human Rights Council, 'Res 29/15, Human Rights and Climate Change, UN Doc AHRC/Res/29/15' (2015); Human Rights Council, 'Res 32/33, Human Rights and Climate Change, UN Doc AHRC/RES/32/33'; Human Rights Council, 'Res 34/20, Human Rights and the Environment, UN Doc AHRC/34/20' (2017).

¹¹⁹⁹ African Charter on Human and Peoples' Rights, OAU Doc CAB/LEG/67/3 rev 5, 21 ILM 58 (1982), (entered into force Oct. 21, 1986), (Banjul Charter) 1981.

¹²⁰⁰ Organization of American States, Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador), 16 November 1999, A-52.

¹²⁰¹ United Nations Economic Commission for Europe Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 2161 UNTS 447, 38 ILM 517 (1999) (n 1095).

¹²⁰² League of Arab States, 'Arab Charter on Human Rights, 15 September 1994' <<https://www.refworld.org/docid/3ae6b38540.html>> accessed 4 March 2021.

¹²⁰³ Knox and Pejan (n 1183) 17,18.

development”.¹²⁰⁴ Under Article 4(1) of Escazú, the Parties have obliged themselves to guarantee the right to a healthy environment.¹²⁰⁵

8.1.2.1. Europe

The European Court of Human Rights in the 1994 case of *López Ostra v. Spain* recognized for the first time environmental matters according to the European Convention on Human Rights.¹²⁰⁶ However, there is no explicit environmental right.¹²⁰⁷

In *López Ostra v. Spain* case, the applicant was a Spanish national and resident of the city of Lorca in Spain, claimed that fumes from a waste treatment plant, which were manufactured by a private company in the neighbourhood of the applicant’s residence (Mrs López Ostra lived twelve meters from plant), polluted the atmosphere of the city and affected the health of others and bothered her so much that she and her family forced to leave their home temporarily, which was a violation of Article 8, the right to private and family life of the Convention. In addition, the Court recognized a direct link between emissions and the applicant’s daughter’s illness.¹²⁰⁸

The Court went on to say it is true that the plant was owned, controlled, and operated by a private company not by State or by the Lorca municipality, but the town allowed the company and subsidized building the plant, whilst the Spanish sovereignty “assumed a positive duty to take reasonable and appropriate measures to secure the applicant’s rights” guaranteed under the Convention of Human Rights. The Court concluded that

¹²⁰⁴ ‘Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (4 March 2018) LC/CNP10.9/5, [Escazú Agreement]’ (n 1096).

¹²⁰⁵ Stephen Stec and Jerzy Jendrośka, ‘The Escazú Agreement and the Regional Approach to Rio Principle 10: Process, Innovation, and Shortcomings’ (2019) 31 *Journal of Environmental Law* 533, 537, 538.

¹²⁰⁶ Council of Europe (n 1180).

¹²⁰⁷ European Court of Human Rights, ‘*López Ostra v Spain*, Merits and Just Satisfaction, App No 16798/90, A/303-C, [1994] ECHR 46, (1995) 20 EHRR 277, IHRL 3079 (ECHR 1994), 9th December 1994’ (1994). For commentaries on *Lopez Ostra v Spain* See, e.g., Judith Hippler Bello and Richard Desgagne, ‘Lopez Ostra v. Spain’ [1995] *American Journal of International Law* 788; Neil AF Popovic, ‘Pursuing Environmental Justice with International Human Rights and State Constitutions’ (1996) 15 *Stan. Envtl. LJ* 338; Dominic McGoldrick, ‘Sustainable Development and Human Rights: An Integrated Conception’ (1996) 45 *Int’l & Comp. LJ* 796.

¹²⁰⁸ European Court of Human Rights (n 1207).

Spain was responsible for violating Article 8 and owing to losing had to take measures to that end.¹²⁰⁹

The 1995 case *Noël Narvii Tauria and 18 others v. France* that reviewed in the European Commission on Human Rights was the same as that of the *Bordes and Temharo v. France* case in the human rights committee. In that case, the applicants claimed that the act and decision of France to perform nuclear tests in the South Pacific has this possibility to violate their rights, Article 2 (right to life) and 8 (right to respect for private and family life) of the European Convention on Human Rights and Article 1 (protection of property) of its protocol No. 1. The commission concluded the same as the committee and stated that: “in order for the applicant to claim to be a victim of violation and loss which he considers he has suffered as a result of the alleged violation”, as many human acts have the possibility to create risks and damages, merely use of nuclear power is not enough to convince the court that the applicants are victims of a violation of convention,¹²¹⁰ but against the committee, the commission clearly distinguished the admissibility of the application for the risk of future violation.

Stating that “it is only in highly exceptional circumstances that an applicant may nevertheless claim to be a victim of a violation of the convention owing to the risk of a future violation”, of course that the applicant must present rational and convincing evidence to show there is acceptance of affecting potential risk on his health and family’s lives.¹²¹¹

The European Court of Human Rights developed its jurisprudence related to the protection of the atmosphere by the *Fadeyeva v. Russia* case in 2005.¹²¹² This case concerned intra-boundary air pollution from the Severstal steel plant in the town of Cherepovests in the Russian federation, privatized in 1993. The applicants were living

¹²⁰⁹ Murase, ‘Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)’ (n 1185) 42.

¹²¹⁰ Noël Narvii Tauria and Others v France, European Commission of Human Rights.

¹²¹¹ Murase, ‘Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)’ (n 1185) 43.

¹²¹² European Court of Human Rights, ‘Case of Fadeyeva v. Russia’ [2005] Application no. 55723/00.

near the plant they claimed their rights to health and well-being, as guaranteed by Article 8 of the European Convention on Human Rights, were violated. According to the court, two points have to be established by the applicant: a) the causal link between environmental pollution or degradation and an impairment of a protected human right and b) a certain minimum level of the harmful effect enough in accordance with the extent of Article 8 of the Convention. In this case, the court concluded that the Russian federation was responsible, as the authorities had to regulate private industry and take reasonable and appropriate measures to secure the applicant's right under Article 8 of the Convention. However, the Severstal steel plant was owned and controlled or operated by the private sector at the time.¹²¹³

Indeed, the environmental jurisprudence of European Court of Human Rights has been concerned with individual rights relating to rights to privacy and family life, while the Inter-American Court of Human Rights and the African Commission on Human and Peoples' Rights have focused more on the collective rights of indigenous or tribal peoples.¹²¹⁴ Depending on the commonality of environmental jurisprudence, the relative treaty substances may in the long time been interpreted and applied in a harmonic way.¹²¹⁵

The *Bordes and Temeharo v. France* case is a corresponding case in this regard.¹²¹⁶ In the *Bordes and Temeharo* case, French citizens who lived on the South Pacific islands argued that the French tests breached the rights to life and their right not to be subjected to arbitrary interference with their privacy and their family life that were guaranteed under the International Covenant on Civil and Political Rights. According to their claim the nuclear test fractured the geological structure of the atolls, and the radioactive particles that leaked from fissures contaminated the atmosphere and exposed the population

¹²¹³ *ibid.*

¹²¹⁴ See Michael Talbot, 'Collective Rights in the Inter-American and African Human Rights Systems' (2018) 49 *Georgetown Journal of International Law* 163.

¹²¹⁵ Murase, 'Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, (1 May-2 June and 3 July-4 August 2017), UN Doc A/CN.4/705' (n 642) 41.

¹²¹⁶ Human Rights Committee, 'Mrs. Vaihere Bordes and Mr. John Temeharo v. France, Communication No. 645/1995, U.N. Doc. CCPR/C/57/D/645/1995' (1996).

surrounding the testing area to a high risk of radiation. The Committee stated that “for a person to claim to be victim of a violation of a right protected by the Covenant, he or she must show either that an act or omission of a State party has already adversely affected his or her enjoyment of such rights, or that is a real threat of such result”, so the opinion of committee was that applicants did not qualify as “victims” of violation owing to distance of damage, and the case was inadmissible. However, it is important that the committee did not refuse the feasibility that atmospheric pollution by a State could violate the right to life and the right to family life guaranteed under the Covenant,¹²¹⁷ but it is necessary that direct link between such environmental pollution and the impairment of the rights is approved.¹²¹⁸

8.1.2.2. Africa

The African Charter on Human and People’s Rights of 1981 (Banjul Charter) is the regional human rights instrument of Africa and was drafted to reflect the African conception of human rights and to take into account the specific needs of Africa. The Banjul Charter is a progressive human rights instrument since it incorporates first (civil and political), second (cultural and social) as well as third (solidarity) generation rights in one single instrument. It is also the first and only international binding treaty that includes significant solidarity rights, such as the right to a generally satisfactory environment, and the right to development. Any discussion on the linkage between human rights and the environment in Africa should therefore consider the Banjul Charter.¹²¹⁹ Article 24 is of primary importance for this discussion because it is the most explicit normative statement of an environmental right in any binding human rights instrument. The Article states that ‘[a]ll peoples shall have the right to a general satisfactory environment favorable to their development’.¹²²⁰ The Banjul Charter provides an example of the embodiment of an explicit relationship between the need

¹²¹⁷ See Jérémie Gilbert, ‘Environmental Degradation as a Threat to Life: A Question of Justice’ (2003) 6 *Trinity CL Rev.* 81, 87.

¹²¹⁸ Murase, ‘Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)’ (n 1185) 42.

¹²¹⁹ Werner Scholtz, ‘Human Rights and the Environment in the African Union Context’, *Research handbook on human rights and the environment* (Edward Elgar Publishing 2015) 402.

¹²²⁰ *ibid* 405.

for economic development, environmental considerations, the human rights framework and sustainable development. The Charter also presents an illustration of the progressive balancing of environmental objectives against economic development in the context of the needs of developing and least developed states. This suggests that ultimately, the Banjul Charter can contribute to the discourse on human rights and the environment against the background of sustainable development.¹²²¹

The 2001 *Ogoni* case¹²²² raised in “African Commission on Human and People’s right” and the complainants claimed among other rights Articles 4 (right to life), 16 (right to health), and 24 (right to general satisfactory environment) of the African Charter on Human and Peoples’ Rights¹²²³ were violated by acts and negligence from Nigeria. In this case, environmental pollution and health problems like skin infections, gastrointestinal and respiratory ailments, and increased risk of cancers, and neurological and reproductive problems affected the Ogoni people in Nigeria from the contamination of water, soil and air caused by activities of an oil consortium. The government of Nigeria was involved in the consortium. African Commission on Human and Peoples’ Rights recognized the link between environmental pollution and infringement of human rights as a required condition for an admissible complaint. The commission proposed that violation of human rights that the applicant had invoked consisted of both negative and positive duties. The commission concluded according to a certain record of the European Court of Human Rights and Inter American Court of Human Rights and confirmed that: “As a human right instrument, the African Charter is not alien to these concepts”. The State must take rational and other measures to prevent pollution and ecological degradation as a positive duty according to Article 24 and stop direct threats affecting the health and environment of their people as a negative duty about Article

¹²²¹ *ibid* 420.

¹²²² African Commission on Human and Peoples’ Rights, ‘Social and Economic Rights Action Center (SERAC) and Center for Economic and Social Rights(CESR)/Nigeria, Decision of 27 October 2001, Communication No. 155/96.’ (2001).

¹²²³ African Charter on Human and Peoples’ Rights, OAU Doc CAB/LEG/67/3 rev 5, 21 ILM 58 (1982), (entered into force Oct. 21, 1986), (Banjul Charter) (n 1199).

16. At the end, the African Commission, after reviewing the defense of the Government of Nigeria, discovered an infringement of Articles 4, 16 and 24 of the Charter.¹²²⁴

8.1.2.3. Latin America

The Community of La Oroya v. Peru suit concerned air, soil, and water pollution and degradation that caused by the metallurgical complex built in 1922 and operated via the United States corporation Doe Run in the society of La Oroya, Peru. The suitors alleged that the State was liable by its act and omission specifically in its negligence in controlling the complex, like absence of monitoring and failure to take measures to relieve the unhealthy effects, so Commission accepted this argument to prevent hazards to life and health by third parties.¹²²⁵

The Inter-American Commission found that:

“The alleged deaths and health problems of victims resulting from actions and omissions by the State in the face of environmental pollution generated by the metallurgical complex operating at La Oroya, if proven, could represent violations of the rights enshrined in article 4 “right to life” and 5 “right to human treatment” of American Convention on Human Rights”.¹²²⁶

8.2. Content of right to the atmosphere

The idea that there is a set of inalienable, universal rights to which all are entitled simply by virtue of being human stands out as perhaps the most significant achievement of twentieth-century international jurisprudence. Realizing human rights involves three different kinds of duties: the duty to respect, the duty to protect, and the duty to fulfil. Thinking of human rights law as a guide to authoritative decision-making may offer a way forward in both environmental protection and in human rights.¹²²⁷

¹²²⁴ Murase, ‘Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)’ (n 1185) 44.

¹²²⁵ Inter-American Human Rights Commission, ‘Community of La Oroya v. Peru , 2009’.

¹²²⁶ Murase, ‘Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)’ (n 1185) 44–45.

¹²²⁷ Rebecca Bratspies, ‘Do We Need a Human Right to a Healthy Environment’ (2015) 13 Santa Clara J. Int’l L. 31, 39, 66.

8.2.1. A right for all categories of persons

Based on the recent data distributed by the WHO in September 2016, approximately 6.5 million deaths each year equal to 11.6 percent of all worldwide deaths are attributed to air pollution with the highest growth in cities of low-income countries. UN General Assembly adopted the Sustainable Development Goals in its 2030 agenda to begin solving this problem. The agenda calls for atmospheric pollution reduction and reduction of the number of deaths and illness from air pollution. The agenda specifically considers the ambient air quality in cities.¹²²⁸

8.2.2. Specific categories and right to the atmosphere

Some groups of people merit specific attention under international law because of their vulnerability caused by atmospheric pollution and degradation. These groups include indigenous people; people living on small islands, and those low-income developing countries such as women; children; the elderly; and persons with disabilities. WHO has stated that: “All populations will be affected by a changing climate, but the initial health risks vary greatly, depending on where and how people live.”¹²²⁹ People living on small islands, developing States and other coastal regions, megacities, and mountainous and polar regions are all particularly vulnerable in different ways. Health effects are expected to be more severe for elderly people and people with infirmities or pre-existing medical conditions.” Persons with incapacitation should also be included here. According to the WHO, the groups who are suffering more of the resulting disease burden are children and the poor, and especially women. So, the World Bank Group in recent years concentrated on ways to support the people most vulnerable to climate change. Based on its Climate Change Action Plan, vulnerable groups consist of the very poor communities without access to basic infrastructure services and social protection, children, women and the elderly, persons with disabilities, indigenous populations,

¹²²⁸ WHO, ‘Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease’.

¹²²⁹ See Adelle Thomas and others, ‘Climate Change and Small Island Developing States’ (2020) 45 Annu. Rev. Environ. Resour. 1.

refugees and migrants, and people living in extremely vulnerable areas such as small islands and deltas.¹²³⁰

8.2.3. Right to the atmosphere as an inter-generational right

Past, present, and future people depend on the Earth. The Earth's resources are scarce; and its capacity to recover from the effects of some of our actions, such as the emission of greenhouse gasses, is limited. It is up to the people of the present what kind of world to leave to the people of the future, the unborn. There are various ideas about what exactly the present people owe to future people, and that is what intergenerational equity is all about. This concept has inspired a significant amount of scholarship, in various disciplines, including philosophy, (global) governance, and international law. The most important and influential international law scholars working on intergenerational equity are Edith Brown Weiss¹²³¹, and Malgosia Fitzmaurice.¹²³² In their research, and that of other scholars working on intergenerational equity in the field of International Law, one finds a great variety of approaches and ideas. It has been argued that the people of the present must leave the earth's resources in as good a condition as in which they found them, to allow future people to use these resources as well. For example, according to a recent report of the United Nations Secretary-General, "nearly all human

¹²³⁰ Murase, 'Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)' (n 1185) 47.

¹²³¹ For Weiss's contributions in developing the intergenerational equity concept see e.g., Edith Brown Weiss, 'Intergenerational Equity: A Legal Framework for Global Environmental Change' (1992) 385 *Environmental change and international law: New challenges and dimensions* 390; Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment' (1990) 84 *The American Journal of International Law* 198; Edith Brown Weiss, 'Climate Change, Intergenerational Equity, and International Law' (2007) 9 *Vt. J. Envtl. L.* 615; Edith Brown Weiss, 'Intergenerational Equity' [2013] *Max Planck encyclopedia of public international law*.

¹²³² For the Fitzmaurice elaboration on the inter-generational rights in international environmental law concept see e.g., Malgosia Fitzmaurice, 'Indigenous Whaling, Protection of the Environment, Intergenerational Rights and Environmental Ethics' (2010) 2 *The Yearbook of Polar Law Online* 253; Malgosia Fitzmaurice, '11. Intergenerational Equity Revisited', *International Law between Universalism and Fragmentation* (Brill Nijhoff 2008); Malgosia Fitzmaurice, 'Indigenous Peoples and Intergenerational Equity as an Emerging Aspect of Ethno-Cultural Diversity in International Law', *Ethno-Cultural Diversity and Human Rights* (Brill Nijhoff 2017).

traditions recognize that the living are sojourners on Earth and temporary stewards of its resources”¹²³³

Equal and reasonable use of the atmosphere and the benefits of future generations of humanity has been addressed in different documents to be protected by the current generation. This international commitment was already stated in Principle 1 of the Stockholm Declaration “solemn responsibility to protect and improve the environment for present and future generation”, and in different senses of sustainable development as regulated in the 1987 Brundtland Report: “development that meets the needs of the present without compromising the ability of future generation”. Also, in the Preamble to the 2030 Agenda for sustainable development mentioned “to support the needs of present and future generations”. In Article 3, paragraph 1, of the United Nation Framework Convention on Climate Change “Parties should protect the climate system for the benefit of present and future generation of humankind”.

In the words of the Special Rapporteur, there are no responsible organizations to invoke the obligations that afforded with legal standing to protect the future generations’ right in this regard, it has been suggested in the literature that the rights involved could be executed by a “guardian” or delegate of future generations. About protection of atmosphere, it is better to hold governments accountable as trustees for the handling of common environmental resources.¹²³⁴

8.3. Application of right to the atmosphere

There is a significant problem for protection of the atmosphere according to human rights law that is the lack of link in their application. While atmospheric law is to be applied not only to the victim states but also to the States that are the source of that damage; the domain of application of human rights treaties is confined to the persons subject to a state’s jurisdiction (Article 2 of the International Covenant on Civil and Political Rights; Article 1 of the European Convention on Human Right; and article 1 of

¹²³³ Otto Spijkers, ‘Intergenerational Equity and the Sustainable Development Goals’ (2018) 10 Sustainability 3836, 2.

¹²³⁴ Murase, ‘Fourth Report on the Protection of the Atmosphere, International Law Commission, Sixty-Ninth Session, UN Doc A/CN.4/705, (1 May-2 June and 3 July-4 August 2017)’ (n 1185) 48.

the American Convention on Human Rights). While the applicants submitted their complaints against their own state, it is not difficult to recognize the States' positive duties due to atmospheric pollution and degradation in the terrain of the relative human rights treaties. However, where an act or omission in one State has environmentally harmful effects and violates a right of people in another State, the case becomes a matter of extra-jurisdictional application and the human rights treaties in this situation cannot normally tackle it. In fact, the most essential barrier in dealing with these harms from the human rights law point of view is that the human rights treaties cannot be used extra-jurisdictionally against the State of genesis of the environmental harm.

According to the object and purpose of human rights treaties a way could be found to address this obstacle. The International Court of Justice in its advisory opinion on the legal outcomes of the Construction of Wall in the Occupied Palestinian Territory express: "while the jurisdiction of states is primarily territorial, it may sometimes be exercised outside the national territory. Considering the objective and purpose of the International Covenant on Civil and Political rights, it would seem natural that, even when such is the case, State parties to the Covenant should be bound to comply with its provisions".¹²³⁵ As the essential objective of human rights treaties is the protection of human rights and the fundamental principle of non-discrimination, it could be argued that international human rights law is applicable to transboundary atmospheric pollution and global degradation. However, human rights law has applicability only for victims of intra-boundary pollution and could not be applied as a legal instrument to address the responsibility of states to prevent such pollution or degradation.¹²³⁶

¹²³⁵ International Court of Justice (ICJ), 'Advisory Opinion Concerning Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory, 9 July 2004' 179.

¹²³⁶ Alan Boyle, 'Human Rights and the Environment: Where Next?' (2012) 23 *European Journal of International Law* 613, 639–640.

Conclusions.

FIRST. The overview of status of the atmosphere and the threats leading to its degradation is associated with humans in three aspects. First, although the study of the atmosphere shows a complicated and dynamic nature with changes through the history of the Earth, present challenges and threats to the Earth's inhabitants through changes in the atmosphere are attributed to human activities to a great extent. In fact, human's domination of the Earth, particularly after the industrial revolution, caused great amounts of emissions to the environment entering the dynamic processes within the atmosphere and triggered changes which are not suited for humans or most other species living on the Earth. The scientific studies about anthropogenic sources of emissions and how they change global or regional composition of the atmosphere justify this fact. Second, approximately all the changes of the atmosphere due to anthropogenic emissions are threatening human being and many of current inhabitants of the Earth. Many adverse effects of the emissions and their consequences for human are studied, showing a great loss in many aspects such as health, economy, and the environment. As the economy is shown to be the most powerful force for people and governments to take action, the adverse economic effects of many aspects have been studied and the results show the economic loss due to emission abatements and mitigation policies are not as severe as the loss from air pollution, climate change, and other environmental consequences of the emissions.

SECOND. The need to take action could lead to insufficient measures due to complicated political and economic interactions among people and governments, which is the third aspect of human action associated with current status and threats to the atmosphere. Note that most threats are transboundary and require actions and measures throughout the whole world. But the distribution of wealth and power between different people and governments affects to what extent they have the power or the will to take action. For example, low-income societies are usually more involved in low technology devices and methods in industry and agriculture which usually leads to more emissions of air pollutants. Besides, such societies usually lack the financial resources to improve the technologies, which could result in less emission with more economic benefits as well as avoiding economic loss due to the emissions. On the other hand, high-income

societies and people are usually involved in lifestyles and economic activities that are responsible for emissions on a greater scales. The status of their economy is usually is responsible for past emissions which the environment still suffers from and high emission levels, particularly carbon dioxide, due to the larger size of their economies. Their lifestyle is also usually is involved in high food and other products consumption, high vehicle transport and many other characteristics which result in high emission per capita, particularly carbon footprints. Note the contrasts of benefits does not exist only among countries, but also on smaller scales such as between different sectors and cities.

THIRD. The complexity of the atmospheric threats, and subjects involved in avoiding them shows why International Environment Law is necessary to manage and develop efficient and sufficient measures over the world, with a just distribution of losses and benefits of such measures.

FOURTH. The scientific findings prove that the atmosphere is facing serious challenges from pollutions and degradation. The first issue in taking legal measures for the atmospheric protection is clarifying the legal status of the atmosphere. Based on the discussions provided in the thesis, it is clear that the atmosphere cannot be considered a common good. Undoubtedly, the broad concept of a global common can encompass the atmosphere - i.e. the atmosphere can be considered as an global common. When considering further categorization, there is debate among scholars as to whether the atmosphere is a common concern of humankind.

FIFTH. The concept of common concern of humankind and the principle of the common heritage of humankind shall be seen as two different but related concepts. In fact, the concept of the common heritage of humankind generally applies to geographic areas or resources, whereas the common concern of humankind concept applies to specific issues. As a result, the common heritage approach provides a framework for managing the sustainable utilization of shared resources, and the common concern of humankind concept provides legal grounds for protecting shared resources like the atmosphere that are being threatened by a global problem. Accordingly, the atmosphere which is a natural resource essential for sustaining life on Earth, human health, and welfare, can

be considered as a kind of common heritage of humankind. Meanwhile, its degradation and pollution are specific issues that could be categorized as a common concern of humankind.

SIXTH. In assessing the works of the ILC on the protection of the atmosphere, despite the importance of the work of the Special Rapporteur, and the potential contribution to the codification of legal norms pertaining to protection of the atmosphere, the Commission took a highly conservative and narrow approach toward the codification of International Law in the context. Despite the rejection of some States, in its work on the draft guidelines on protection of the atmosphere, the Commission imposed a set of controversial self-limitations, which is a kind of extreme regression. For instance, the Commission cannot deal with the liability of States and addressing the ‘polluter pays’ principle, and the ‘precautionary’ principle, common but differentiated responsibilities, and the transfer of funds and technology to developing countries, including intellectual property rights; the topic will also not deal with specific substances, such as black carbon, tropospheric ozone, and other dual-impact substances, which are the subject of negotiations among States. The project will not seek to fill gaps in the treaty regimes. The outcome of the work on the topic will be draft guidelines that do not seek to impose on current treaty regimes, legal rules or legal principles not already contained therein. Also, the rejection of the academically well-accepted principle of ‘common concern of humankind’, eliminating ‘energy’ from the scope of debate on ‘atmospheric pollution’ have limited the work of the Commission to a partial codification of the existing International Law on the topic. In fact, the Commission’s work is a conservative codification of the International Law and lacks the expected steps of the progressive development of International Law on the topic.

SEVENTH. Comparing to the marine standards and liabilities, air pollution and generally protection of the atmosphere is less well regulated by treaty law. Therefore, the recognized no-harm principle as a well-recognized customary international norm like the principles of good faith and equity have been an important legal tool in filling the treaty law shortcomings. The no-harm principle, and requirement for the environmental impact assessment driven from it, are pertaining to a wider issue of environmental protection and are not specifically or exclusively dealing with the protection of the

atmosphere. However, these principles have played a crucial role in transboundary harms related decisions made by the international court of justice.

EIGHTH. Despite their positive influence in providing legal basis for the protection of the environment in general and protection of the atmosphere in particular, some of the important instances of international norms including the sustainable development, the precautionary principle, and the polluter pays principle remain subject to a legal debate to be considered as customary international rules. However, in the past few years there have been considerable efforts made by environmental legal activists and academics in encouraging States to accept and respect these norms. This may provide the grounds for the wider acceptance of the States and the recognition of these rules as international customary norms.

NINTH. One of the main challenges in this regard is the relatively long procedure that a norm takes to be considered a recognized customary international norm. The critical issue in case of global environmental challenges in general and atmospheric issues in particular is the fast pace of pollutions and degradations. In fact, the current environmental crisis that according to the scientific facts could be altered into environmental disasters will not wait for the new legal instruments to be gradually developed during the coming decades. Therefore, it could be argued that the already recognized human rights customary norms may play a more significant role in being used as an already existing legal tool for the protection of the environment and the atmosphere in the short term.

TENTH. As was discussed, the atmosphere as the largest common resource of human beings has not benefited from a comprehensive universally binding agreement yet. However, there has been a considerable amount of corresponding soft law documents that have been developed in past few decades. It is expected that these soft law mechanisms can provide the legal basis for the formation of hard law instruments. However, lack of political will and putting the short-term national economic interests first, remain a main barrier to the formation and establishment of required hard law instruments.

ELEVENTH. There are several international and regional agreements for the protection of the atmosphere against air pollution, ozone depletion and climate change. However, to regulate 'transboundary air pollution' there is no universal framework such as the Paris Agreement or the UN Convention on Biological Diversity (regardless to their shortcomings). As discussed, International Law to regulate air pollution formed as a patchwork of scattered instruments. These fragmented instruments in some areas impose overlapping measures for the same pollutants and in some other areas are facing substantial shortcomings. The other important point is the differentiation of the air pollution issues to climate change. It is true that both air pollution and climate change technically overlap in some aspects. However, the issue of the air pollution shall be treated as an independent environmental issue with different social, health and environmental impacts. Therefore, the existing treaty law have significant lacunas and shortcomings in terms of the domain of regulated substances and activities, geographical coverage, and, most importantly, applicable principles and rules.

TWELFTH. The LRTAP Convention with its eight Protocols could be considered as the main international agreement on air pollution. The LRTAP Convention has succeeded in attaining significant reductions of acidification, lead pollution, and POPs. Although the geographic scope of the LRTAP regime is limited to 51 countries from the Northern Hemisphere, it remains the most significant transnational legal instrument dealing with the transboundary air pollution. Apart from their direct impacts, CLRTAP have already influenced the global awareness and discussions regarding the transboundary air pollution.

THIRTHEENTH. The Agreement on Transboundary Haze Pollution signed by ASEAN members in 2002 is another example of the existing treaty law with regionally limited coverage. The soft language, a noncompliance mechanism, and the late participation on the part of Indonesia as a major source of haze pollution, were all factors that weakened this Agreement's effectiveness. Similarly, other instruments such as the Canada-US Agreement or directives under United European Air Policy Framework had positive impacts, but they are only regional accords with limited coverage. Moreover, other multilateral agreements pertaining to air pollution include the Minamata Convention on

Mercury and the Stockholm Convention on Persistent Organic Pollutants, both of which focus on a specific type of pollutant, and do not have the required integrated and inclusive approach.

FOURTEENTH. Regarding atmospheric degradation and climate change, the UNFCCC framework and the latest achievements in bringing all of the nations to the table for the Paris Agreement, proves a promising point for global progress. However, the soft nature of its obligations and the highly flexible nature of NDCs, the political rivalries and diplomatic tensions, and lack of standardization of measuring, tracking and monitoring leave a considerable doubt about its success in meeting the essential target of preventing the global atmospheric temperature from rising more than 1,5 and 2 degrees.

FIFTEENTH. The atmospheric protection requires a unified body of law with a comprehensive manner which covers atmospheric pollution and atmospheric degradation together. Due to the very nature of the International Law, formation of such treaty law mechanism highly depends to the wills and ambitions of the States. In this regard, the social and legal activism play a considerable role in encouraging the political paces to achieve such a target. The recognition of the concept of “*common concern of humankind*” could provide the necessary basis for formation and establishment of such treaties in the future. It is obvious that the obligations incumbent on States under International Law must be implemented in domestic law. It therefore seems more important to encourage countries which have not to yet acceded to certain multilateral instruments to do so.

SIXTEENTH. In the *Barcelona Traction* case, the ICJ recognized *actio popularis* doctrine for breach of *erga omnes* obligations. However, The Court’s discussion in *Barcelona Traction* of obligations *erga omnes* did not include any environmental obligations in its list of examples. It could be argued the *Barcelona Traction* case was decided decades ago when environmental damages and its affects were not so serious or evident. The 2011 Advisory Opinion of the Seabed Dispute Chamber of the International Tribunal for the Law of the Sea on *Activities in the Area* interpreted provisions of UNCLOS on the

protection and preservation of the marine environment as entailing obligations *erga omnes*. Likewise, prevention of atmospheric degradation affecting areas beyond national jurisdiction is an obligation *erga omnes*, as the legal status of the atmosphere and the marine environment are similar -common heritage of humankind- this advisory Opinion can support the protection of the atmosphere with obligations *erga omnes*. By assessment of the jurisprudence of the ICJ and Article 42 of the Draft Articles on Responsibility of States for Internationally Wrongful Acts, the protection of the atmosphere against the significant transboundary air pollutions and global atmospheric degradation shall be considered as an *erga omnes* right and obligation. The recognition of the *actio popularis* doctrine could substantially improve access to justice and the litigation possibilities. This may serve as an important legal tool in providing a protection umbrella for the atmosphere.

SEVENTEENTH. The interrelationship between the International Law relating to the protection of the atmosphere and international human rights law is crucial. In this regard, the protection of the atmosphere as an instance of International Environmental Law, is interconnected with some aspects of human rights including the right to life, the right to health, and the right to a satisfactory environment. It is possible to find a link between atmospheric protection and human rights protective rules. While an explicit right to a healthy environment in general and a right to the atmosphere in particular is not recognized by human rights sources, international human rights remain a potential option in service of atmospheric protection. In this regard, any damage to the atmosphere could be considered a degradation affecting the international community as a whole. Meanwhile, as recognized in the Principle 1 of the Stockholm Declaration, it is crucial to consider the benefits of future generations in an equal and reasonable use of the atmosphere. Regardless of the scholarly discussions over the notion of the human right of the future generation, it could be considered as an effective driver in enhancing the environmental rights in general and the healthy atmosphere right in particular.

EIGHTEENTH. Judicial organs in certain cases such as the *López Ostra v. Spain* case have tried to establish a logic link between human rights and atmospheric damages. At the same context, the content of right to the atmosphere should be clarified. The nature

and justiciability of that right is still under debate. On one hand, the atmosphere is an issue related to certain categories of persons and on the other hand, right to the atmosphere is an inter-generational right. In this context, equal and reasonable use of the atmosphere should be guaranteed by taking into account the benefits of future generations.

NINETEENTH. Apart from the substantive discussion on the atmospheric protection from the human rights point of view, the central problem is related to the application of a right to the atmosphere. In fact, weaknesses and gaps of international structure cannot be ignored, the outcome of international courts and tribunals are far from to be satisfying and many failures remain that must be corrected. In this context, I should repeat the Mrs. Catherine Branson's words¹²³⁷ as "increasingly recognition is being given internationally to the interdependence of human rights and the environment. It is no longer possible, assuming that it ever was, to assert, that the human rights community is concerned only with individuals and the environment community is concerned only with the protection of the environment. Such a dichotomy is an oversimplification of what is a complex relationship between two complimentary causes. The truth is that environmental conditions impact on the enjoyment of human rights; in the absence of a healthy environment many human rights cannot be protected and promoted. Moreover, it is important that we protect the dignity of all people living in the present while at the same time preserving the Earth for future generations". It is not a dream, it is not an empty talk. It is our legal duty as HUMAN BEING!

¹²³⁷ She is president of the Australian Human Rights Commission.

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