A CRITICAL LEGAL ANALYSIS OF TECHNOLOGY TRANSFER UNDER UNITED NATION'S FRAMEWORK ON CLIMATE CHANGE

Dissertation submitted to National Law University and Judicial Academy, Assam in partial fulfilment for the award of the degree of MASTER OF LAWS

Supervised by:

Prof. Dr. Yugal Kishore (Professor of Law)

Submitted by:

Swastik (SM0217017)

NATIONAL LAW UNIVERSITY AND JUDICIAL ACADEMY, ASSAM

JUNE 2018

SUPERVISOR CERTIFICATE

It is to certify that Mr. SWASTIK is pursuing Master of Laws (LL.M.) from National Law University, Assam and has completed his/her dissertation titled "A CRITICAL LEGAL ANALYSIS OF TECHNOLOGY TRANSFER UNDER UNFCCC"under my supervision. The research work is found to be original and suitable for submission.

Date:

(Prof. Dr. Yugal Kishore)
Professor of Law

DECLARATION

I, SWASTIK , pursuing Master of Laws (LL.M.) from National Law University, Assam, do hereby declare that the present dissertation titled "A CRITICAL LEGAL ANALYSIS OF TECHNOLOGY TRANSFER UNDER UNITED NATION'S FRAMEWORK ON CLIMATE CHANGE" is an original research work and has not been submitted, either in part or full anywhere else for any purpose, academic or otherwise, to the best of my knowledge.

Date:

(SWASTIK)

SM0217017

ACKNOWLEDGEMENT

At the first instance I would like to thank and express my heartfelt gratitude to my supervisor, Prof. Dr. Yugal Kishore for his invaluable support and constant encouragement throughout the course of this research.

I am also very grateful to my initial supervisor and Environmental Law teacher, Mr. Chiradeep Basak for his stimulating and scintillating lectures, and also his suggestions and intellectual impetus which helped me come up with this unique topic.

I would also like to thank Mr. Swaraj Sharma and Ms. Riya Bhandari for their invaluable support and motivation, which gave me the strength and focus to complete this Dissertation.

Most importantly I would like to thank my Parents and the Almighty, without whose support and good wishes, nothing would have been possible.

Thank you all

With Sincere and Heartfelt Regards

Swastik

LIST OF ABBREVIATIONS

&	And
CBDR	Common but Differentiated Responsibilities
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Research
COP	Conference of Parties
CTCN	Climate Technology Centre and Network
CTI	Climate Technology Initiative
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environmentally facility
GHG	Green House Gases
IEA	International Energy Agency
Int'l	International
IRENA	International Renewable Energy Agency (IRENA)
LDCs	Least Developed Countries
LDFC	Least Developed Countries Fund
No.	Number
PSI	Private Sector Initiative
PSP	Poznan Strategic Programme
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
TEC	Technology Executive Committee

TERI	The Energy and Resources Institute
TNA	Technology Needs Assessments
UN	United Nations
UNEP DTIE	United Nations Environment Programme, Division of Technology, Industry and Economics
UNFCCC	United Nation's Framework Convention on Climate Change
UNTCAD	United Nations Conference on Trade and Development
WIPO	World Intellectual Property Organization

TABLE OF STATUES

- United Nation Framework Convention on Climate Change, 1992
- Kyoto Protocol, 1997
- Poznan Strategic Programme, 2008
- Paris Agreement on Climate Change, 2015

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

"*Climate change policy inevitably has two core components: goals, and means chosen to pursue those goals. Decisions on goals and means necessarily have distributional consequences. Any policy choice generates winners and losers. While this outcome cannot be avoided- even doing nothing leads to a distributional consequences- policymakers can, through the choice, design and implementation of policies, shape to some extent the distribution of the burdens of mitigation and adaptation to climate change*"

- **Javier de Cendra de Larragán**[1]

"[*e*]*missions not only produce the burden of marginalization they also produce the benefit of power, and the right to use the atmosphere as a dumping ground represents a source of economic power*"

- **Wolfgang Sachs**[2]

Renewable energy also creates more jobs than other sources of energy - most of these will be created in the struggling manufacturing sector, which will pioneer the new energy future by investment that allows manufacturers to retool and adopt new technologies and methods.

-Jay Inslee[3]

[1] Javier De Cendra de Larragán, "Distributional Choices in EU Climate Change Law and Policy: Towards a Principled Approach?" (1st edn, Kluwer Law International 2011)

[2] Wolfgang Sachs, "equity in the greenhouse: how just is the Kyoto protocol' in reading the Kyoto protocol: the ethical aspects of convention on climate change" (1st edn, Euborn Academic Publishers 2005).

[3]Jay Inslee, " (BrainyQuote.com) http://www.brainyquote.com/quotes/quotes/j/jayinslee267811.html (June 23, 2018)

It is an indubitable fact that the climate is getting affected due to our chase for development. The desire to encompass more ecological space gave birth to a disparity, the disparity between "winners and losers". This is an endeavour to comprehend, contextualize and decisively evaluate the adverse effects of climate change and the pros and cons of use of other mans of renewable form of energies. The whole configuration of Climate Change found importance after the countries realized the adverse effects of human conduct on environment. As for centuries, the prime objective of these countries was to attain the level of development. In order to achieve that, the technology played a keen role. With development of these technologies, many other forms of pollutants came into existence. The emission of these so called green house gases paved a way to global warming, heat mortality, cyclones, floods, hurricanes, desertification, glacial melting, ozone depletion etc. The premature phase of climate based negotiations barely argued on human rights approach until Inuit and Small Island States flickered that dimension.[4] The stand of the third world countries brought a new light over "common concern". They rightly pointed out the adverse effects upon the environment of all these countries for the activities of few. Therefore, a new perception of third-world powerlessness became a part of greater discourse.[5]

It is estimated that the average global temperature will rise from 1.8-6.48° C by end of 21st Century.[6] The average combined global land and ocean surface temperature for September 2012 tied with 2005 as the warmest September on record, at 0.67°C (1.21°F) above the 20th century average of 15.0°C (59.0°F). Records began in 1880.[7] Despite the efforts that started way back in 1972, till date we encounter the same threat. The failure of United Nations Framework Convention on Climate Change (UNFCCC) and

[4] Available at http://www.inuitcircumpolar.com/files/uploads/icc-files/FINALPetitionICC.pdf (June 23, 2018). Also see L. Rajamani, 'The increasing currency and relevance of Rights Based perspectives in the International Negotiation on Climate Change' [2010] J Env L 391, 394

[5] R. Gordon, 'Climate Change and poorest nations: further change in global inequality' [2007] Colo. L. Rev 1559, 1559

[6] Human Development Report, 'Fighting Climate Change: Human Solidarity in a Divided World ' 2007/8 (n2) 8

[7] 'State of Climate Global analysis' (National Oceanic and Atmospheric Administration National Climate Data Center, September 2012) http://www.ncdc.noaa.gov/sotc/global/2012/9 acc (June 23, 2018)

its supplement protocol, signed in Kyoto, Japan (The protocol was adopted by COP 3 on 11 December 1997) gave birth to Copenhagen Accord. It is to be noted that the Kyoto Protocol laid a standard for combating GHG emissions. The ultimate purpose of this protocol was to ensure stabilization in GHG concentrations in the atmosphere at an echelon that would thwart dangerous anthropogenic intrusion with the climate. The step was to congregate respect and commitments from annexed-countries (of Kyoto Protocol). To ensure the commitments, the protocol divided the countries in groups. This key concept was based on the economic capacity of the countries. Three major mechanisms were initiated:

- International Emission Trading (IET);
- Clean Development ,Mechanism (CDM);
- Joint Implementation (JI).

The target was applied to six major GHGs:

- Carbon Dioxide;
- Methane;
- Sulphur Hexafluoride;
- Nitrous Oxide;
- Hydro fluorocarbons;
- Per fluorocarbons.

In addition to these standards, the other industrial gases and Chlorofluorocarbons (CFCs) were included under Montreal Protocol on Substances responsible for depletion of Ozone Layer 1987. Two decades later, 170 countries met in Rio for the United Nations Conference on Environment and Development (UNCED) and debated over environmental protection, economic development and its inconsistency and antithetical nature.[8] But all these standards of quantified emission limitation and reduction criteria's raised a major issue from the sides of Third world countries. The whole notion of CDM was under attack. They questioned the limitation of emission which was previously

[8] Edith Brown Weiss, 'United Nations Conference on Environment and Development' (1992) 31 I.L.M. 814
http://heinonline.org/HOL/Page?handle=hein.journals/intlm31&div=156&collection=journals&set_as_cursor=0&men_tab=srchresults&terms=renewable|energy|and|climate|change&type=matchall#828> (June 15, 2018)

disrespected and ignored by the developed countries for centuries. But the concept of right to development is yet to receive a strong recognition. For developing countries and Least Developed Countries (LDCs), these were an attempt to restrict their way to development. Ecological colonialism became a buzz word in environmental jurisprudence. The direction to implement CDM received a rap by the strong log of "Want of Capacity". The standards of Sustainable Development appear to be very beautiful in words of International norms but its practical feasibility has been challenged. The shift towards other sustainable and efficient energy like Biomass; Wind Power; Hydro-Power; Waste Gas and Heat Utilization, nuclear power, solar power, Bio-fuel etc became a matter of great cost spending (which LDCs and Developing countries can't afford). Absence of sustainable technology and lack of any capacity building initiatives from the developed countries left the LDCs and developing countries to continue the traditional forms of energy. Some are willing and some denied respecting the standards of sustainable development

The 21st century faces an immense threat and a problem that concern the entire planet. Climate change[9] is one of the most important challenges facing the international community today. A great no. of scientific research have claimed and proved that climate change is a result of human activities and this change in the climate has extreme repercussions on the ecosystems as well as humans.[10] Since the 1950s many of the observed changes have been unprecedented. It is conceivable that more than one half of the observed increase in global average surface temperature between 1951 and 2010 was caused by the anthropogenic increase in greenhouse gas (GHG) concentrations and other perturbations.[11]

[9] United Nations Framework Convention on Climate Change, "Article1(3) , 'Climate Change' means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods", U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[10] https://climate.nasa.gov/evidence/ (June 20, 2018)

[11] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?" , 44 Environmental Policy and Law. (2014) pg 422

In this respect, the United Nations General Assembly has recognized Climate change as a "common concern of mankind", since climate is an essential condition which sustains human life on the earth.[12] This forces us to take urgent steps to tackle with climate change within a global framework that focuses on tackling anthropogenic climate change.[13] It can be observed that climate change is a problem with various characteristics. It is global, long-term problem and involves inter-linkage between climatic, environmental, economic, political, institutional, social and technological processes.[14] It generates many other global issues which effect the global environment and human beings. Pollution give rise to other problems as well besides climate change, i.e. diseases, shortage of drinking water, acid rain etc. which impact people, animals and environment equally.[15] Climate change has effects on environment but it pose a great threat on human as well. It effects the human health and hinders human development, it is an environmental threat but also has anti-development effects.

The scientific understanding of the issue of climate change, establishing the cause-effect relationship between increase in the earth's surface temperature and the human economic activities emitting greenhouse gases (GHG) through the physical process of enhanced greenhouse effect, necessitates the urgent need to control and limit anthropogenic GHG emissions.[16] In fact, the increase in anthropogenic GHG emissions leads to increase in GHG concentration in the atmosphere which results in enhanced greenhouse effect. This enhanced greenhouse effect causes the increase in the surface temperature of the earth, thereby results in climate change. In this regard, the theory of greenhouse effect is a well-established scientific theory. The IPCC reports have attributed the cause of the climate change to human activities.

---

[12] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[13] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?", 44 Environmental Policy and Law. (2014) pg. 422

[14] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[15] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11.

[16] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

Attribution of climate change to the human activities in tum transforms the issue of climate change from a scientific inquiry into a problem to be addressed at the political level by the international community of States. This is because both cause and effect of climate change are anthropocentric. Further, controlling and limiting anthropogenic GHG including carbon dioxide emissions resulting from human activities imply need to regulate the human activities related to GHG emissions within a legal framework. In fact, the international community has responded to the threat of climate change by adopting a legal regime through negotiation process. The present climate change regime is embodied in the UNFCCC and the Kyoto Protocol.

SCIENTIFIC STUDY

It has been known since late in the last century that an anthropogenic (manmade) warming of the earth's climate system is possible due to the atmospheric emissions and radiative properties of industrial and agricultural "greenhouse gases". In fact, the theory of the "greenhouse effect" was propounded over a century ago by the French mathematician, J.B. Fourier in 1824. This theory was supported by Tyndall's studies on the absorption of heat by gases.[17] However, it was a Swedish scientist, Svante Arrhenius, who published the first analysis of a possible climate change caused by industrial emissions of radioactively active gases in 1896. He calculated that there would be a global warming of 3.2-4.0 degrees celsius from a doubling of the earth's atmospheric carbon dioxide concentration, a level which could be attained sometime in the next century.[18] Since then, the theory of the greenhouse effect has passed from conception, to hypothesis, to the consensus view that it is both real and the probable driving force for global climate change m our time.[19]

[17] J. Tyndall, "On The Absorption and Radiation of Heat by Gases and Vapours." Philosophical Magazine and Journal of Science, S4, 22, No. 146, 1861, pp. 169-194;

[18] S. Arrhenius, "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground." Philosophical Magazine and Journal of Science, S5, 41, No. 251, 1896, pp. 237-276.

[19] Sunil Kumar Agarwal, “Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms”, Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

GREENHOUSE EFFECT

The scientific theory of the greenhouse effect explains the process in which the absorption of infrared radiation by the natural occurring greenhouse gases (GHG) present in the atmosphere warms the earth's surface.[20] The greenhouse effect is a natural physical phenomenon in the earth's climatic system. Due to this process, certain gases in the earth's atmosphere, known as greenhouse gases, absorb heat that would otherwise escape to space.[21] This heat originates from visible sunlight that warms the earth's surface. Subsequently, heat radiates from the surface to the atmosphere, where some of it is absorbed by greenhouse gases and radiated back to the surface.[22]

When energy from the sun enters the earth's atmosphere, which comprises of GHG gases, such as water vapour, carbon dioxide, methane and nitrous oxide, about a third of it is reflected back to space from the atmosphere itself.[23] Of the rest, the atmosphere absorbs some, but most of it passes through the atmospheric layer and is absorbed by the surface of the earth. The earth re-radiates energy back to space at longer wavelengths. However, the re-radiated energy has to once again pass through atmosphere, comprising GHG gases, which traps infrared radiation heat in the atmosphere, absorb some of the energy re-radiated by the earth's surface again and leaving some re-radiated energy from the earth to escape to space.[24] This absorbed re-radiated energy from the earth's surface is one again re-reradiated by the atmosphere back to the earth's surface. This whole process is known as greenhouse effect.[25]

RESPONSE WITHIN UN FRAMEWORK

- *Common Concern of Mankind*

It appears that by the late 1980s, climate change was firmly on the international agenda. In this context, Malta requested the UN General Assembly for inclusion of an agenda

[20] *ibid*

[21] *ibid*

[22] *ibid*

[23] *ibid*

[24] *ibid*

[25] *ibid*

on the climate change for the first time September 1988.[26] The Maltese initiative got widespread support and was well appreciated by the UN General. This led the UN General Assembly, in December 1988, to adopt a resolution on the protection of the climate for present and future generations of mankind?[27] This resolution recognized that climate change is a "common concern of mankind". This, in tum, led to discussion amongst policy-makers as to what legal and policy options might be adopted by the international community in response to the perceived threat of climate change.[28] However, no sustained negotiations began until after the publication of the first IPCC Report in 1990.[29]

- *Intergovernmental Negotiating Committee*

In response to the threat of climate change, the UN General Assembly initiated the intergovernmental negotiation process to develop a legal framework for tackling climate change in 1990.[30] In this regard, at its 45th Session the UN General Assembly established an Intergovernmental Negotiating Committee (INC) for preparing a framework convention on climate change in December, 1990.[31] The mandate of the INC was to negotiate a convention containing "appropriate commitments" in time for signature at the UN Conference on Environment and Development (UNCED) in June 1992.[32] The INC met six times between February 1991 and May 1992. The outcome of negotiations under the INC was the 1992 UN Framework convention on Climate Change (UNFCCC).[33]

---

[26]http://www.un.org/depts/los/biodiversity/prepcom_files/BowlingPiersonandRatte_Common_Concern.pdf (June 10, 2018)

[27]*ibid*

[28] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797

[29] Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

[30] https://uia.org/s/or/en/1100025172 (June 10, 2018)

[31] *ibid*

[32] Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

[33] *ibid*

LEGAL FRAMEWORK UNFCCC

- *UN Framework Convention on Climate Change*

At the core of international efforts to address climate change is the United Nations Framework Convention on Climate Change. It provides the overall climate policy framework, objective and legal basis for addressing the climate change issue.[34] The objective of the UNFCCC is to stabilize the concentration of the greenhouse gases in the atmosphere, so as to prevent dangerous human interference with the climate system in a certain time- frame. In this regard, it provides the non-legally binding obligations of the countries party, following the principle of common but differentiated responsibilities and respective capabilities.[35] It also establishes an institutional framework for further evolution of the legal process to tackle the problem of the climate change[36]. The UNFCCC, being a framework convention, established a process for future development the climate regime by institutionalizing the negotiation process to be conducted in the framework of the Conference of Parties (COP) among country Parties to the UNFCCC.[37] It also made provisions for the review of the commitments undertaken by the parties[38]. Accordingly, the Kyoto Protocol was negotiated in the framework of the 'Berlin Mandate' to strengthen the mitigation commitments of Annex I developed countries and subsequently adopted at COP-3 in 1997.[39]

- *The Kyoto Protocol*

The Kyoto Protocol to the convention was negotiated under the Berlin Mandate and subsequently adopted in 1997. Under the Kyoto Protocol, annex I developed countries have legally binding commitments to reduce greenhouse gas emissions, as inscribed in

[34] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[35] *ibid*

[36] https://unfccc.int/process/the-convention/history-of-the-convention#eq-1 (June 10, 2018)

[37] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[38] *ibid*

[39] *ibid*

its annex B, with a view to reducing their overall emissions of such gases by at least 5 percent below 1990 levels in the commitment period 2008-212.[40] Non-annex I developing countries are exempted from binding commitments. For providing flexibility to annex I developed countries in meeting their legally binding targets, the Kyoto Protocol provides three innovative market-based mechanisms - joint implementation;[41] Clean Development mechanism (CDM); and carbon emission trading. These flexibility mechanisms are collectively known as the Kyoto Protocol Mechanisms.[42]

The Kyoto Protocol provides for the Kyoto mechanisms to assist annex I developed countries to meet their QELAR targets under the Kyoto Protocol in a cost-effective manner.[43] Although the Kyoto Protocol provided a framework for action under the Kyoto mechanisms, still its implementing rules were to be determined through further negotiation.[44] In this regard, rules and modalities of these mechanisms were further negotiated by the parties in the framework of the Buenos Aires Plan of Action and subsequently adopted as a part of the 'Marrakesh Accords' at COP-7 in 2001.[45] The decisions related to the Kyoto mechanisms embodied in the 'Marrakesh Accords' were adopted by the first meeting of parties (COPll/MOPl) held at Montreal in 2005, after the entry into force of the Kyoto Protocol, thereby operationalizing the Kyoto Protocol and its Kyoto Protocol mechanisms.[46]

In order to achieve the environmental integrity through the use of Kyoto mechanisms, the protocol's implementation rules also put a cap on use of the Kyoto Protocol mechanisms by the Annex I developed countries to comply with their legally binding commitments as inscribed in the Annex B to the Kyoto Protocol for the period 2008

[40] https://unfccc.int/resource/docs/convkp/kpeng.pdf (June 10, 2018)

[41] Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

[42] *ibid*

[43] https://unfccc.int/resource/docs/convkp/kpeng.pdf (June 10, 2018)

[44] *ibid*

[45] Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

[46] https://unfccc.int/resource/docs/convkp/kpeng.pdf (June 10, 2018)

to 2012.[47] It has also put into place a carbon emission market by establishing regulatory framework under the overall supervision of the COP/MOP under this cap-and-trade system for the transaction of the Kyoto units, i.e. CERs, AAUs, ERUs, at the international level.[48] The overall purpose of the Kyoto Protocol mechanisms is to provide flexibility to the Annex I developed countries to achieve their mandatory emission reduction targets as inscribed in the Annex Bin a cost-effective manner by making use of carbon market to meet the deficit in their assigned amount of GHG emissions.[49] This way the Kyoto Protocol mechanisms contribute to achieve the ultimate objective of the UNFCCC, which is to stabilize the GHG concentration in the atmosphere, in a cost-effective manner.[50]

The thrust of the Kyoto Protocol is on mitigation of climate change and market-based mechanisms to facilitate the annex I developed countries in meeting their legally binding targets in a cost-effective manner.[51]

- *Paris Agreement*

The Paris agreement was the latest big development with regard to Climate Change under UNFCCC and was a result of COP 21. The Paris Agreement builds upon the Convention and for the first time the brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effect, with enhanced support to assist developing countries to do so.[52] Paris Agreement acknowledges that developing countries and least developed countries seek support to enable them attain its objectives which includes international co-operation on technology development and technology transfer in several phases of technology cycle.[53] The agreement requires all Parties to put forward their best efforts through

[47] Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

[48] *ibid*

[49] *ibid*

[50] https://unfccc.int/resource/docs/convkp/kpeng.pdf (June 10, 2018)

[51] *ibid*

[52] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement (June 10, 2018)

[53] *ibid*

nationally determined contributions (NDCs) and to strengthen these efforts in the years ahead. This includes requirements that all Parties report regularly on their emissions and on their implementation efforts.[54]

This was the brief introduction of what climate change is, how it effects the environment and the frameworks formulated in order to tackle with the problem. The important things required to curb the problem are technology transfer, flow of finance and international co-operation.

[54] *ibid*

1.2 STATEMENT OF PROBLEM

The anthropogenic activities have led to the degradation of the environment and caused a massive amount of green-house gas emissions which ultimately led to climate change. Climate change has effected every aspects of life on earth, whether it is temperature, water, seasons, food cycles etc. which ultimately has raised questions on the survival of life on this planet and how long this life would prevail if the current situation remains or exaggerates. United Nation Framework Convention on Climate Change attempted to address and neutralise this problem as soon as possible. This was the first time when all the nations accepted that a threat so grave exist upon the world and has the capacity to eliminate life itself from the planet. The convention aims at mitigating the effects of climate change and taking steps in order to adapt with the climate change and its aftermath.

Technology has been playing an important role in every field and it possess a great potential to deal with the problem that it itself created. There is a difference between the technological knowledge of developed nations and developing nations, this difference is a key that can help in resolving the problem of climate change. The Principle of "Common but Differentiated Responsibilities" is the guiding principle of UNFCCC and its battle against the Climate. It promotes principle of equity and climate justice and brings a burden on the developed nations to provide financial and technological aid to other countries so as to reduce the differences among the nations socially and economically, also, provide climate technology which would help in curbing the problem of climate change. But the exit of U.S.A. from Paris agreement has posed a question on the principle of CBDR and technology transfer.

1.3 AIM

The aim of the study is to explore and comprehend the effectiveness of strategic program on technology transfer under United Nation Framework Convention on Climate Change and its subsequent legal instruments.

1.4 OBJECTIVES

- To understand the principle of "Common but Differentiated Responsibility."
- To understand the legislative evolution of Technology Transfer under United Nation Framework Convention on Climate Change.
- To understand the role of private players in Technology Transfer.

1.5 SCOPE AND LIMITATIONS

The scope of this study is within ambit of framework convention on climate change and global negotiations associated with the strategic programmes adopted by Conference of Parties with regard to Technology Transfer and due to paucity of time and resources the amplitude of this study has been kept within the parameters of associated knowledge database available at official documentation of UNFCCC.

1.6 LITERATURE REVIEW

- Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009)

This article provide with an in depth understanding of the concept of Common but Differentiated Responsibility and how the application of principle is as per the International Principle of Equity. That every nation should be treated and made obligated under the UNFCCC as per its capacity i.e. upon the socio-economic condition, technology available, geographical location of the country. It explained that whether the principle of CBDR should be promoted and still continued or a realistic approach should be taken towards Climate Change.

- Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797

This article talks about Common but Differentiated Responsibility and various type of responsibilities. It provides that why the burden should be borne by the developed countries and why the developing and LDC's have the right to claim things from these developed nations under CBDR.

- Michael Weisslitz, "Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context", 13 Colo. J. Int'l Envtl. L. & Pol'y 473 (2002)

This article talks about the principle of CBDR and what are its impact and forces us to rethink whether there is a need of CBDR, as developing nations have been misusing this principle and avoiding to comply with the responsibilities that should be borne by them. The developing countries have been emitting a lot of GHGs

adding up to climate change for their development sake and this issue is to be understood and the principle of CBDR is to be reformed.

- John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11.

This article basically provides with the statistics of the world and the emission rate of countries which in a way prove their compliance with the UNFCCC and Kyoto Protocol. This article provides us with details of the top 20 emitters and how far each nation of the world has complied with their commitment to each other.

- Sumudu Atapattu, "Climate Change, Equity and Differentiated Responsibilities: Does the Present Climate Regime Favour Developing Countries?", Human Development Report 2007/2008, UNDP

This article mainly focuses on the CBDR principle, Principle of International Equity and how the current climate regime works. The relation among the three is explained and how the developed and developing nations are working under the climate regime, whether the regime is favouring one category of nations or not. Also, the question that arises in this article is that whether the benefits that developing nations are enjoying should be more focused on least developed countries.

- Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?" , 44 Environmental Policy and Law. (2014)

In this article the author has tried to explain the importance of climate- friendly Technology Transfer. He has explained different aspects of climate technology with regard to adaptation, mitigation process as well as trade related issues with regard to climate technology. The article provides us with various economic aspects of technology transfer and use various principle of economics to explain it.

- Stephanie Chuffart, "Technology Transfer and Dissemination under the UNFCCC: Achievements and New Perspectives, Columbia Law School, May 2013.

The article forms it basis upon the Technology Transfer under the UNFCCC. It explains the use of technology for the purpose of mitigation and adaptation and how all of them are inter- dependent. The article explains the working of mitigation process and what importance they have with regard to climate change and the possible use of technology in the field, also, in the case of adaptation how the applicability of technology would ease the adaptation process and resolve many other issues related to environment.

- Elizabeth Burleson, Multilateral Climate Change Mitigation, Vol. 41, University of San Francisco Law Review, (2007)

The article provides us with various dimensions of climate mitigation and the meaning of the term mitigation. It also explains the necessities of the world and how mitigation is the best measures to curb the problem of climate change and merely reduction of the harmed caused can save the environment.

- Ronald C. Griffin, " A Prairie Perspective on Global Warning and Climate Change: The Use of Law, Technology, and Economics to Establish Private Sectors Markets to Compliment Kyoto, Southeastern Environmental Law Journal, Vol. 17, (2008)

The article gives us an idea with regard to how technology is an essential need to curb the problem of climate change and what possible uses can be made of the asset. The role of private sector and stakeholders has been introduced in this article and how they affect the climate change regime. It also explains that the role of private players is beyond the governments and international organizations. The climate regime opens a wide area of investment which can prove beneficial for these private players.

- Buchner, B.; Falconer, A.; Hervé-Mignucci, M. & Trabacchi, C., "The Landscape of Climate Finance," Climate Policy Initiative, Venice, 2012.

The article provides with the role of climate finance and climate change, how it effects climate technology and what is the role of private sector in the field. It also provides how the private players can influence climate change, climate finance and climate technology.

- Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533

This research work provide us with the information with regard to the problem of climate change and the scientific research with regard to the effects of the climate change. It provides with the background of various UN framework working with regard to climate change. The main focus is with regard to Kyoto and its working with regard to technology transfer and emission caps.

1.7 RESEARCH QUESTIONS

- How does climate change mitigation and adaptation depend on climate technology?
- How does Private stakeholders have a role in climate change and climate technology?
- How does transfer of technology effect the impact of climate change and sustainable development?

1.8 RESEARCH METHODOLOGY

For the purpose of this research, both doctrinal as well as exploratory method have been adopted.

For doctrinal research, primary and secondary sources of data are referred i.e. legislation, conventions, treaties etc. fall under the category of primary sources, whereas books, articles, news reports etc. fall under the category of secondary sources. This helps in comparing various data and information knowledge available in various sources and exploring them to find a better perspective of the study and falls under the category of exploratory method.

CHAPTER 2: COMMON BUT DIFFERENTIATED RESPONSIBILITIES

The United Nations Framework Convention on Climate Change acknowledges the fact that there is change in the Earth's climate and its adverse effects are a common concern for humankind.[55] The UNFCCC provides that the human activities have increased the amount of greenhouse gases which will result in enhancing the greenhouse effect resulting into a warmer planet. Under the UNFCCC the parties concluded that the largest share of historical and current global emissions[56] of greenhouse gases[57] has originated in developed nations and the per capita emissions in developing countries are still relatively low.[58] The share of global emissions originating in developing countries will grow to meet their social and development needs.[59]

The framework convention appreciated the work conducted by many states and international organisation with regard to climate change[60] and recognized the steps required to understand and address climate change socially, economically and most importantly environmentally.[61] The framework convention here provided with distinction between the nations of the world and the different effect that climate change would have upon them taking in considering the geographical, economical aspects into consideration. As UNFCCC was the result of the Rio Summit, therefore sustainable development was an important part of the convention. It focused on coordinating climate change with social and economic development and avoiding adverse effect on the climate.[62]

---

[55] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[56] Article 1(4) of UNFCCC, "Emissions" means the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time.

[57] Article 1(5) of UNFCCC, "Greenhouse gases" means those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.

[58] *Ibid* pg 1

[59] *Ibid* pg 1

[60] Article 1 (2) of UNFCCC, "Climate Change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

[61] *Ibid* pg 2

[62] *Ibid* pg 3

UNFCCC recognized that all countries, especially developing countries, need access to resources required to achieve sustainable social and economic development. In order for developing countries to progress towards the goal, their energy consumption will need to grow taking into account the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general, including through the application of new technologies on terms which make such an application economically and socially beneficial.[63] It is agreed that the industrial revolution led to the development of the current most powerful economies and the result gained was by the use of natural resources and causing pollution. The advantage that the developed nations possess today is a result of the past activities, therefore they have an obligations towards the world.

The UNFCCC provides under Article 3 (1) (Principles), " the parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take lead in combating climate change and the adverse effects thereof."[64] The Article provides us with two principles i.e. the Principle of Sustainable Development which provides that the development and environment should go hand in hand and one should not overlap each other, also, protect climate for the present and the future generation.

The second Principle provided in the above stated Article is "The Principle of Common but Differentiated Responsibilities", it evolved from the notion of the "common heritage of mankind" and in a manifestation of general principles of equity in International Law.[65] The International Environmental Justice, is a useful instrument to analyse the problem of climate change because the costs and benefits of climate change are not evenly distributed.[66] CBDR includes in itself two elements of responsibilities i.e. one is the *common responsibility* of all the parties to address and work towards the

[63] *Ibid* pg 4

[64] *Ibid* pg 4

[65] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009) pg 166

[66] *Ibid* pg 166

concerns of environmental protection and sustainable development[67] as it is impossible, for example, to combat global climate change unless all nations cooperate to reduce greenhouse gas emission and concentrations in the atmosphere; and the other element is *differentiated responsibility* obligating the nations to act, for environment protection, in their national capacity and as per their national priority.[68]

The Convention recognizes climate change as the common responsibility of all parties, and that international cooperation is extremely essential to protect it.[69] Common concern and the shared responsibility of humankind to address climate change underpin the UNFCCC and are a longstanding custom of international environmental law.[70] This aspect of common responsibility has evolved throughout the history of international environmental law as there are other principles directly related, including common concern, common heritage of mankind, and province of mankind.[71]

Common responsibility is likely to apply where the resource is shared, under the control of no state, or under the sovereign control of a state, but subject to a common legal interest. Differentiated responsibility is based upon both historical responsibility of States and differing capacities of States to address climate change.[72] Eliminating

[67] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797, https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9388.00243 (June 10, 2018)

[68] *ibid*

[69] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[70] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009) pg 166

[71] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797, https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9388.00243 (June 10, 2018)

[72] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797, https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9388.00243 (June 10, 2018)

poverty is the most important goal of developing states but unlike the developed nations they lack the financial and technical capacity to deal with climate change.[73]

> *"Rajamani in her article explains that the differentiated responsibilities between the states can be classified mainly into three broad categories: central obligation with respect to emission reduction targets, establishing national systems for estimating the reductions, national communications ensuring compliance with mitigation commitments; on the basis of implementation like making policies and measures to reach mitigation commitments can be done as per the national circumstances, flexible time frame for implementation, permission to adopt a subsequent base year; and grants and assistance through financial assistance with respect to reporting obligations or commitments on mitigation, education etc. and financing the transfer of environmentally sound technology to developing countries[74]"*

Climate change and Sustainable Development are two essential things which are to be addressed by all the stated of the world, therefore making them their common responsibilities, but due to different social, economic, historic and geographical conditions, countries must address different responsibilities.[75] The above reasons can be subsumed under the need to ensure equity and justice in addressing climate change, as applying uniform standards on all States may be unfair thereby imposing hardship on the less responsible and yet less capable of responding.[76]

---

[73] Chiara Armeni, "Global Experimentalist Governance, International Law and Climate Change Technologies, Vol 64 Int'l & Comp. L.Q. 875 (2015)

[74] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797, https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9388.00243 (June 10, 2018)

[75] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009)

[76] *ibid*

2.1 CHALLENGES TO THE APPLICATION OF CBDR PRINCIPLE

The fact that the principle of CBDR needs rethinking cannot be denied after the massive shift in the economies from 1992 to the present. However, the formulation or the reshaping of the responsibilities face many challenges- the main issue is that the developed and the developing world want different things by the interpretation and application of the principle.[77] The developed countries and the LDCs want the principle to dilute to bring in more commitments and responsibility on the major developing countries;[78] whereas the latter advocate for following the strict language of the framework convention and the protocol. For the same reason US withdrew from the Paris Agreement stating that India was a big polluter, India was not doing and was not expected to do much on climate change under the Agreement, and India was asking for lots of money in return for little action.[79]

The major challenge in the application of CBDR principle in the present day international climate regime is the difficulty of negotiation or achieving of a consensus between the negotiating groups of their commitments and responsibilities. Although according to the principle of CBDR, developing countries are not required to reduce emissions in the existing Kyoto Protocol;[80] their further involvement is needed in global emissions reduction. To put the principle of CBDR into practice under the UNFCCC, the distinction was made between the 'Annex I' (Developed Nations) and the 'Non-Annex I' (Developing and LDC's) parties.[81]

---

[77] Nirupama Subramanian, " At UN General Assembly, PM Modi pitches for Climate Justice, War on Poverty", INDIAN EXPRESS, New York, September 26, 2015, https://indianexpress.com/article/india/india-others/pm-at-un-general-assembly-narendra-modi-pitches-for-climate-justice-war-on-poverty/ (June 10, 2018)

[78] Arunabha Ghosh, " US exit from Paris climate deal: How it affects India's Renewable energy ambitions", HINDUSTAN TIMES, July 13, 2017 , https://www.hindustantimes.com/opinion/us-exit-from-paris-climate-deal-how-it-affects-india-s-renewal-energy-ambitions/story-9HcTajiXQn4J8RYwl1N8IM.html (June 15, 2018)

[79] *ibid*

[80] Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1998 https://unfccc.int/resource/docs/convkp/kpeng.pdf (June 15, 2018)

[81] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

This idea of a differentiated responsibility has been challenged on many occasions. Countries with economies in transition are indicated by an asterisk in Annex I. Although there was no question about which states qualify as economies in transition, their legal status posed a problem. One of the challenges with respect to the differentiation is its lack of definition. There is no definition of CBDR as contained in Principle 7 of the *Rio Declaration* and no international environmental agreement before Rio expressly mentions it. Principle 7 divides the world into developed and developing countries without defining the border-line between them.[82] Where that line should be drawn is an obstacle in any international treaty or protocol that tries to make the CBDR principle operational. Following are some of the major challenges discussed more elaborately.

- Historic Responsibilities and the Differentiation:

It is important to clarify that Art. 3.1 does not refer to historic contributions to climate change as originally proposed by some developing countries but presents a more balanced approach emphasizing Parties' responsibilities as well as their present-day capabilities.[83] Ignoring historical accountability would give a retrospective license to past emitters from developed countries to disadvantage the poorer countries.[84] The proposal for historic responsibility towards the climate change was put forward by the developing countries like India, Brazil, China and Bolivia in 2009.

The objective of the CBDR principle was to put a positive differentiation of responsibilities over the parties. With the continuous focus and discussion of the historic responsibility, the developed countries are unwilling to accept their past adverse effect on the environment and to comply with the historic responsibility

[82] *ibid*

[83] *ibid*

[84] Michael Weisslitz, "Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context", 13
Colo. J. Int'l Envtl. L. & Pol'y 473 (2002)

towards the emission reductions.[85] The developed world wants to cover the current and future emissions making the major polluters like China and India accountable for their part of the emissions whereas they advocate for strict differentiation and compliance with historic responsibilities.[8687] Contradictory issues of fairness arise, as Annex I countries bear essentially all the direct economic costs of reducing emissions, and non-Annex I countries are granted the right to increase emissions to meet developmental needs.[88]

Finally, the focus on historical emissions as a baseline for regulation has differential and arbitrary impacts on individual nations. The developing countries like Brazil, India and China still advocate that the developed countries have a historic responsibility for causing the carbon emissions which they caused for develop their economy- and now that it is the turn of the developing countries to improve their economy and should be given privileges with respect to emission reductions.[89]

- <u>Fixed Differentiation between the Developed and the Developing:</u>

The use the principle of CBDR to differentiation between the developed and the developing countries should be broader.[90] Sumudu Atapattu, in his article he states: "Can the BASIC nations (Brazil, South Africa, India and China) be properly categorized besides the poorest of the world? In terms of greenhouse gas emission

[85] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797, https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9388.00243 (June 10, 2018)

[86] Arunabha Ghosh, " US exit from Paris climate deal: How it affects India's Renewable energy ambitions", HINDUSTAN TIMES, July 13, 2017 , https://www.hindustantimes.com/opinion/us-exit-from-paris-climate-deal-how-it-affects-india-s-renewal-energy-ambitions/story-9HcTajiXQn4J8RYwl1N8IM.html (June 15, 2018)

[87] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11. https://fpc.state.gov/documents/organization/113569.pdf (June 16, 2018)

[88] *ibid*

[89] *ibid*

[90] Sumudu Atapattu, "Climate Change, Equity and Differentiated Responsibilities: Does the Present Climate Regime Favour Developing Countries?", Human Development Report 2007/2008, UNDP

stocks (aggregate emissions since the industrial revolution) perhaps, but their flows (current annual emissions) have the character of the established economies of North America and Europe."[91]

The Kyoto Protocol provides for a list of the annexes of the countries marking a clear and *fixed* distinction between the developed and the developing countries. However, since 1992, when the Kyoto Protocol was signed, there has been a massive difference in the emission levels by the countries of different annexes. [92] The rapidly developing nations are having an almost equal adverse impact on the environment as the developed world.[93] Thus, despite what major leaders in the developing world advocate, there is a need to re-define the annexes or dilute the principle. It remains unclear both to what extent developing States should contribute and how much of the costs incurred by them shall be covered by contributions from the industrialized countries.[94]

The Protocol does not require any emissions reductions by developing countries, which represents a failure to properly apply the CBDR principle as the principle's basic premise is that everyone should bear at least some level of responsibility. Over such a long period of time some developing countries will advance into fully industrialized nations, the most successful among them may even surpass some of today's rich countries in terms of GDP per capita.[95] Differentiating responsibilities between developed and developing nations — as the UNFCCC does — fails to focus efforts on some of the largest emitters. Moreover, many developed countries have not achieved stabilization of their emissions despite the UNFCCC. The fixed categories would mean

[91] *ibid*

[92] Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1998 https://unfccc.int/resource/docs/convkp/kpeng.pdf (June 15, 2018)

[93] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11. https://fpc.state.gov/documents/organization/113569.pdf (June 16, 2018)

[94] Sumudu Atapattu, "Climate Change, Equity and Differentiated Responsibilities: Does the Present Climate Regime Favour Developing Countries?", Human Development Report 2007/2008, UNDP

[95] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11. https://fpc.state.gov/documents/organization/113569.pdf (June 16, 2018)

that the emerging super powers can circumvent the responsibility of adverse environmental impact caused by them in the present or in the future, with the developed countries still being liable for the adverse impact caused in the past, due to the historic difference.[96]

The fixed differentiation hardens the categorization between the poor, developing and the developed economies despite their improving economic state and it's in turn adverse environmental impacts. The responsibility towards the environment should increase or be revised as the economic growth of a state improves instead of being defined or fixed for a long period of time. However, the differentiation between the developed and the developing makes achieving the objective of the principle difficult making it possible for majorly rising economies to step back from their responsibilities towards the environment. The developed countries want to widen the ambit to include the majorly developing countries like BASIC nations to shoulder the responsibilities who are contributing in a large amount to the adverse climate impact.

- Per Capita Emissions versus Total Emissions:

The historically larger contribution of developed countries to climate change and their higher per capita emissions are, however, referenced as a factual statement in paragraph 3 of the Convention Preamble, which also recognizes that the share of global emissions originating in developing countries will grow to meet their social and developmental needs.[97] The different methods of measuring total emission or per capita emission give very different rankings to the states as emitters. For example, China is by far the biggest polluter today based on its total amount of emissions, while the United States is historically the most important one and Qatar takes the lead if per capita emissions are considered.[98]

[96] Sumudu Atapattu, "Climate Change, Equity and Differentiated Responsibilities: Does the Present Climate Regime Favour Developing Countries?", Human Development Report 2007/2008, UNDP

[97] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[98] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11.

The UNFCCC, in the preamble, notes- "That the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs.[99]" Today, developing countries with 76.5% of the world's population are responsible for 36.9% of current carbon emissions, while industrial countries with 17.7% of the world's population are responsible for 51%.76[100] The United States and some other developed countries have categorically rejected anything like the idea of equal per capita distribution of rights to emit, or development rights described in this way.

The Umbrella Group has the highest emission ration currently in the world where as G77 and China has comparatively very low per capita emissions considering their large population but is bound to increase in the near future.[101] The CBDR gives room to developing countries to increase their per capita emissions to meet their social needs. But with China alone being responsible for 14% of the world's greenhouse gas emissions as back as in 2000, the per capita emissions may prove to be a hindrance to the ultimate objective of the UNFCCC and the CBDR principle of stabilizing the greenhouse gas concentration in atmosphere.[102]

This line of argument is combined with the fact that the impacts of climate change will be felt with important differences among countries and regions in the world.[103][104] However, with the mobile nature of atmosphere, the emissions produced by countries like China, India which have room for emissions because of the lower per capita

[99] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[100] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11.

[101] *ibid*

[102] *ibid*

[103] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[104] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797

emissions rate, the environment as a whole shall be adversely impacted.[105] In the process of convergence, the rights and interests of one country to enjoy healthy environment are really infringed by another country. A country's high or low per capita real emissions cannot justify its high/low emission entitlements. This approach could permit most less-developed countries to increase their emissions to accommodate expanding economies.[106]

- Protecting the Environment in a Heterogeneous World:

The developed world has now passed the industrialization stage and is now focusing on global market growth and enhancing economy. The largest emissions come from activities like energy production, transportation and consumption. Most of the developing countries have not even entered the phase of industrialization, they rely majorly on non-renewable energy resources to meet their everyday need.[107] As discussed earlier even fast developing countries like India and China have a lot to cater to in terms of economic and social security for its nationals. Thus the application of the principle of CBDR after 20 years of signing of Kyoto Protocol is still faced by the challenge of the continued north–south dichotomy under the Durban platform.[108]

Further, the developed countries have an influential stand on the developing countries through their financial strengths and the technological know-how. According to United Nations Conference on Trade and Development statistics, there were approximately 82,000 Multinational Companies and 820,000 of their branches in 2008, most of which are from developed countries.[109] These multinational companies though from the

[105] Michael Weisslitz, "Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context", 13
Colo. J. Int'l Envtl. L. & Pol'y 473 (2002)

[106] *ibid*

[107] Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797

[108] John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11.

[109] *ibid*

developed world have employees from the developing countries working for them in a huge number. The heterogeneity is not only restricted to the north-south world. It also applies within the developing group. The developing countries are at very different stages for industrialization and urbanization. For example, emerging economies like India and China have very high amount of emissions which will keep rising even in the near future.[110] However, some other countries of the G77 or the Least Developed Countries are at very initial stages of such development.

All the nations whose emissions paths currently seem to be within the climate-friendly range are poor developing countries. Thus the main challenge to the applicability of CBDR is the heterogeneity of the groups and within the groups.[111] Thus the responsibility allotment and the emission pledges are largely affected by the difference between the groups which seems to be increasing by the demand of urbanization and rise in social needs. This diversity poses a challenge to the application of CBDR as different groups want different responsibilities and lesser commitment. A good example in this regards is the Paris Agreement negotiations, where the groups had different stand with respect to the legally binding emission reduction limit.

These are some of the reason which have led to unsuccessful application of the principle of "Common but Differentiated Responsibilities" as each nation think about the pros and cons for each one of them through the applicability of the same. Also, some nations feel that they are being misused in the name of CBDR and some are over- exploiting the resources and benefits that arise from the applicability of CBDR. There are recent examples of the difference between developed, developing and LDCs. China and India have been enlisted among the most polluted countries in the world and their environmental health has been degraded.[112] Reasons for the same can be many i.e.

---

[110] *ibid*

[111] Michael Weisslitz, "Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context", 13

Colo. J. Int'l Envtl. L. & Pol'y 473 (2002)

[112] Malavika Vyawahare, " India among 5 worst countries in terms of Environmental health", HINDUSTAN TIMES, New Delhi, Jan 24, 2018, https://www.hindustantimes.com/india-news/india-

population, poverty etc. but the ground reality is that it is hampering the environment and boosting climate change. U.S.A's exit from the Paris Agreement is a big blow to CBDR principle and as per the statements of the US President, developing nations are gaining a lot from this agreement and principle but in return their actions towards the cause of climate change aren't up to the mark.[113]

4th-worst-country-in-curbing-environmental-pollution/story-VWjWupzHcy8H5VdNGbp32J.html (June 18, 2018)

[113] Arunabha Ghosh, " US exit from Paris climate deal: How it affects India's Renewable energy ambitions", HINDUSTAN TIMES, July 13, 2017 , https://www.hindustantimes.com/opinion/us-exit-from-paris-climate-deal-how-it-affects-india-s-renewal-energy-ambitions/story-9HcTajiXQn4J8RYwl1N8IM.html (June 15, 2018)

CHAPTER 3: TECHNOLOGY TRANSFER

3.1 INTRODUCTION

We live in the era of technology, where everything is affected by technology directly or indirectly. People are dependent on technology for almost everything, be it from making your breakfast, travelling, power production, space projects etc. It has roots in everywhere and is evolving at a rapid pace. Improvement and Innovation are the way forward, without which evolution of technology and rapid development will be effected.

Climate and technology have a long history which can be traced, the beginning of industrial revolution was the change that had effects in every field but some less known. Technology led to social, economic development and helped in making the human life easier and comfortable but on the other hand it disturbed the ecological cycle of the world, causing problems like global warming, climate change etc. Therefore, the effect of technology is immense but it has the capacity to undo whatever wrong has been done with regard to technology. The technology can make it possible to achieve the goal of sustainable development and improve the environment. Since the 1950s many of the observed changes have been unprecedented. It is conceivable that more than one half of the observed increase in global average surface temperature between 1951 and 2010 was caused by the anthropogenic increase in greenhouse gas (GHG) concentrations and other perturbations.[114]

Development today has become an essential commodity for all, people need better living standards and nations strive towards this goal.[115] UNFCCC and the Sustainable development goals[116] provides that development is essential for all nations of the world and it's against the principle of equity under International Law not to allow developing

[114] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?", 44 Environmental Policy and Law. (2014) pg. 422

[115] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[116] United Nation Development Program, Sustainable Development Goals, http://www.undp.org/content/undp/en/home/sustainable-development-goals.html (June 10, 2018)

and least developing nations to being at par with the developed nations.[117][118] Prime Minister of India, Narendra Modi, in his speech at the Paris Agreement used the term Climate Justice[119][120] which in a way is can be understood as the principle of "common but differentiated responsibilities".[121] There is a need of global emphasis and co-operation in developing renewable sources of energy through innovation, finance and technology from developed nations, this can help in stopping the environmental degradation.[122] Also, there is a need for change in the lifestyle of the developed nations which can help us in order to move towards more sustainable consumption.[123]

Climate justice believes in the principle of equity and it is the right of developing nations and LDC's to get at par with the developed nations in terms of social, economic development.[124] It is true that the climate is changing and the carbon emissions are to be reduced but the developing nations and LDC's advocate that making them obligated for the activities of developed nations which resulted into climate related problem and attaining developed state and asking them to reduce their emission is against the principle of equity.[125] They argue that it is their right to eradicate poverty, hunger, illiteracy and attain better living standards, thus, they have the right and necessity to

[117] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[118] United Nation Development Program, Sustainable Development Goals, http://www.undp.org/content/undp/en/home/sustainable-development-goals.html (June 10, 2018)

[119] PTI, "Paris Agreement a victory of 'Climate Justice', says Modi", THE HINDU, New Delhi, December 13, 2015, https://www.thehindu.com/news/national/paris-agreement-a-victory-of-climate-justice-says-modi/article7983268.ece# (June 10, 2018)

[120] Nirupama Subramanian, " At UN General Assembly, PM Modi pitches for Climate Justice, War on Poverty", INDIAN EXPRESS, New York, September 26, 2015, https://indianexpress.com/article/india/india-others/pm-at-un-general-assembly-narendra-modi-pitches-for-climate-justice-war-on-poverty/ (June 10, 2018)

[121] *Ibid*

[122] *ibid*

[123] *ibid*

[124] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[125] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009) pg. 166

use resources and develop themselves.[126] This argument of using the resources and developing themselves and the above provided statement tries to explain the idea of Climate Justice. [127]

Continued emissions of GFGs will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reduction of GHG emissions.[128]On one hand, global trade activity is closely related to climate change i.e. the absence of effective climate policies can contribute to climate deterioration. On the other, trade can be regarded as having a positive effect on mitigating climate change by improving resource allocation, promoting economic growth and increasing overall welfare.[129] To tackle the problem of climate change and maintain equity among all the nations of the world. Climate justice is essential, this can only be attained if there is an exchange of funds, knowledge and technologies among them.[130] Technologies that we use to address climate change are known as climate technologies.[131] Climate technologies help us in combating problems related to climate change by helping in reducing emission and concentration of green- house gases in the environment, help in switching from conventional form of energy to renewable form of energy such as wind energy, solar power and hydropower. Also, to adapt to the adverse effects of climate change, development and usage of climate technology is essential as it can be used to produce drought resistant crops, early warning systems, sea wells etc.[132]

---

[126] *Ibid* pg. 166

[127] Nirupama Subramanian, " At UN General Assembly, PM Modi pitches for Climate Justice, War on Poverty", INDIAN EXPRESS, New York, September 26, 2015, https://indianexpress.com/article/india/india-others/pm-at-un-general-assembly-narendra-modi-pitches-for-climate-justice-war-on-poverty/ (June 10, 2018)

[128] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?" , 44 Environmental Policy and Law. (2014) pg. 422

[129] *ibid*

[130] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[131] Available at https://unfccc.int/topics/climate-technology/the-big-picture/what-is-technology-development-and-transfer (June 15 2018)

[132] *ibid*

3.2 UNFCCC AND TECHNOLOGY TRANSFER

The Unites Nation Framework Convention on Climate Change (UNFCCC) talks about Technology Transfer under Article 4 (Commitments) and Article 11 (Financial Mechanism).[133] It provides that the developed countries should provide new and additional financial resources in order to meet the costs incurred by developing countries in complying with their obligations. Also, the developed nations should provide financial resources for transfer of technology, required by the developing nations. All this is with regard to fulfilment of the commitments made under Article 4 of the UNFCCC. The implementation of these commitments should take into account the need for adequacy and predictability in the flow of funds and the appropriate burden sharing among the developed countries.[134] This article facilitates the idea of Climate Justice and Common but Differentiated Responsibilities, it asks the developed countries to provide developing nations with financial and technology aid in order to meet their commitments as per the UNFCCC and appropriately share the burden among themselves, in order to attain sustainable development and address the issue of Climate Change.[135] Also, UNFCCC provides that calculations of emissions by sources and removals by sinks of greenhouse gases for the purpose of the convention should take into account the best available scientific knowledge, including the effective capacity of sinks.[136]

The framework convention also provides that the extent to which the developing countries will implement their commitments depends on the effective implementation by developed countries of their commitments related to financial resources and transfer of technology and consider that economic and social development and poverty

[133] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[134] Article 4(3), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[135] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009) pg. 166

[136] Article 4(2)(c), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

eradication are the most important concerns of the developing nations.[137] It has been proven with scientific evidence that the major cause for climate change today is the past activities of developed nations[138] and therefore as per the principle of International Equity the burden to correct their wrongs falls upon them.[139] Therefore, they have more obligations towards other nations and climate change. Special focus is given upon Least Developed Countries and countries which are most likely to get effected by climate change i.e. small island countries, countries with low- lying coastal areas etc.[140] and other parties are to take full account of the specific needs and special situations of these countries with regard to funding and transfer of technology.[141][142]

Developing and transferring technologies to support national action on climate change has been as essential element from the beginning of the UNFCCC process. In 1992, when countries established the convention, they included specific provisions on technology with the aim of achieving the ultimate objective of the convention i.e. curbing climate change.[143] The convention notes that all parties shall promote and cooperate in the development and transfer of technologies that reduce emissions of green-house gases. It also provides that all developed countries should take all practicable steps to promote, facilitate and finance the transfer of, or access to, climate technologies to other countries.[144] The convention states that the extent to which

[137] Article 4(7), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[138] https://climate.nasa.gov/evidence/ (June 20, 2018)

[139] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009)

[140] Article 4(8), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[141] *ibid*

[142] Article 4(9), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[143] https://unfccc.int/topics/climate-technology/the-big-picture/what-is-technology-development-and-transfer (June 18, 2018)

[144] *ibid*

developing counties will effectively implement their commitments will depend on the effective implementation by developed countries of their commitments regarding to the financial resources and transfer of technology.[145]

Response to climate change will critically depend on the cost, performance, and availability of technologies that can lower emissions, mitigate, and adapt to climate change. Technological innovation can furthermore lower the cost of achieving environmental objectives.[146] The objective of the UNFCCC provides that the ultimate objective of this convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development in a sustainable manner.[147]

There are two fundamental elements of the UNFCCC which tend to focus on curbing the issue of climate change, they are:-

MITIGATION

There is a direct relation between global average temperatures and the concentration of greenhouse gases in the atmosphere, the key for the solution to the climate change problem rests in decreasing the amount of emissions released into the atmosphere and in reducing the current concentration of carbon dioxide by enhancing sinks. Efforts to reduce emissions and enhance sinks are referred to as "mitigation".[148] UNFCCC provides that the parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects.[149] Where there are threats of serious or irreversible damage, lack of full scientific certainty should not

[145] *ibid*

[146] Stephanie Chuffart, "Technology Transfer and Dissemination under the UNFCCC: Achievements and New Perspectives, Columbia Law School, May 2013.

[147] Article 2, United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 10, 2018)

[148] https://unfccc.int/topics/mitigation/the-big-picture/introduction-to-mitigation (June 20, 2018)

[149] Article 3(3), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 20, 2018)

be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.[150] This defines the precautionary principle under environmental law which promotes mitigation practices even though we lack scientific knowledge. UNFCCC also provides that all parties should formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases.[151] [152] Such programmes target economic activity with an aim to incentivize actions that are cleaner or disincentive those that result in large amount of GHGs. They include policies, incentives schemes and investment programmes which address all sectors i.e. energy generation and use, transport, buildings, industry, agriculture, forestry and other land use, and waste management.[153]

Climate Technology plays a vital role in mitigation process, as it provides different alternatives to the existing mechanisms. For example, increased use of renewable energy, the application of new technologies such as electric cars, better consumption of energy resources etc.[154] New Innovative technologies are essential for the mitigation process as the effect of conventional form of technology usage has led to the problem of climate change. The aim of mitigation process and technology is that to reduce emissions and GHGs concentration in the atmosphere, but also socio-economic development is an objective of the UNFCCC, therefore a balance among is to be maintained and better innovative technology is the solution to both prospective. The aim is to develop such technology which would give equal or more output in form of

[150] *ibid*

[151] Article 4(1)(b), United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 20, 2018)

[152] https://unfccc.int/topics/mitigation/the-big-picture/introduction-to-mitigation (June 20, 2018)

[153] *ibid*

[154][154] https://unfccc.int/topics/climate-technology/the-big-picture/what-is-technology-development-and-transfer (June 20, 2018)

development but emit lesser GHGs.[155][156] Recently, climate negotiations have reached a consensus agreeing that effective climate-friendly technology transfer, as a response to the climate change problem, will necessitate significant involvement of developing countries in mitigation efforts. Even though much of climate- friendly technology transfer and international research cooperation is among developed nations, some developing countries have become significant trade and research partner.[157]

ADAPTATION

The world is already experiencing changes in average temperature, shifts in the seasons and an increasing frequency of extreme weather events and other climate change impacts and slow onset events. The faster the climate changes, and the longer adaptation efforts are put off, the more difficult and expensive it could be.[158] Adaptation, refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic change and their effects. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change.[159] In simple terms, countries and communities need to develop adaptation solution and implement action to respond to the impacts of climate change that are already happening, as well as prepare for future impacts.[160]

Adaptation solutions take numerous shapes and forms, depending on the different context of a community, business, organization, country or region. There is no single and similar solution for all, as different nations and localities have different ecological

[155] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 20, 2018)

[156] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?" , 44 Environmental Policy and Law. (2014)

[157] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?", 44 Environmental Policy and Law. (2014) pg. 422

[158] https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/understanding-climate-resilience (June 20, 2018)

[159] *ibid*

[160] *ibid*

setting, different geography, different economic structure etc.[161] Many nations and communities are already taking steps to build resilient societies and economies, but far greater action and ambition will be needed to cost-effectively manage the risks, both now and in the future.[162] Adaptation can include building dams in order to control floods and power generation, also can be used to irrigation facilities to place affected by droughts or having less water facilities, setting up early warning systems for cyclones, redesigning communication systems, business operations and government policies etc. [163]

Even though government activities and policies play an important role in successful adaptation but there in a need for active involvement of stakeholders including national, regional, multilateral and international organizations, the public and private sectors, civil society and other relevant stakeholders, as well as effective management of knowledge.[164]

Every nation in the world agrees upon that adaptation in a worldwide challenge spanning its wings at every level of the society i.e. local, subnational, national, regional and international. Adaptation is necessary in order to tackle the problem of climate change in order to protect environment, people and their livelihoods.[165] Darwin's evolutionary theory explains the need of adaptation mechanism, as he provides the phrase, "Survival of the Fittest" which provides that only those who possess the ability to adapt according to the circumstances can survive. Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, considering vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as

[161] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009)

[162] https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/understanding-climate-resilience (June 20, 2018)

[163] Elizabeth Burleson, Multilateral Climate Change Mitigation, Vol. 41, University of San Francisco Law Review, (2007)

[164] *ibid*

[165] https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/understanding-climate-resilience (June 20, 2018)

appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions.[166]

Technology is essential in order to have better adaptive measures, as it can be used in various aspects of adaptive process. For example, climate change has led to shift in seasons and has completely disrupted the ecological cycle therefore, untimely rainfalls and droughts have become a major problem in agricultural areas. As farmers are dependent on rainfalls and climate and the food cycle depends on them.[167] Technology and adaptive methods can come to the rescue in such situations, building up a water canal towards a drought area from an area which is most likely to be flood prone, thus, in way solving both the problems. Today, two percent of the population feeds us. With mechanical advancements, new farm machinery, innovative practices, products, commodities, securities and markets can do something to reward farmers for their efforts to slow the pace of climate change.[168] Development in crops can be the solution to ever growing population, high yielding seeds and drought resistance crops can help in solving the problem of climate change and tackling the problem of food shortage. These are some of the practice that could help in adapting to the climate change. Thus, we conclude that technology plays an important role in mitigation and adaptation process, the need of technology is eminent and UNFCCC facilitates this transfer of technology.[169]

Climate- friendly technology integrates environmental and economic values. The transfer and distribution of GHG mitigation technology offers an opportunity to achieve significant and cost- effective emission reductions on a global scale.[170] In some cases,

---

[166] *ibid*

[167] Ronald C. Griffin, " A Prairie Perspective on Global Warning and Climate Change: The Use of Law, Technology, and Economics to Establish Private Sectors Markets to Compliment Kyoto, Southeastern Environmental Law Journal, Vol. 17, (2008)

[168] Ronald C. Griffin, " A Prairie Perspective on Global Warning and Climate Change: The Use of Law, Technology, and Economics to Establish Private Sectors Markets to Compliment Kyoto, Southeastern Environmental Law Journal, Vol. 17, (2008) pg. 96

[169] United Nations Framework Convention on Climate Change, U.N. Document FCCC/INFORMAL/84, GE.05-62220 (E) 200705, 1992 https://unfccc.int/resource/docs/convkp/conveng.pdf (June 20, 2018)

[170] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?", 44 Environmental Policy and Law. (2014) pg. 424

for example in relation to energy-efficiency measures, the transfer and implementation of technological mitigation solutions may involve very low or no reduction costs.[171] Scientists say technological advances like hydrogen- fuelled cars, giant synthetic trees, and windows embedded with solar cells could help address global warming if given enough societal support.[172] Given that an increase in emission level is expected to occur on a global level and escalate in developing countries, technology transfer between developed countries and developing countries will also play a key role in finding a more climate- friendly route to economic development than has been used in the past.[173]

Climate- friendly technology should differ from traditional trade in technology, which mainly focuses on creating international trade rules that maximise the economic interests of both parties.[174] Developing countries traditionally feel a need to energise their domestic economics so as to increase wealth across large populations; however developing countries also must face climate change risk.[175] A better choice would be the transition to a low carbon economy through the weeding out of high- emission production, and increasing the utilisation of clean energy and technology.[176]

3.3 TECHNOLOGY AND PRIVATE SECTOR

As the world is moving towards a more capitalism-oriented society, and the earlier notions of state dominations are fading, the role of private sector has increased several folds. Private sector involvement can now be seen in policy making, international conventions and agreements and several other areas of governance and decision making. Although they have not been given full powers to decide matters on behalf on the countries, but they are now allowed to participate, discuss and share their views on the matters.

The UNFCCC has also recognised the importance of private sector in climate action and hence launched Private Sector Initiative (PSI). The Private Sector Initiative (PSI)

[171] *ibid*

[172] *ibid*

[173] *ibid*

[174] *ibid*

[175] *ibid*

[176] *ibid*

aims to catalyse the involvement of the private sector in the wider adaptation community. The unique expertise of the private sector, its capacity to innovate and produce new technologies for adaptation, and its financial leverage can form an important part of the multi-sectorial partnership that is required between governmental, private and non-governmental actors.[177]

The PSI provides a platform for businesses to contribute in a sustainable and profitable manner to a strong and effective response, both in their own adaptation efforts and, importantly, in those of the most vulnerable countries and communities around the world.[178]

Partnership in the initiative brings a number of benefits to companies. These not only include the possibility to take part in activities mandated under the Nairobi work programme, but also include networking opportunities, reputational advantages and increased visibility, and association with the United Nations process for addressing climate change.[179]

While climate change poses a number of risks to vulnerable communities and businesses around the world, many opportunities are unfolding for private companies to implement actions towards reducing risks to their business operations, as well as investing in adaptation action in vulnerable regions in a sustainable and profitable manner, including[180]:

- New market opportunities and expansions;
- Development of climate friendly goods and services;
- Potential cost savings;
- Risk reduction measures, including physical operations;
- Climate proofing the supply chain;
- Enhanced corporate social responsibility.

[177] UNFCCC, Private Sector Initiative, available at: https://unfccc.int/topics/resilience/resources/adaptation-private-sector (accessed on June 22, 2018)

[178] *Ibid*

[179] *Ibid*

[180] *Ibid*

Over the past few years, the global debate on climate finance has increasingly focussed on the potential of the private sector to contribute to and/or leverage climate finance. At the outset, discussion on the role of the private sector in climate finance was focused on mitigation to reduce the level of greenhouse gases emissions. Today the role of the private sector is increasingly relevant as regards the global adaptation debate.

The private sector currently represents close to 75% of global climate finance flows. Private capital is essential to scale up climate finance in light of restricted public resources.[181] However, the term 'private sector' includes a highly diverse group of actors and activities operating at international, national and local levels.[182] This makes analysis of the contribution of the private sector to adaptation especially challenging.

Adaptation to climate change comprises all actions aimed at reducing the vulnerability of human and natural systems to the current and future effects of climate change, including climate variability.[183] Meeting the adaptation needs of developing countries may come with a large price tag. Although estimates vary depending on the methodology, baseline scenarios and projections, they all suggest that developing countries adaptation needs are comparable to current aid flows (US$ 134 billion in 2011, according to the OECD)[184].

Trade parties are basically equal, at least in terms of compensating for unfairness within the market's natural cycle. Indeed this assumption has stimulated exchange among different levels of countries over the past decade. Worldwide economic development also shows that there has been compensation for the imbalance toward poorer countries.[185] Even with these considerations, however, the promotion of the

[181] Buchner, B.; Falconer, A.; Hervé-Mignucci, M. & Trabacchi, C., "The Landscape of Climate Finance," Climate Policy Initiative, Venice, 2012.

[182] *Ibid*

[183] European Climate Adaption Platform, available at: https://climate-adapt.eea.europa.eu/metadata/portals/unfccc-database-of-private-sector-initiative-on-adaptation, accessed on June 23, 2018.

[184] *Ibid*

[185] Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009)

international code of conduct on technology transfer has been unsuccessful. While the EU, the US and Japan own most of the climate- friendly technology, their governments have not directly undertaken to regulate its trade or redistribution. These technologies are owned mainly by the private sector.[186] Consequently, this problem is more complicated than just providing pure technology assistance to less developed countries. Specially, developed countries have no reason to set aside their economic concerns and consider the non- market dimensions of green technology even when the UNFCCC has made the green- technology transfer commitment on their behalf.[187]

SOME INITITIATIVE BY PRIVATE ENTITIES ON CLIMATE CHANGE

Industrial Group:

Carbon Disclosure Project: CDP's climate change program works to reduce companies' greenhouse gas emissions and mitigate climate change risk. It works on the basis of improving corporate awareness through measurement and disclosure and is vital to the effective management of carbon and climate change risk. It also helps companies capitalize on the opportunities for revenue generation through more sustainable products and services. They retrieve information on the risks and opportunities of climate from the world's largest companies on behalf of 767 institutional investor signatories with a combined US$92 trillion in assets. CDP then provides this information to its 767 institutional investor signatories, as well as distributing it throughout the global market place to increase transparency around climate-related investment risk and commercial opportunity, and drive investments towards a low carbon economy[188].

[186] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?", 44 Environmental Policy and Law. (2014) pg. 424

[187] Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?", 44 Environmental Policy and Law. (2014) pg. 425

[188] http://www.cdproject.net (June 25, 2018)

Research Institution:

Carbon Trust: The Carbon Trust is a not-for-profit company set up by the UK government to reduce carbon emissions. The Trust provides technical assistance, investment funds and other services to companies on emission reduction strategies and for the development of new technologies. It is to tackle climate change by accelerating the move to a sustainable, low carbon economy that delivers jobs and wealth. They render service to organisations put sustainability to business strategy and gain a competitive advantage in the market. By stimulating low carbon action contribute to green goals, including the lowering of carbon emissions, the development of low carbon businesses, increased energy security and job creation[189].

Industrial Group:

Cement Sustainability Initiative: The Cement Sustainability Initiative (CSI) is a global effort by 24 major cement producers with operations in more than 100 countries who believe there is a strong business case for the pursuit of sustainable development. Collectively these companies account for around 30% of the world's cement production and range in size from very large multinationals to smaller local producers[190].

The purpose of the Initiative is to:

- Explore what sustainable development means for the cement industry;
- Identify actions and facilitate steps cement companies can take, individually and as a Group, to accelerate progress toward sustainable development;
- Provide a framework for other cement companies to become involved;
- Create the content and context for further stakeholder engagement.

Voluntary Group:

[189] http://www.thecarbontrust.co.uk/default.ct (June 25, 2018)

[190] http://www.wbcsdcement.org/index.php/about-csi (June 25, 2018)

Chicago Climate Exchange: The Chicago Climate Exchange is a GHG emission reduction and trading pilot programme for emission sources and offset projects in the USA, Canada and Mexico. It is a self-regulatory, rules-based exchange designed and governed by the members who have made a voluntary commitment to reduce their GHG emissions by 4% below the average of their 1998–2001 baseline by 2006[191].

Investing agencies:

Pew Center on Climate Change Business Environmental Leadership Council: Under this initiative, 41 companies establish emissions reduction objectives, invest in new, more efficient products, practices, and technologies and support actions to achieve cost-effective emissions reductions[192]

[191] http://www.chicagoclimatex.com (June 25, 2018)

[192] http://www.pewclimate.org/companies_leading_the_way_belc/ (June 25, 2018)

CHAPTER 4: FRAMEWORK POST UNFCCC

4.1 KYOTO PROTOCOL

UNFCCC, negotiated in 1992, is an international environmental treaty that has the goal of achieving the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The Kyoto Protocol was negotiated in 1997 as a supplement to the Framework Convention, detailing the manner of implementation of the obligations undertaken by the parties to the Treaty.[193]

"The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC or FCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan, and entered into force on 16 February 2005. As of April 2010, 191 states have signed and ratified the protocol.[194] The Protocol allows for several "flexible mechanisms", such as emissions trading, the clean development mechanism (CDM) and joint implementation to allow Annex I countries to meet their GHG emission limitations by purchasing GHG emission reductions credits from elsewhere, through financial exchanges, projects that reduce emissions in non-Annex I countries, from other Annex I countries, or from annex I countries with excess allowances.[195]

Objectives: Kyoto is intended to cut global emissions of greenhouse gases.

The objective of the Kyoto climate change conference was to establish a legally binding international agreement, whereby all the participating nations commit themselves to tackling the issue of global warming and greenhouse gas emissions. The target agreed upon was an average reduction of 5.2% from 1990 levels by the year 2012. According to the treaty, in 2012, Annex I countries must have fulfilled their obligations of

[193] M.K. Ramesh, "Piggyback Riding on CDM?", www.nlsenlaw.org. (June 17, 2018)

[194] *ibid*

[195] *ibid*

reduction of greenhouse gases emissions established for the first commitment period (2008–2012) (listed in Annex B of the Protocol).[196]

The Kyoto Protocol's first round commitments are the first detailed step of the UN Framework Convention on Climate Change. The Protocol establishes a structure of rolling emission reduction commitment periods, with negotiations on second period commitments that were scheduled to start in 2005. The first period emission reduction commitments expire at the end of 2012.[197]

4.2 THE POZNAN STRATEGIC PROGRAM (PSP) ON TECHNOLOGY TRANSFER

There is no doubt that the cardinal principles of Climate Change encompasses within itself an enormous databank of activities, initiatives, measures undertaken to respond certain genuine crisis which is an outcome of certain practices by developed states for quite a long period of time.

From there emerged the principle of Common but Differentiated Responsibility (CBDR) which justified a common concern that we (group of nations) share and common responsibility in order to protect, preserver and conserve the essence of it. The brunt has to be borne by the developed nations in fixing the damages they have done. Hence, the researcher intends to take this principle a starting point and link the same to some of the major elements of Climate Change i.e. capacity building, adaptation & technology transfer.

It was during COP 13, when the contracting state parties realized and decided to adopt a strategic program on technology transfer. The prime objective of this initiative was to enable the developing countries, to develop environmentally sound technologies.

Thereafter, the Global Environmentally Facility (GEF) Council, Special Climate Change Fund (SCCF) and Least Developed Countries Fund (LDCF) came

[196] *ibid*

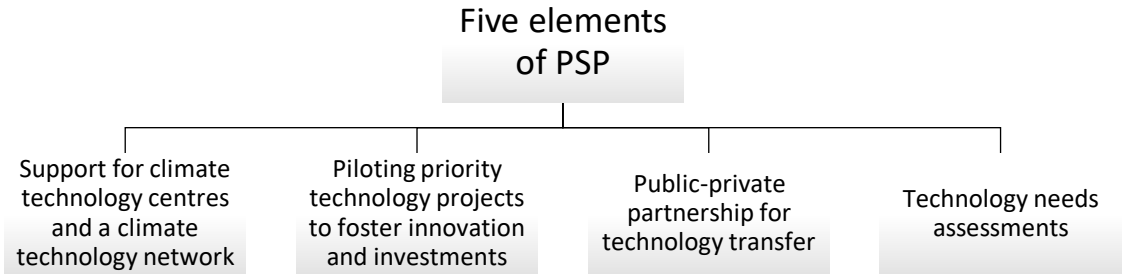
[197] *ibid*

together to adopt the GEF'S strategic program on technology transfer. The same was later renamed as Poznan Strategic Program on Technology Transfer.

"In 2008, the GEF Council approved a strategic program on technology. The program had three windows:

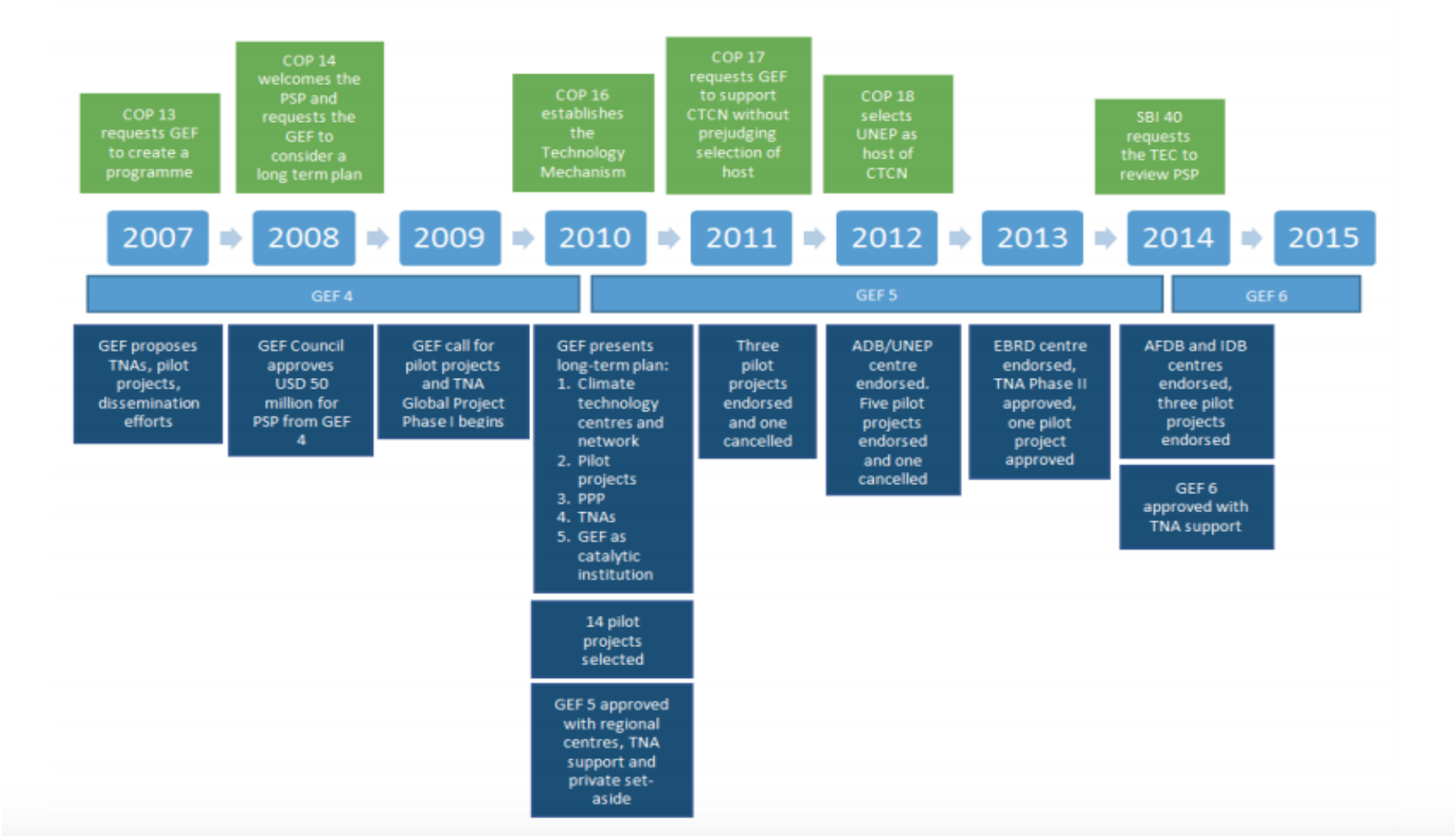
- Technology needs assessments (TNAs);
- Piloting priority technology projects linked to TNAs;
- Dissemination of GEF experience and successfully demonstrated environmentally sound technologies."

The GEF submitted to COP 16 a plan for the long-term implementation of the PSP.[198]

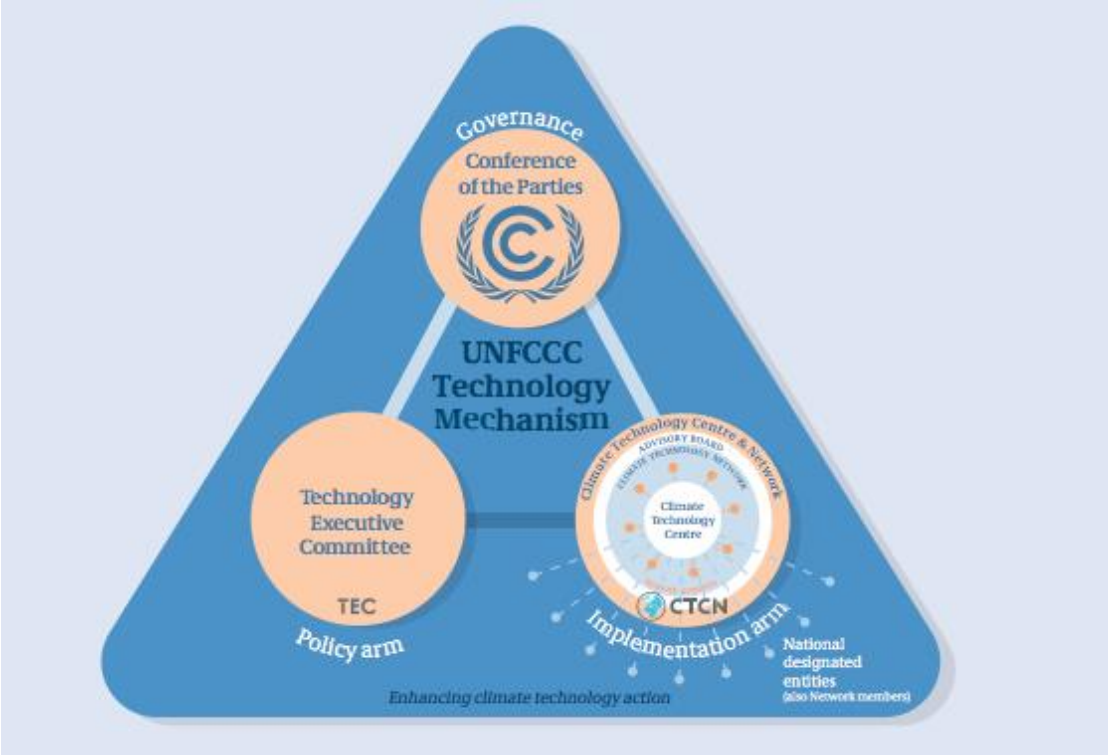


[198] FCCC/SBI/2010/25.

The PSP has evolved quite substantially, since its inception:



"*The Technology Mechanism's two bodies, the TEC and the CTCN, work together to enhance climate technology action. Their complementary functions support developing country efforts to address both policy and implementation aspects of climate technology development and transfer. They work to enrich coherence and synergy in the delivery of climate technology support and respond effectively to the needs of countries."*



Source: UNFCCC web-portal

The TEC is the policy arm of the UNFCCC Technology Mechanism. It consists of 20 technology experts representing both developing and developed countries.[199] The

[199] See Technology Mechanism Enhancing Technology Transfer Mechanism and Development, available at http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEM/0e7cc25f3f9843ccb98399df4d47e219/174ad939936746b6bfad76e30a324e78.pdf June 14, 2018.

CTCN is the operational arm of the Technology Mechanism. It is hosted by the United Nations Environment Programme, in collaboration with the United Nations Industrial Development Organization, and is supported by 11 partner institutions with expertise in climate technologies. The centre facilitates a network of national, regional, sectoral and international technology centres, networks, organizations and private sector entities.[200]

Despite all good attempts to develop a good technology transfer mechanism, there has been a strong jolt as regards climate finance as a whole and even with respect to PSP. There has been challenges and risks associated with the channelizing the finance.

"*For technologies with negative abatement costs, misaligned incentives, intangible benefits, high transaction costs and lack of standardization in the quantification of energy savings and other benefits, in addition to the upfront capital costs, frequently hamper their financing and uptake."*[201]

Obtaining financing for climate technologies is particularly challenging in developing countries due to additional uncertainty and risks that are hard to mitigate in private financial markets, lack of patient and low-cost capital, poor creditworthiness, lack of guarantees and low availability of capital for public investment.[202]

One of the major problems associated with economic barriers with respect to technology transfer, revolves around inadequate access to financial resources and inappropriate economic incentives. Another aspect of financial barrier is with respect to risk management. Policy risks affect those climate investments that rely on revenue and regulatory support; market and commercial risks refer to economic risks and

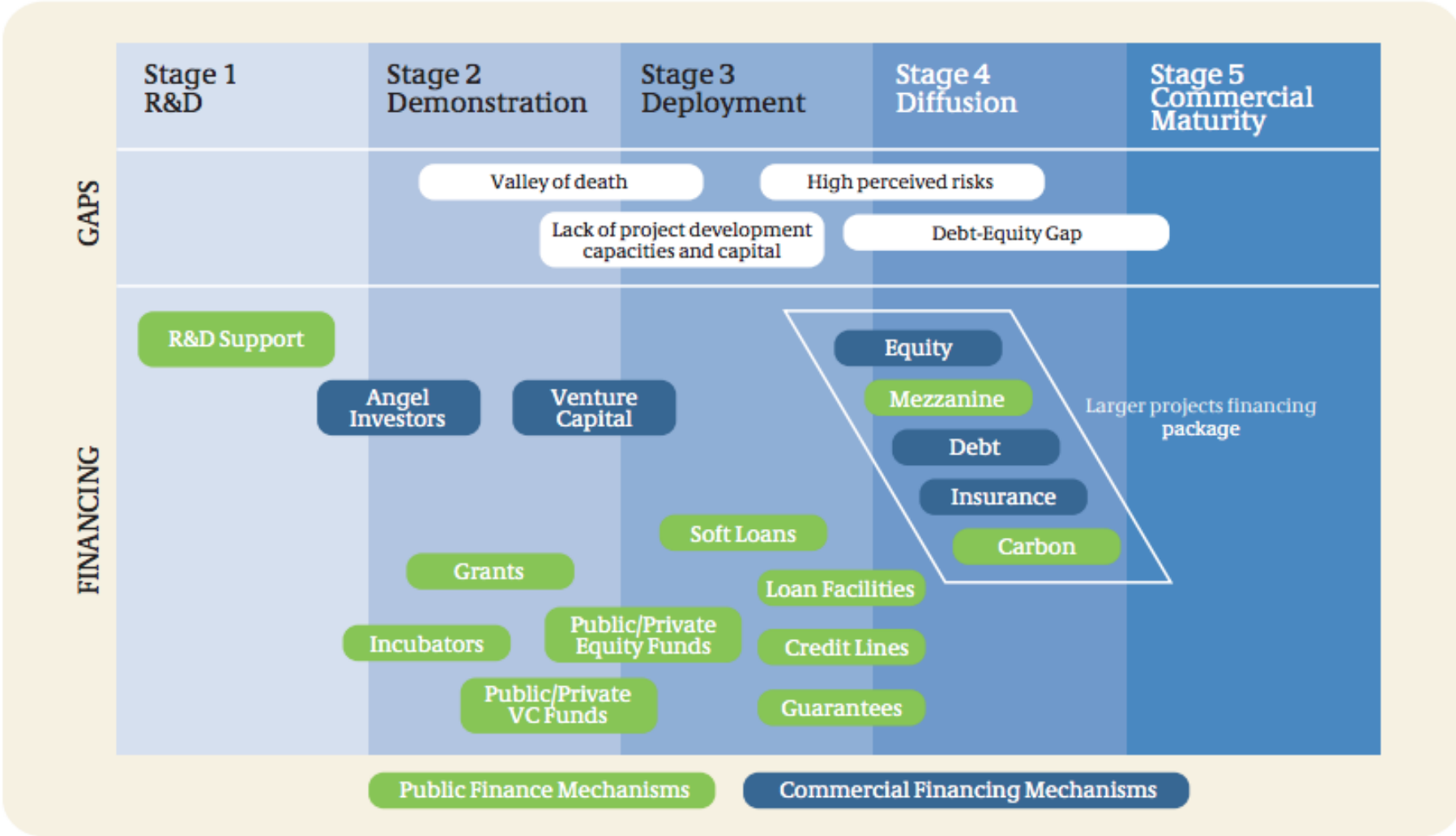
[200] *ibid*.

[201] *ibid*.

[202] Enhancing Access to Climate Technology Financing, available at http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_documents/204f400573e647299c1a7971feec7ace/ea65db0ca9264cdbaefeb272dd30b34c.pdf last seen on June 15, 2018.

include financial risks, such as access to capital and the cost of financing; and technology risks are inversely related to technology maturity.[203]

[203] *ibid*.


Stage 1
R&D
Stage 2
Demonstration
Stage 3
Deployment
Stage 4
Diffusion
Stage 5
Commercial
Maturity
GAPS
Valley of death
High perceived risks
Lack of project development capacities and capital
Debt-Equity Gap
FINANCING
R&D Support
Angel Investors
Venture Capital
Equity
Mezzanine
Debt
Insurance
Carbon
Larger projects financing package
Soft Loans
Grants
Loan Facilities
Incubators
Public/Private Equity Funds
Credit Lines
Public/Private VC Funds
Guarantees
Public Finance Mechanisms
Commercial Financing Mechanisms

The gaps in the field of technology transfer (source: UNFCCC)

There are several initiatives in allied schemes, which is working on technology development and transfer initiatives. They are as follows[204]:

- Africa Renewable Energy Initiative
- Breakthrough Energy Coalition
- Consultative Group on International Agricultural Research (CGIAR)
- Climate Tech Wiki
- Climate Technology Initiative (CTI)
- Food and Agriculture Organization of the United Nations (FAO)
- International Energy Agency (IEA)
- International Solar Alliance
- International Renewable Energy Agency (IRENA)
- Mission Innovation
- Clean Energy Info Portal Reegle
- Renewable Energy Policy Network Ren 21
- The Energy and Resources Institute (TERI)
- United Nations Conference on Trade and Development (UNCTAD)

[204] http://unfccc.int/ttclear/support, (June 16, 2018)

- United Nations Environment Programme, Division of Technology, Industry and Economics (UNEP DTIE)

- World Intellectual Property Organization (WIPO)

- World Bank.

4.3 TECHNOLOGY TRANSFER UNDER PARIS AGREEMENT

Under Article 10 of Paris Agreement,

"*Parties, noting the importance of technology for the implementation of mitigation and adaptation actions under this Agreement and recognizing existing technology deployment and dissemination efforts, shall strengthen cooperative action on technology development and transfer."*

"*A technology framework is hereby established to provide overarching guidance to the work of the Technology Mechanism in promoting and facilitating enhanced action on technology development and transfer in order to support the implementation of this Agreement, in pursuit of the long-term vision referred to in paragraph 1 of this Article.*

Accelerating, encouraging and enabling innovation is critical for an effective, long-term global response to climate change and promoting economic growth and sustainable development. Such effort shall be, as appropriate, supported, including by the Technology Mechanism and, through financial means, by the Financial Mechanism of the Convention, for collaborative approaches to research and development, and facilitating access to technology, in particular for early stages of the technology cycle, to developing country Parties.

Support, including financial support, shall be provided to developing country Parties for the implementation of this Article, including for strengthening cooperative action on

technology development and transfer at different stages of the technology cycle, with a view to achieving a balance between support for mitigation and adaptation. The global stock take referred to in Article 14 shall take into account available information on efforts related to support on technology development and transfer for developing country Parties."

To achieve the goals of the Paris Agreement, there is a pressing need to accelerate and strengthen technological innovation so that it can deliver environmentally and socially sound, cost-effective and better-performing climate technologies on a larger and more widespread scale. But there is no 'one size fits all' approach. Different innovation approaches are needed.[205] Harnessing technological innovation is a prerequisite for countries to smoothly implement their NDCs, national adaptation plans and mid-century strategies. These are central elements of the Paris Agreement.[206]

"Technological innovation is a key part of the climate solution. Without scaling up and speeding up climate technology innovation, it will be difficult, if not impossible, for the world to achieve the Paris Agreement objectives and sustainable development goals. The climate plans under the Paris Agreement – NDCs, national adaptation plans and mid-century strategies – present us with challenges of different time horizons."[207]

[205] See UNFCCC TEC Brief 10, available at http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/brief10/8c3ce94c20144fd5a8b0c06fefff6633/57440a5fa1244fd8b8cd13eb4413b4f6.pdf last seen on June 18, 2018.

[206] *ibid.*

[207] *ibid.*

CONCLUSION

Technology has played an important role in almost every aspect of life and since UNFCCC, 1992 its importance has increased. The transfer of technology has become an essential tool in curbing the problem of climate change both for Mitigation and Adaptation measures. Example of such activities have been provided in the thesis. The principle of "Common but Differentiated Responsibilities" and principle of "International Equity" can be considered as biggest hindrance in today's world, because these principle give right of exploitation to the developing countries. CBDR believe in common but different responsibilities, but the relaxation that has been given to developing nation has allowed them to pollute the environment irresponsibly. China being a developing country is the largest emitter of greenhouse gases today, even though its per capita emission is lower than that of U.S.A. but it combined emission ranks 1st in the world.

India has been demanding funds from various developed countries in the name of Climate Justice. This has ultimately led to the withdrawal of U.S.A. from the Paris Agreement as it claims that the developing countries aren't doing their part or fulfilling their share of responsibilities. Furthermore, the LDCs are the ones which suffer the most as they lack the basic technology to produce power and the excessive pollution caused by developing and developed nations have the worst impact these on countries. Technology and fund transfer are required by these countries the most.

Rather than equity it is time to take some pragmatic steps towards climate change and reduce the carbon emission by increasing carbon sinks as well as developing better climate friendly technology. The Poznan Strategic Program is an essential part of the technology transfer deal as it provides with a better mechanism than UNFCCC with regard to technology assessment and transfer of the same. Another problem is that the developed nations doesn't have any consideration in this technology transfer mechanism therefore, it lower down their interest in the mechanism. Developed countries have no reason to set aside their economic concerns and consider the non- market dimensions of green technology even when the UNFCCC has made the commitment on their behalf.

The main target should be the private sector as they are the one who provide with technology and have the capacity to innovate new forms of better technology. The market of climate technology can be changed by these private players, so a need to incorporate them into the system and provide them with benefits which would encourage them to produce and invest in

green technology. The solution is not with the developed countries, it is with the private stakeholders. Secondly, the developing countries should be made responsible for their emissions and stringent actions should be taken against the offender. It is true that UNFCCC provides with CBDR principle but it also provides the principle of Sustainable Development which is only possible if all the countries make an equal effort towards the cause of Climate Change.

BIBLIOGRAPHY

PRIMARY SOURCE

- United Nation Framework Convention on Climate Change, 1992
- Kyoto Protocol, 1998
- Poznan Strategic Programme,
- Paris Agreement on Climate Change, 2015

SECONDARY SOURCE

Articles

- Werner Scholtz, "Equity as the Basis for a Future International Climate Change Agreement: Between Pragmatic Panacea and Idealistic Impediment. The Optimisation of the CBDR Principle via Realism." , 42 Comp. & Int'l L.J.S. Afr. 166 (2009)
- Lavanya Rajamani, "The Principle of Common but Differentiated Responsibility and The Balance Of Commitments Under The Climate Regime', (2000) ISSN 0962 8797
- Michael Weisslitz, "Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context", 13 Colo. J. Int'l Envtl. L. & Pol'y 473 (2002)
- John Blodgett and Larry Parker, "Greenhouse Gas Emissions: Perspectives on the Top 20 Emitters and Developed versus Developing Nations", CRS Report for Congress Order Code RL32721 2008 1, 11.
- Sumudu Atapattu, "Climate Change, Equity and Differentiated Responsibilities: Does the Present Climate Regime Favour Developing Countries?", Human Development Report 2007/2008, UNDP
- Jiang Jiani, "Can the System Promote Climate-friendly Technology Transfer?" , 44 Environmental Policy and Law. (2014)
- Stephanie Chuffart, "Technology Transfer and Dissemination under the UNFCCC: Achievements and New Perspectives, Columbia Law School, May 2013.
- Elizabeth Burleson, Multilateral Climate Change Mitigation, Vol. 41, University of San Francisco Law Review, (2007)

- Ronald C. Griffin, " A Prairie Perspective on Global Warning and Climate Change: The Use of Law, Technology, and Economics to Establish Private Sectors Markets to Compliment Kyoto, Southeastern Environmental Law Journal, Vol. 17, (2008)
- Buchner, B.; Falconer, A.; Hervé-Mignucci, M. & Trabacchi, C., "The Landscape of Climate Finance," Climate Policy Initiative, Venice, 2012.
- Sunil Kumar Agarwal, "Mitigating Global Climate Change: A legal Study on the Kyoto Protocol Mechanisms", Jawarharlal Nehru Univeristy, 2008, pg 4 ,http://hdl.handle.net/10603/14533
- Javier De Cendra de Larragán, "Distributional Choices in EU Climate Change Law and Policy: Towards a Principled Approach?" (1st edn, Kluwer Law International 2011)
- Wolfgang Sachs, "equity in the greenhouse: how just is the Kyoto protocol' in reading the Kyoto protocol: the ethical aspects of convention on climate change" (1st edn, Euborn Academic Publishers 2005).

Web Sources

- http://www.brainyquote.com/quotes/quotes/j/jayinslee267811.html
- http://www.inuitcircumpolar.com/files/uploads/icc-files/FINALPetitionICC.pdf
- http://www.ncdc.noaa.gov/sotc/global/2012/9
- http://heinonline.org/HOL/Page?handle=hein.journals/intlm31&div=156&collection=journals&set_as_cursor=0&men_tab=srchresults&terms=renewable|energy|and|climate|change&type=matchall#828
- https://unfccc.int/resource/docs/convkp/conveng.pdf
- https://climate.nasa.gov/evidence/
- http://hdl.handle.net/10603/14533
- http://www.un.org/depts/los/biodiversity/prepcom_files/BowlingPiersonandRatte_Common_Concern.pdf
- https://unfccc.int/process/the-convention/history-of-the-convention#eq-1
- https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9388.00243
- https://indianexpress.com/article/india/india-others/pm-at-un-general-assembly-narendra-modi-pitches-for-climate-justice-war-on-poverty/

- https://www.hindustantimes.com/opinion/us-exit-from-paris-climate-deal-how-it-affects-india-s-renewal-energy-ambitions/story-9HcTajiXQn4J8RYwl1N8IM.html
- https://unfccc.int/resource/docs/convkp/kpeng.pdf
- https://fpc.state.gov/documents/organization/113569.pdf
- https://www.hindustantimes.com/india-news/india-4th-worst-country-in-curbing-environmental-pollution/story-VWjWupzHcy8H5VdNGbp32J.html
- http://www.undp.org/content/undp/en/home/sustainable-development-goals.html
- https://www.thehindu.com/news/national/paris-agreement-a-victory-of-climate-justice-says-modi/article7983268.ece#
- https://unfccc.int/topics/climate-technology/the-big-picture/what-is-technology-development-and-transfer
- https://unfccc.int/topics/mitigation/the-big-picture/introduction-to-mitigation
- https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/understanding-climate-resilience
- https://unfccc.int/topics/resilience/resources/adaptation-private-sector
- https://climate-adapt.eea.europa.eu/metadata/portals/unfccc-database-of-private-sector-initiative-on-adaptation
- http://www.cdproject.net
- http://www.thecarbontrust.co.uk/default.ct
- http://www.wbcsdcement.org/index.php/about-csi
- http://www.chicagoclimatex.com
- http://www.pewclimate.org/companies_leading_the_way_belc/
- www.nlsenlaw.org.
- http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEM/0e7cc25f3f9843ccb98399df4d47e219/174ad939936746b6bfad76e30a324e78.pdf
- http://unfccc.int/ttclear/support