

**TITLE: THE EFFICACY OF CARBON EMISSIONS TRADING
FOR CLIMATE POLICY IN THE CONTEXT OF
SUSTAINABLE DEVELOPMENT: AN EXPLORATORY
STUDY**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF THE MASTER OF LAWS (LL.M) DEGREE
IN ENVIRONMENTAL AND NATURAL RESOURCES LAW AT
THE UNIVERSITY OF NAIROBI.**

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DECLARATION

I, OWUOR LYDIA AKINYI of Registration Number **G62/64061/2010** do hereby declare that this project report is my original work and that it has not been submitted either in part or in whole and is not being currently submitted for a degree in any other University.

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*This thesis is dedicated to the memory of my brother
Felix Omogi Owuor.*

Abbreviations and Acronyms

AAUs	Assigned Amount Units
AR5	Fifth Assessment Report
AR4	Fourth Assessment Report
CDM	Clean Development Mechanisms
CSIRO	The Commonwealth Scientific and Industrial Research Organization
CO _{2e}	Carbon Dioxide Equivalent
CFC	Chlorofluorocarbons
CO ₂	Carbon dioxide
CH ₄	Methane
COP	Conference of the Parties
CERs	Certified Emission Reductions
DESA	Department of Economic and Social Affairs
DOE	Designated Operational Entity
ERUs	Emission Reduction Units
EU-ETS	European Union Emissions Trading Scheme
FAR	First Assessment Report
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
HFC	Hydrofluorocarbon
HCFC	Halogenated Fluorocarbons
IPCC	Intergovernmental Panel on Climate Change
IISD	International Institute for Sustainable Development
JI	Joint implementation
MDG	Millennium Development Goal
MOP	Meeting of the Parties
NAPs	National Allocation Plans
N ₂ O	Nitrous Oxide
O ₃	Ozone
OECD	Organization of Economic Cooperation and Development
PFC	Perfluorinated Carbons
QELROs	Quantified Emission Limitation and Reduction Objectives
SF ₆	Sulphur Hexafluoride
SBSTA	Subsidiary Body for Scientific and Technological Advice
SBI	Subsidiary Body for Implementation
SO ₂	Sulphur Dioxide
SDGs	Sustainable Development Goals
SAR	Second Assessment Report
TAR	Third Assessment Report
TERI	The Educational Resource Institute
UN	The United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNCHE	United Nations Conference on the Human Environment
UNEP	United Nations Environment Programme

UNDP	United Nations Development Programme
UNCSD	United Nations Conference on Sustainable Development
WCED	World Commission on Environment and Development
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

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CHAPTER 1

PLAN OF STUDY

1.1 Introduction

From the beginning of international discussions about climate change, one of the most striking aspects of the deliberations has been the intensity of disagreement between factions which lobby for economic incentives approach in dealing with global warming and opponents of the economic incentives approach. As recently as a decade ago environmental regulators and lobbying groups with a special interest in environmental protection looked upon the market system as a powerful adversary:¹ That the market unleashed powerful forces was widely recognized and that those forces clearly acted to degrade the environment was widely lamented. Conflict and confrontation became the battle cry for those groups seeking to protect the environment as they set out to block market forces whenever possible.²

The opponents of economic incentives approach, mainly Southerners and environmental protection activists, have in climate change deliberations raised specific concerns regarding the direction in which the global climate regime has evolved with one of the key concerns being that the focus of the regime has become skewed towards minimizing the burden of implementation on polluter industries and countries, instead of giving priority to vulnerabilities of the communities and countries at greatest risk and disadvantage.³ Proponents of economic incentives

¹ T. H. Tietenberg, *Economic Instruments for Environmental Regulation* (Oxford University Press and Oxford Review of Economic Policy Limited, Vol. 6, No. 1), 17

² T. H. Tietenberg, *Economic Instruments for Environmental Regulation* (Oxford University Press and Oxford Review of Economic Policy Limited, Vol. 6, No. 1), 17

³ Adil Najam, Saleemul Huq and Youba Sokona, *Climate Negotiations Beyond Kyoto: Developing Countries Concerns and Interests* (Elsevier Limited, 2003), 223

approach being mainly Northern governments and corporate polluters have on the other hand advocated for this approach for reasons that it is the most feasible mechanism for reducing emissions that balances at a level playing field the objectives of economic development and environmental globalization.⁴

However, among the more enlightened participants in the environmental policy process the air of confrontation and conflicts has now begun to recede in many parts of the world.⁵ There is an apparent shift and continuing acquiescence towards emissions trading.⁶ Carbon emissions are emerging as a new and dynamic commodity that links the global North and South, business enterprises and consumers, and science and markets in complex ways.⁷ For example, offset⁸ projects have become a new source of funding for development and conservation in the global south and a rapidly growing business opportunity for those who develop and broker projects and credits.⁹

The prospects of leveraged investment and or participation in projects that can generate profits through carbon emissions trading seem to have facilitated and led the global community to dramatically vary the design and structure of dealing with global warming to the concept of carbon emissions trading. Carbon, being the principal greenhouse gas, is now tracked like any

⁴ Environmental globalization here means an important conceptual change in the way we think about the environment and most critically the need to look at it as an international concern rather than a national concern.

⁵ T. H. Tietenberg, *Economic Instruments for Environmental Regulation* (Oxford University Press and Oxford Review of Economic Policy Limited, Vol. 6, No. 1), 17

⁶ 'Emissions trading', 'carbon trading' and 'carbon emissions trading' are used interchangeably in this paper.

⁷ Adam G. Bumpus and Diana M. Liverman, *Accumulation by Decentralization and the Governance of Carbon Offsets* (Economic Geography, Clark University, 2008), 128

⁸ Polluters can offset their emissions by purchasing carbon credits that are generated by such projects as forest planting, renewable energy, biofuels, methane capture, energy efficient wood stoves and lighting.

⁹ Adam G. Bumpus and Diana M. Liverman, *Accumulation by Decentralization and the Governance of Carbon Offsets* (Economic Geography, Clark University, 2008), 128

other commodity:¹⁰ These designs have attracted large projects and investments with the main focus being monetary returns.

1.2 Background of the Problem

The premier form of dealing with human-induced global warming and towards carbon reductions is driven by the commitments made by signatories to the Kyoto Protocol to the United Nations Framework Convention on Climate Change of 1997.¹¹ The ultimate goal of the Framework Convention on Climate Change¹² is to enable development to proceed in a sustainable manner: That is, sustainable development as defined in the Brundtland Report,¹³ being development that meets the needs of the present generation without compromising the ability of the future generations also to meet their needs. In advancement of this objective, the Kyoto Protocol is aimed to promote the Framework Convention's goal of "stabilizing atmospheric concentrations of greenhouse gases at a level that would prevent dangerous anthropogenic interference in the climate system."¹⁴

At the core of the Kyoto Protocol is an agreement to reduce emissions, due to power or energy generations, by an average of 5.2 percent below 1990 levels of greenhouse gases by the year

¹⁰ G. I. Pearman, *GREENHOUSE: Planning for Climate Change* (CSIRO Australia, 1988), 3

¹¹ Adam G. Bumpus and Diana M. Liverman, *Accumulation by Decentralization and the Governance of Carbon Offsets* (Economic Geography, Clark University, 2008), 132

¹² The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) is an international environmental treaty that was the outcome of the United Nations Conference on Environment and Development (UNCED) (informally known as the Earth Summit) in Rio de Janeiro, June, 1992. The UNFCCC was opened for signature on May 9, 1992 after an Intergovernmental Negotiating Committee produced the text of the Framework Convention as a report following its meeting in New York. It entered into force in March, 1994.

¹³ World Commission on Environment and Development, *Our Common Future* (Oxford University Press, New York, 1987)

¹⁴ Cinnamon Carlarne, *The Kyoto Protocol and the WTO: Reconciling Tensions Between Free Trade and Environmental Objectives* [Colo. J. Int'l Envtl. L. & Pol'y, Vol. 17:1, 2006], 46

2012¹⁵ where we are. The Protocol's commitments are expressed in terms of emissions allowances, or Assigned Amount Units, that are equal to a nation's allowable greenhouse gas emissions.¹⁶

The Kyoto Protocol provides for no less than three international emission trading programs, usually referred to as the Kyoto "flexibility mechanisms", as a means of achieving the reduction targets for individual countries.¹⁷ They are:

(i) An *emissions trading* regime that allows industrialized countries to buy and sell emissions credits amongst themselves. Countries that limit or reduce emissions more than is required by their agreed target are able to sell the excess emissions credits to countries that find it more difficult or more expensive to meet their own targets.¹⁸

(ii) *Joint implementation* (JI) projects which offer "emissions reduction units" for financing projects in other developed countries.¹⁹ These project trades apply not at the country level but basically at a country union where the countries are an integrated economy like the European Union. The mechanism is known as joint implementation as, here, the countries within the Union realize that they are an integrated economy and they may have serious implications if one or more countries within the Union cannot meet their obligation.

¹⁵ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 2

¹⁶ Cinnamon Carlarne, *The Kyoto Protocol and the WTO: Reconciling Tensions Between Free Trade and Environmental Objectives* [Colo. J. Int'l Env'tl. L. & Pol'y, Vol. 17:1, 2006], 47

¹⁷ David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading under the Kyoto Protocol* [bepress Legal Series, Hosted by The Berkeley Electronic Press, Paper 1643, 2006], 18

¹⁸ See Article 17 of the Kyoto Protocol

¹⁹ See Article 6 of the Kyoto Protocol

(iii) *Clean Development Mechanisms (CDM)* which provide credit for financing emissions-reducing or emissions-avoiding projects in developing countries where credit will be earned in the form of certified emissions reductions.²⁰ Here the arrangement is that the emissions reduction that has been achieved is quantified and attributed to the Countries that undertook that clean development mechanism and which credits can then be purchased by developed countries and private companies within developed countries. The CDM's "purpose is to assist" developing countries in "achieving sustainable development."²¹

These three Kyoto market based mechanisms are the form in which carbon as a commodity was created and continue to develop as the overall legal structure in defense against global warming; with the key feature of the Protocol being the agreement to sell the excess emissions credits. Trading is therefore the linchpin for the Kyoto framework.

1.3 Statement of the Problem

The thrust of the international policy response to climate change remains weighted overwhelmingly towards the Kyoto Protocol emissions reduction strategies²² with emissions trading at the heart of efforts to address global warming. However, the problem with trading as the linchpin for the Kyoto success and, for achieving the Framework Convention's goal of "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent

²⁰ See Article 12 of the Kyoto Protocol

²¹ David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading under the Kyoto Protocol* [bepress Legal Series, Hosted by The Berkeley Electronic Press, Paper 1643, 2006], 18

²² Sonja Boehmer-Christiansen & Aynsley Kellow, *The International Environmental Policy: Interests and the Failure of the Kyoto Process* [Edward Elgar Publishing Limited, 2002], 9

dangerous anthropogenic interference with the climate system”²³ in general, is that, concern is mounting that perhaps the flexibility mechanisms provided under the Kyoto Protocol are not sustainable designs for enabling an environment for low carbon emissions and atmospheric build up of greenhouse gases; and that this would consequently impede efforts to address global warming.

At the centre of these concerns is an apprehension that the total idea of carbon emissions trading may fail or misguide efforts to combat global warming should the idea vary to being an opportunity for very large economic incentives to defect from any agreement²⁴ as; this would mean that participation in the Kyoto flexibility mechanisms would exclusively be motivated by self-interest²⁵. If the emissions trading idea diverges from being a solution to global warming which requires integrity and compliance, to being an improvident scheme for profiting and also for allowing governments (and firms) not to comply with emission reduction targets, then in turn, the model will cease from being fully compatible with the principles of sustainable development. Economic incentives are only conducive to sustainability if they are effective within the overall context of sustainable development. Therefore, if emissions trading is used as the primary policy instrument whilst it does not encourage behavior that is conducive to environmental sustainability and climate change then it will only remain a meaningless mechanism that does not contemplate the magnitude of the problem presented by anthropogenic climate change.

²³ Article 2 of the United Nations Framework Convention on Climate Change

²⁴ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 13

²⁵ Mark Schapiro, *Conning the Climate Inside the Carbon-Trading Shell Game* (Harper’s Magazine, Report, February 2010) also available at http://www.cdm-watch.org/wordpress/wp-content/uploads/2010/04/conning_the_climate_schapiro.pdf . At page 39 the report argues that carbon exists as a commodity only through the decision of politicians and bureaucrats, who determine both the demand, by setting emissions limits, and the supply by establishing criteria for offsets.

The presence of this problem undercuts the very motivation of countries to act²⁶ towards stringent efforts in the struggle to slow global warming. More importantly, however, is that this makes it contentious whether the emissions trading model is an intergeneration solution to global warming and a model for future environmental regulation. This brings the purpose of this research project to a consideration of whether or not carbon emissions trading as an economic incentive is an optimum solution to global warming and appropriate environmental management strategy which tallies with the targets set under the principles of sustainable development.

1.4 Objectives of the Study

The chief purpose of this research project is to probe whether the economic incentives approach in dealing with global warming replenish concepts and policies of sustainable development or whether they are mechanisms that are gradually slipping the global community out of the core values of sustainable development by weakening its essence. Flowing from this broad objective, the paper seeks to measure the efficacy of the carbon emissions trading structures and designs in the context of global warming as the key policy instrument towards carbon reductions and, based on the findings of the study, to make modest recommendations on alternative sustainable mechanisms that can be deployed in the strategy to manage the climate change challenge.

²⁶ Stephen M. Gardiner, *The Global Warming Tragedy and the Dangerous Illusion of the Kyoto Protocol* (Reprinted from *Ethics & International Affairs* 18, no. 1. © 2004 Carnegie Council on Ethics and International Affairs) 30

1.5 Research Questions

The following are the questions that this research paper will consider:

- (a) Is an emissions trading scheme an effective way to reduce emissions or does promotion of emissions trading sidetrack the global community's focus from models that would bring the world to authentic emissions reduction?
- (b) Are economic incentives a sustainable form of managing climate change?
- (c) How can the global community enhance effectiveness and efficiency in the commitment to emissions reduction in order to ensure that the designs deployed in this pursuit fortify the pillars of sustainable development?

1.6 Hypotheses

This research project carries bias towards the following hypotheses:

1. That the market driven mechanism for achieving the Kyoto Protocol targets subject the atmosphere to the *legal* emission of greenhouse gases: The arrangement parcels up the atmosphere and establishes the routinized buying and selling of "permits to pollute" as though they were like any other international commodity²⁷. As a result, market based approaches towards reduction of emissions are not really incentives for effective environmental management obligations but merely a course for polluters to buy their way out of reducing their emissions and deviate from their environmental obligations.

²⁷ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 2

2. That the introduction of emissions trading means that precious time and resources are being channeled away from the solutions that could successfully resolve climate change in a just way.²⁸ This hypothesis suggests that market based approaches are trading mechanisms that merely privatize the air and commodify the atmosphere while undermining alternative efficient approaches to pollution control and, which designs and approaches bear no practical safe levels of emissions reduction.
3. That the carbon economy concept only postpones dealing with the impending over-pollution-crisis expected to impact the future generations. The underlying hypothesis herein is that a future retrospective analysis of the effects of the operation of the carbon economy concepts may reveal that it is merely a concept that could be carried out today due to the fact that the environment was still within its 'safe-days'²⁹ when the consequences of unsustainable development causing destructive pollution were yet to manifest.
4. That a commodity approach also functions to detach the global warming problem from climatological uncertainties and indeterminacies³⁰. The dynamics of global warming as

²⁸ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 13

²⁹ The word 'safe' means out of harm, secure or protected. The term safe days put together therefore does not have a specific definition but a basic meaning of the two distinctive words. However, for purposes of this project a special conception of the term 'safe days' has been constructed. Safe days is construed here to mean a period of minimal impact.

³⁰ Larry Lohmann for Kean Birch & others, eds., *Neoliberalism and the Calculable World: The Rise of Carbon Trading* (London, Zed Books, forthcoming) 4

a social problem reveal that both demand attenuation and issue direction process have diminished global warming's standings as a "celebrity" social problem.³¹

1.7 Justification of the Study

'Environmental issues are best handled with the participation of all concerned citizens, at the relevant level'; these are the first words of Principle 10 of the Rio Declaration.³² This project takes the context of that statement to mean that the voice of the environment can take many different forms including this discourse and that is the main backdrop against which this study is conducted.

Combating climate change is vital to the pursuit of sustainable development; equally, the pursuit of sustainable development is integral to lasting climate change mitigation.³³ Dealing with global warming is therefore essentially an environmental management effort. For that reason, appraisal of activities, programmes and projects in the management plan is mandatory in order to evaluate whether they meet and keep the requirements and principles of sustainable development.

Against that background, this project will be a significant endeavor in the discussions about climate change as it proposes a constructive evaluation of whether the concepts of carbon emissions trading are representative of the true values of sustainable development in order to measure our approaches for effective management of the environment.

³¹ Ungar S. Seldon, *The Rise and (Relative) Decline of Global Warming as a Social Problem* (The Social Quarterly, Volume 33, Issue 4, Dec. 1992) 483 - 501

³² The Rio Declaration on Environment and Development (1992)

³³ Adil Najam, Saleemul Huq and Youba Sokona, *Climate Negotiations Beyond Kyoto: Developing Countries Concerns and Interests*, 228

The goal of this study is to apply sustainable development criteria in assessment of the global warming tragedy and its combating strategies and to contrast various considerations that have been represented in this subject with the aim of provoking new thoughts and postulating informed recommendations.

1.8 Theoretical Framework

It is theorized that the concept of sustainable development does not pit 'growth' against 'environment' but rather accepts that in some cases environmental protection and conservation can promote growth in the economy, and also, that the real issue is *not* 'growth or no growth', but *how* growth is to be attained. That in particular instances, this may mean trading off environmental quality for growth, but only after fully informed decision of the true environmental costs have been made; in other cases growth will be sacrificed in favour of environmental quality³⁴ – in which case, where an irreplaceable asset would be used up by an activity, sustainable development requires that activity's cessation³⁵.

This theory projects the view that the concept of sustainable development does not only foster the resolve to protect the environment; it also recognizes that peace, security, stability and respect for human rights and fundamental freedoms are essential for achieving sustainable development³⁶. Therefore, only credible, reliable and adequately informed strategies and controls should be adopted and promoted in the effort of protecting the environment and the pursuit of sustainable development. The theory further unsettles the views of proponents of economic incentives approach that market mechanisms encourage innovations vital to sustainable

³⁴ David Hughes & others, *Environmental Law* (Fourth Edition, Oxford University Press, 2005), 256

³⁵ David Hughes & others, *Environmental Law* (Fourth Edition, Oxford University Press, 2005), 20

³⁶ Kevin R. Gray, *Accomplishments and New Directions?* (International and Comparative Law Quarterly, 2003), 21

development and points out that, market mechanisms, therefore, may not be the best choice for sustainable development strategy.

The underlying presumption of public policy makers supporting the use of pricing incentives to attain desired environmental behavior is that market forces, being adjusted with price changes, will re-equilibrate markets at some pre-determined and desired level. The significance of applying these incentives is the achievement of environmental and climate change objectives.³⁷ This theory therefore provides a foundation for assessing whether carbon emissions trading operates to achieve the objectives of sustainability and climate change.

This research project will be guided generally by the perspective of this theory because it fits the purpose of the study as it ventures into an analysis of the research questions and also aids this project by providing a key point from which the recommendations and the conclusions will be drawn. The theory will therefore provide the general structure and outline for the direction of this study.

1.9 Methodology

This study is based on both primary and secondary sources of data. The primary sources include international agreements, resolutions, reports, regulations, declarations and other articles of the United Nations. The secondary sources of data include books, journals, periodicals, news papers, looseleaf publications and interview transcripts touching on this subject. Articles on the internet derived from various websites shall also provide an alternative source of information for issues

³⁷ Jim Hamilton, *The Failure of Economic Incentives to Encourage Sustainable Community Development* (Community Research Connections (CRC), Discussion Paper Series, Number 4, April 2009), 2

arising in this research and shall be helpful in highlighting issues not yet captured in textbooks, current affairs and emerging issues. These websites shall be thoroughly scrutinized to confirm authenticity of the data therein. The source of data for the study may however be reviewed and or enhanced during the course of the research.

The methodology of this study entails desktop research by utilizing facts and general information on the topic that have been published in the sources underscored above. Application of the secondary source of data and the research method is sufficient to meet the demands of this research project and to achieve the objectives of the study.

1.10 Limitation of the Study

The greatest limitation of this project is that the research is based on a topic that is subject to seemingly ever expanding discussion and expressions. This would mean that during the course of this research, more and more texts on the subject may continue to be put forward over and above the already extensive body of literature that has been developed. This will be a limiting factor in this study in the sense that, because of these developments, there may be changes in the platforms and dynamics of the discussions about climate change, global warming and the Kyoto flexibility mechanisms that may demand the attention of this project. As a result, it will be quite time consuming and tedious to ensure that the content presented in this project is accurate and still valid in order to avert misleading conclusions.

On that account, this study may possibly not capture the changing perspectives and or points of contradiction; its parameters will be within a substantial study of the economic incentives

approach in dealing with global warming towards realization of sustainable development. Nevertheless, all relevant developing data will be utilized in forming the structure of this project to a certain extent.

1.11 Literature review

Intergovernmental Panel on Climate Change (IPCC) Assessment Reports³⁸

The IPCC is a scientific intergovernmental body established by two organizations in 1988 – the World Meteorological Organization and the United Nations Environment Programme, under the chairmanship of Professor Bert Bolin³⁹. IPCC's mandate includes comprehensive review and recommendations with respect to the science of climate change, social and economic impact(s), possible policy responses by Governments to delay, limit or mitigate the impact of adverse climate change, relevant treaties and other instruments dealing with climate change, (and) elements for possible inclusion in a future international convention on climate.⁴⁰ IPCC's action, based on the said mandate, has been to consider various aspects of climate being scientific findings, interpretations, costs of inaction and of action based on the scientific findings, ideas, opinions, strategies and conclusions. The IPCC Reports are representative of the global community's international cooperation and valuable efforts to deal-with climate change and the basis upon which action has been taken.

³⁸ The IPCC produces at regular intervals Assessment Reports of the state of Knowledge on climate change – available on the IPCC website.

³⁹ Forward by G.O.P Obasi, M.K. Tolba in *Climate change 1992: The Supplementary Report to the IPCC Scientific Assessment, Combined with supporting Scientific Material* (World Meteorological Organization/United Nations Environment Programme, Intergovernmental Panel on Climate Change, Published by Press Syndicate of the University of Cambridge, New York, USA)

⁴⁰ Shardul Agrawala, *Context and Early Origins of the Intergovernmental Panel on Climate Change* (Climate Change 39, Kluwer Academic Publishers, 1998) 616

Upon its constitution, the Panel formed 3 Working Groups to look at each of the focus areas that would work in parallel but carry out simultaneous work in the following arrangement: Working Group I looking at Science, Working Group II at impacts and Working Group III at Response Strategies. The Panel also established a Special Committee on the participation of developing countries to promote the participation of those countries in its activities.

The First Assessment Report (FAR) was completed in August 1990. It consisted of IPCC Scientific Assessment, the IPCC Impact Assessment, the IPCC Response Strategies, the Policy Makers' Summary of the IPCC Special Committee and the IPCC Overview. FAR is considered the most authoritative and widely accepted view-point on global warming, and this research confirms this assertion. Here, IPCC reported that they were certain that some global warming would occur due to human activities, should existing emissions trends continue⁴¹. This assertion served as the basis for negotiating the United Nations Framework Convention on Climate Change.

The Second Assessment Report (SAR) of the IPCC was completed in 1995 and published in 1996. SAR was an assessment of the then available scientific and socio-economic information on climate change: It not only updated the information on the same range of topics as in the First Assessment but also included a new subject area of technical issues related to the economic aspects of climate change⁴². SAR was superseded by the Third Assessment Report (TAR) in 2001. Whilst TAR contained a large number of 'scenarios', the particular projection that was

⁴¹ Mathew Paterson, *Global Warming & Global Politics* (Routledge, 1996) 9

⁴² Forward in *Climate change 1995: Economic & Social Dimensions of Climate Change, Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change* (World Meteorological Organization/United Nations Environment Programme, Intergovernmental Panel on Climate Change, Published by Press Syndicate of the University of Cambridge, New York, USA, 1996)

given prominence was the projection generated by computer models showing the most extreme and alarming rate of global warming: 5.8°C over the next century. TAR further emphasized on new and stronger evidence confirming that most of the warming observed was attributable to human activities.

The Fourth Assessment Report (AR4) is the fourth in the series of reports by the IPCC and the latest. The report is the largest and the most detailed summary of the climate change situation and was an update on the preceding reports. AR4 will be superseded by The Fifth Assessment Report (AR5) expected in 2013/2014.

The key conclusion of the Panel's work is that the global community should expect future temperature increases should anthropogenic emissions continue. This conclusion is associated with several catastrophic events that will consequently occur should the international community fail to initiate effective action to slow down global warming.

The IPCC Reports are authentic, having been generated from the participation of renowned scientists in observance of IPCC Guidelines. The information that shall be gathered by this research from the IPCC Reports is important in understanding the climate change phenomenon as well as in exploring adaptation and mitigation options.

International Law and the Environment – Patricia Birnie, Alan Boyle and Catherine Redgwell⁴³

International Law and the Environment is written by three of United Kingdom's most renowned academics. The core context of this book is the environment in a global sense. The book provides a wide and definitive account of international regulation of the environment especially through treaties, conventional norms and developing case law with an expanded coverage of the principal law-making process and multilateral treaty regimes, whilst all the while emphasizing the integratedness of environmental issues.

The material in this book demonstrates the evolution of environmental law into a substantive body of environmental regulation and its core themes have a wide relevance to this research project. To wit, it is an excellent text book whose materials can effectively be utilized in this research.

Particularly important is the guidance not to view any part of international law in isolation from the whole because, not only are rules dynamic, but potentially so is their interaction: Therefore, the application of norms of international law dealing specifically with environmental problems may also take into account other bodies of law dealing inter alia with sustainable development, human rights amongst others⁴⁴.

⁴³ Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Third Edition, Oxford University Press, 2009)

⁴⁴ Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Third Edition, Oxford University Press, 2009), 109

This work provides a penetrative analytical and refined account of international law and the environment that will instruct the objectives of this study and will positively advance data obtained from other literature.

The Greenhouse Effect Climatic Change and Ecosystems – Bolin Warrick and Döös Jäger James⁴⁵

This book is immensely profitable to any research about climate change and global warming. It gives a definite holistic account of the issue comprising complex discussions on the science of climate change and the greenhouse effect as well as an overview of the historical development of carbon dioxide emissions, consequences, responses to the problem, contributing factors, future projections, impacts and effects of increased carbon dioxide emissions into the atmosphere, different facets of the issue especially energy infrastructure and technological factors and, recommendations. The object of this book was well executed and achieved as it bears an elaborate discussion and summary of essential data, written in a very accessible style, which will provide relevant information for the considerations that this research proposes to undertake. That is, it will assist in answering all pertinent questions such as: What is climate change and how will climate change? What is the greenhouse effect? What are the effects of inaction or, of increased carbon dioxide emissions? What recommends are derived from these facts?

⁴⁵ Bolin Warrick and Döös Jäger James, eds., *The Greenhouse Effect Climatic Change and Ecosystems* (Scientific Committee on Problems of the Environment (SCOPE), 1986)

Conquering Carbon – Felicia Jackson⁴⁶

Felicia Jackson describes her book as an attempt to explain what is actually going on and how we might be affected and, how the carbon markets might help us solve the problem. Although describing the advent of global warming as controversial⁴⁷, she argues that conquering carbon and its effects necessitates that we need to balance supply and demand and that sustainability is high on both the political and corporate agenda: Her hypothesis is that; ‘One of the most effective ways of changing people’s behavior in a capitalist economy is in the pricing of goods and services. By including an explicit price of carbon we hope to discourage and curb its emission. At the same time, in a predominantly capitalist world, the use of market forces to effect modular change has a great deal of appeal...’⁴⁸ She proposes thus that carbon markets are the best hope we have to change the framework of our economy to a low carbon basis. In her view, the only realistic option that we have is to adapt our models of production and consumption sufficiently to change the way we use our resources; that, this would then place us on the cusp of a fundamental transformation of how our economy functions. She states further that successfully addressing the issue of climate change and environmental decline will demand a cultural shift in our expectations of consumption as well as our expectation of comfort⁴⁹.

This book is preferred for review because it covers the entire landscape of the topical subjects in carbon trading and the simplicity within which the whole work has been delivered and how the

⁴⁶ Felicia Jackson, *Conquering Carbon: Carbon Emissions, Carbon Markets and the Consumer* (New Holland Publishers (UK) Limited, 2009)

⁴⁷ Felicia Jackson, *Conquering Carbon: Carbon Emissions, Carbon Markets and the Consumer* (New Holland Publishers (UK) Limited, 2009), 11

⁴⁸ Felicia Jackson, *Conquering Carbon: Carbon Emissions, Carbon Markets and the Consumer* (New Holland Publishers (UK) Limited, 2009), 25

⁴⁹ Felicia Jackson, *Conquering Carbon: Carbon Emissions, Carbon Markets and the Consumer* (New Holland Publishers (UK) Limited, 2009), 55, 63

author has managed to summarize the topic will aid a general understanding of the scale of the issues.

*Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases - Heidi Bachram*⁵⁰

Bachram's piece is mainly a critique of the Kyoto agreement as regards its endorsement of the notion of emissions trading. He commences his piece with the quote by the Indian Centre for Science and the Environment that "the rush to make profits out of carbon-fixing engenders another kind of colonialism"; this ideally reveals to the reader an abstract of his perspective from the onset. Bachram's discourse in this piece is that "...progress in "cleaning up" the atmosphere might appear to be going forward, while closer scrutiny reveals that no actual improvement is taking place."⁵¹ His hypothesis is that while many hundreds of million dollars are being invested in setting up emissions trading schemes all over the world, virtually no resources are being channeled into their regulation and that, therefore, opportunities of fraud abound as the poorly regulated emissions markets develop.⁵²

To the question whether the concept of "carbon offsetting" is tenable or desirable, Bachram takes the view that carbon offsetting is a problematic approach: That offset schemes typically do not challenge the destructive consumption ethic, which literally drives the fossil fuel economy.⁵³

⁵⁰ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004)

⁵¹ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 4

⁵² Heidi Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 4

⁵³ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 7

Bachram ultimately concludes with a case for environmental justice which, in his view, is violated by emissions trading. He postulates that the introduction of emissions trading means that precious time and resources are being channeled away from solutions that could successfully resolve climate change in a just way⁵⁴. The hypothesis of this research project settles in with Bachram's perspectives and his piece will be valuable in developing the research hypothesis.

The Carbon Shop: Planting New Problems - Larry Lohmann⁵⁵

The tone of *The Carbon Shop* is basically an exposé of what is referred to in the article as a Universal Carbon Shop: In his hypothesis, the Universal Carbon Shop is an approved international Carbon Shop where rich-country customers who do not wish to cut their carbon dioxide emissions would be able to go into and have a precise length of carbon sink measured out for them which will safely "cover" their emissions⁵⁶. Like any exposé would do, this article 'reveals' and discredits the idea of creation of a market in carbon "offsets" in checking the accumulation of carbon dioxide in the atmosphere on the standpoint that the struggle to create a market in carbon "offsets" disregards common sense and science. Through a critical examination of carbon trading, the article sets out facets of the concerns raised in the debate over carbon trading which are particularly useful for the understanding of the issues within the scope of this research.

⁵⁴ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 13

⁵⁵ Larry Lohmann, *The Carbon Shop: Planting New Problems* (Briefing Paper, Plantation Campaign, World Rainforest Movement, 1999)

⁵⁶ Larry Lohmann, *The Carbon Shop: Planting New Problems* (Briefing Paper, Plantation Campaign, World Rainforest Movement, 1999), 7

Development as Freedom - Amartya Sen⁵⁷

The interlink between development and sustainability is that they are both aimed towards one end being the upgrading of the livelihood of mankind and, both view law as a critical instrument for the actualization of this goal. In Chapter 2⁵⁸ of *Development as a Freedom*, Amartya Sen introduced a novel perspective of measuring development. He viewed development as a process of also expanding human freedom in order to enhance human capabilities and that these human capabilities are extinguished when critical tenets conditions that promote longevity are compromised. This relatively new perspective will play an important role in this project by assisting, especially in the analysis of the data obtained and in expanding the scope of interrogation of the research issue.

Accomplishments and New Directions? - Kevin R. Gray⁵⁹

Gray's article primarily discusses the World Summit on Sustainable Development (WSSD) that took place in Johannesburg from 26 August to September 2002. It underscores the major issues that dominated discussions in the summit and the resolutions that were made at its conclusion. The interesting element that is put in context in this article is the progression of the concept of sustainable development: That sustainable development is no longer defined as an environmental issue but has been enlarged to include broader concerns about poverty, health and human rights. That new concerns such as the rule of law and good governance take sustainable development away from the realm of managing the environment and more towards improving our ability to govern ourselves.

⁵⁷ Amartya Sen, *Development as Freedom* (Oxford University Press, Oxford, 1999)

⁵⁸ Amartya Sen, *Development as Freedom* (Oxford University Press, Oxford, 1999), 35 - 53

⁵⁹ Kevin R. Gray, *Accomplishments and New Directions?* (International and Comparative Law Quarterly, 2003)

Environmental Law - David Hughes et al.⁶⁰

There is a great deal of well researched content in *Environmental Law*. The book considers, broadly, the facets and principles that constitute the basis of environmental law, with evident bias to European law and or UK strategies. The book discusses the history and evolution of environmental laws and principles and, various topical issues under environmental law and management and challenges with an enthusiastic narration of legal values, practices and standards of the European Community.

This volume assembles valuable discussions about the environment in terms of evolution and future of (international) environmental law, ethical basis of environmental law and principles, implementation of environmental law and policy and, attributes of the environmental media involved. The piece however reports mainly on England and Wales, within the context of both the European Community and International Environmental Law. Part I and III of the book will be particularly supportive to this project as they bear informative chapters that incorporate perspectives from Europe and in turn offer a credible point of reference. The perspectives shared in this book are useful for testing whether recommendations on measures and strategies for managing the environment in relation to the atmosphere are practical.

An Inconvenient Truth – Al Gore⁶¹

Al Gore submits on the issue of the effects of global warming legitimately through graphics and pictures that give physical evidence of the devastating state of the environment precipitated by human-induced climate change. Reviewing this piece is quite attractive as it is one of the books

⁶⁰ David Hughes & others, *Environmental Law* (Fourth Edition, Oxford University Press, 2005)

⁶¹ Al Gore, *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It* (Rodale, USA, 2006)

that have so far given such accuracy about the intensity of adverse transformation of the environment. It is undeniably fascinating that Al Gore was able to consolidate, in one book, before and after pictures of various sites compellingly proving the dramatic changes taking place all over the world. Al Gore gracefully projects to the world that human caused climate change has the potential of large scope irreversible disaster and that in the spate of global warming the situation is becoming more and more dangerous indeed making it a planetary emergency. This is the message that Al Gore states as so unmistakably clear that the only reason why world leaders would choose to ignore it is because it is an inconvenient truth.

A great deal of understanding the degree of a catastrophe is either through firsthand account of the situation or through evidence being furnished. Al Gore goes beyond just explaining and clarifying the issue of global warming by translating the discussions to images bearing the effects of global warming for our visual appreciation. This is the component that makes Al Gore's piece resourceful as for any project to achieve its set objectives there must be an implicit comprehension of the subject at hand, which Al Gore offers.

Chapter breakdown

Chapter One

This proposal shall be converted into chapter one which chapter introduces the research question, the statement of the problem, justifications of the study and the objectives intended to be achieved through this study.

Chapter two

This chapter shall highlight the climate change phenomenon in context vis-à-vis sustainable development. Here, climate change science shall be extensively discussed within the scope of its causes, manifestations, potential consequences and the legal and policy framework in place for combating climate change. The chapter shall further analyze the relationship between climate change and sustainable development.

Chapter Three

Chapter three will discuss the legal response to climate change by analyzing the regulatory efforts and considerations to address climate change and achieve sustainable development goals and, the legal framework's progression and future assignments.

Chapter Four

Chapter four shall essentially constitute an evaluation of the carbon emissions trading concept in relation to both the conventional and progressive values of sustainable development with a view to determining the research questions.

Chapter Five

Chapter five will basically cover recommendations to the research issue which shall emanate from all the data that will contribute to the findings of the research and a conclusion of this paper which will be heavily motivated by the theoretical framework underscored.

CHAPTER 2

CLIMATE CHANGE IN CONTEXT, SUSTAINABLE DEVELOPMENT AND THEIR INTERLINKAGES

2.1 Introduction

This study considers the dangers of unabated climate change and the strategies in place to combat the global warming predicament. In this case, it is appropriate to broadly review the field of study before narrowing down to the heart of this research which is the debate on carbon trading. This chapter lays out the scales of anthropogenic climate change and documented evidence of the impacts and concludes by analysing the relationship between climate change and sustainable development.

The change of climate within the purview of the dialogue in this chapter is climate change driven by human activities underscored in the United Nations Framework Convention on Climate Change: Climate change is defined as 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.⁶² The United Nations Framework Convention on Climate Change uses ‘climate change’ for human caused change, and ‘climate variability’ for other causes.

⁶² Article 1.2 of the United Nations Framework Convention on Climate Change (UNFCCC)

2.2 Understanding Climate Change and the Climate Change Phenomenon

Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description of weather in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The relevant quantities are most often surface variables such as temperature, precipitation and wind. In a wider sense, climate is the state, including a statistical description, of the climate system⁶³.

The climate system is a complex, interactive system consisting of the atmosphere, land surface, snow and ice, oceans and other bodies of water, and living things: The atmospheric component of the climate system characterizes climate. There are many feedback mechanisms in the climate system, both positive feedback and negative feedback, that define or determine the complexities of the earth's climate.⁶⁴ Historical evidence suggests that feedback mechanisms may have played a significant role in past climatic fluctuations. The changes in the interactions between climate and other elements such as marine and terrestrial ecosystems have the potential to produce feedbacks to the climate system, which could either amplify or dampen expected rates of global warming and climate change.⁶⁵

⁶³ IPCC, Fourth Assessment Report (AR4), Synthesis Report (SYR) Appendix Glossary

⁶⁴ Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H. L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, 95-97

⁶⁵ Feedback Loops: *The Potential to Amplify Global Warming Beyond Current Predictions* (This article is largely based on "Terrestrial Ecosystem Feedbacks to Global Climate Change" by Daniel A. Lashof and Benjamin J. DeAngelo of the Natural Resources Defense Council and John Harte and Scott R. Saleska of the University of California at Berkeley, submitted for publication to the Annual Review of Energy and the Environment, 1997 edition, volume 22.) available at <http://www.andweb.demon.co.uk/environment/globalwarmingfeedback.html> <accessed on August 24, 2012>

In the main, climate change refers to a change in the state of the climate that can be identified by changes in the mean and or the variability of its properties and that persists for an extended period, typically decades or longer.⁶⁶ The change may be due to natural internal processes or external forcings.⁶⁷ Changes in the atmospheric abundance of greenhouse gases and aerosols, in solar radiation and in land surface properties alter the energy balance of the climate system. These changes are expressed in terms of radiative forcing which is used to compare how a range of human and natural factors drive warming or cooling influences on global climate.⁶⁸

Climate change is a problem which is global in terms of causes and consequences. Still, the uncertainties which also are a key element of most aspects of climate change are large and continue to persist⁶⁹. However, even in the midst of uncertainties, there is only one conclusion that can be drawn from current and evolving scientific evidence: the increasing warming of the earth's atmosphere is caused by man-made emissions. By now there is scientific proof showing that urgent appeals in the past by scientists warning against the catastrophic consequences of rising temperatures were justified.⁷⁰ The evidence that climate change is in large measure anthropogenic and set on a very worrying path grows even stronger. There are a few scientists who still dispute the argument and or evidence, but they are a small minority and their positions become weaker as the evidence accumulates⁷¹.

⁶⁶ IPCC, Fourth Assessment Report (AR4), Synthesis Report (SYR) Appendix Glossary

⁶⁷ External forcings include natural phenomena such as volcanic eruptions and solar variations, as well as human-induced changes in atmospheric composition.

⁶⁸ Climate Change 2007: The Physical Science Basis, Summary for Policy Makers, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

⁶⁹ Shardul Agrawala, *Context and Early Origins of Intergovernmental Panel on Climate Change* (Climatic Change 39: 605-620, Kluwer Publishers 1998), 605

⁷⁰ Economica Verlag, Bonn and Verlag C. F. Muller, Karlsruhe, *Climate Change. A Threat to Global Development: Acting Now to Safeguard the Future* (First Report Submitted by the 12th German Bundestag's Enquete Commission "Protecting the Earth's Atmosphere", 1992), 11

⁷¹ Nicholas Stern, *What is the Economics of Climate Change* (World Economics, Vol. 7 No. 2, April - June 2006), 2

2.3 The Science of Climate Change/The Global Warming Hypothesis

Climate change has a clear scientific base and science has been quite important in the understanding of the issues underlying human-induced climate change. The basis for the science was established in the nineteenth century with the work of French mathematician and physicist Fourier, the English physicist Tyndall and the Swedish chemist Arrhenius.⁷² Scientific work has accelerated and international collaboration has been strong, particularly via the Intergovernmental Panel on Climate Change (IPCC).⁷³

The reason the Earth's surface is warm is the presence of greenhouse gases, which act as a partial blanket for the long-wave radiation coming from the surface. This blanketing is known as the natural greenhouse effect⁷⁴ which result is an insulating blanket round the earth. The gases allow in the energy provided by the sun; this warms the earth. Then in turn, the insulating gases prevent the warmth from escaping. This effect is what makes the planet habitable; without it, most of the earth would be frozen⁷⁵.

Essentially, the presence of these gases makes our planet habitable. The most important greenhouse gases being water vapour and carbon dioxide absorb long-wave solar radiation emitted from the surface of the earth and radiate both back to the surface, producing an

⁷² See Spencer R. Weart, *The Discovery of Global Warming* (Revised and Expanded Edition, Published in the United States of America, 2003,2008), 2-13

⁷³ Nicholas Stern, *What is the Economics of Climate Change* (World Economics, Vol. 7 No. 2, April - June 2006), 2

⁷⁴ Le Treut & others, Historical Overview of Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, 97

⁷⁵ Rosalind Malcom, *A guide to Environmental Law* (London: Sweet and Maxwell, 1994), 9

additional warming, and to space, maintaining the radiating balance at the top of the atmosphere.⁷⁶

The greenhouse effect was initially a natural phenomenon that seeks temperature stability as the climate is an active system and it continues to change over time: The climate system evolves in time under the influence of its own internal dynamics and due to changes in external factors that affect climate (called 'forcings').⁷⁷ Under historical conditions since the Great Ice Age, it has been the greenhouse effect that has maintained a stable Earth climate suitable for life.⁷⁸ However, the concentration of carbon dioxide and other substantial greenhouse gases, principally Chlorofluorocarbons (CFCs) have been added in significant quantities in the atmosphere and this has been attributed and inseparably linked to human activities.⁷⁹

Human activities, primarily the combustion of fossil fuels, intensify the blanketing effect through the release of greenhouse gases which dramatically alters the chemical composition of the global atmosphere by keeping in too much heat, with substantial implications for climate in effect, the term universally known as *global warming*. By common usage, 'global warming' implies a human influence.

⁷⁶ John F. B. Mitchell, *The "Greenhouse" Effect and Climate Change* (Reviews of Geophysics, 27, 1, February 1989), 115 - 116

⁷⁷ Hervé Le Treut & others, *Historical Overview of Climate Change Science, In: Climate Change 2009: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, Cambridge, United Kingdom and New York), 96

⁷⁸ Dr. Brian E Lloyd, AM Climate Change and Global Warming, *The science, issues, attitudes and actions from published material* (Histec Publications, September 2007) 13 available at <http://histec.com/files/Climate%20Change%202007.pdf> <accessed on August 27, 2012>

⁷⁹ John F. B. Mitchell, *The "Greenhouse" Effect and Climate Change* (Reviews of Geophysics, 27, 1, February 1989), 115

Greenhouse gases

The main sources of greenhouse gases, in order of global importance are electricity generation, land-use changes (particularly deforestation), agriculture and transport; the fastest growing sources being transport and electricity.⁸⁰ The common activity in all these sources is energy-related with the highest percentage of energy-related gases produced in these activities being carbon dioxide from fuel consumption.

The climate change dilemma is human influences or activities that affect the climate and of most concern is that we live in a fossil fuel-based economy. Fossil fuels are our primary source of energy and support our entire way of life. Amidst scientific evidence that this critical institution is causing changes to the global climate, we are faced with a technological and social dilemma to end our dependence on fossil fuels.⁸¹ Fossil fuels are sources of energy derived from living organisms. In the combustion of any fossil fuel, carbon is oxidized and carbon dioxide is released to the atmosphere. When burned, different fuels produce varying amounts of carbon dioxide for a given release of thermal energy. Coal is the most carbon dioxide-intensive fossil fuel followed by oil and gas.⁸² The use of fossil fuels is considered unsustainable in the climate change context because these fuels contain certain matter which are in the form of greenhouse gases molecules and that, when burnt, ends up in the atmosphere and significantly change the concentrations of greenhouse gases in the atmosphere.⁸³

⁸⁰ Nicholas Stern, *What is the Economics of Climate Change* (World Economics, Vol. 7 No. 2, April - June 2006), 1

⁸¹ Andrew Hoffman, This essay appeared as "By Invitation- Climate change: Calling the fossil fuel abolitionists" in *Ethical Corporation*: 28 May 08.

⁸² Bolin Warrick and Döös Jäger James, eds., *The Greenhouse Effect Climatic Change and Ecosystems* (Scientific Committee on Problems of the Environment (SCOPE), 1986), 40-41

⁸³ Hans Rosling's *200 Countries, 200 Years, 4 Minutes*, The Joy of Statistics.

In climate change terms, carbon dioxide (CO₂) is considered the most important greenhouse gas, as it is the most common. In common parlance, 'carbon' is the term used to describe the group of greenhouse gases (GHGs), which include methane (CH₄), nitrous oxide (N₂O), halogenated fluorocarbons (HCFCs), ozone (O₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs), and are described in terms of their equivalent to carbon dioxide - CO_{2e}.⁸⁴

Since the beginning of industrialization, rapid increases have been observed mainly in the abundance of trace gases – particularly carbon dioxide, methane and nitrous oxide whose atmospheric concentrations have risen sharply since industrial revolution.⁸⁵ The scientific consensus is that avoidance of large and dangerous changes in the climate system requires reduction in the emission of GHGs at whatever cost to the world economy.⁸⁶

2.4 Effects of Climate Change

The earth is altering in the natural systems significantly due to the direct and profound effects of elevated CO₂ concentrations. There has been widespread and significant changes in the global climate over the past several decades. The rise in average surface temperatures is reflected in warming of the atmosphere and oceans, and increasing melting of ice and snow.⁸⁷ The risk of

⁸⁴ Felicia Jackson, *Conquering Carbon: Carbon Emissions, Carbon Markets and the Consumer* (New Holland Publishers (UK) Limited, 2009), 17

⁸⁵ Economica Verlag, Bonn and Verlag C. F. Muller, Karlsruhe, *Climate Change. A Threat to Global Development: Acting Now to Safeguard the Future* (First Report Submitted by the 12th German Bundestag's Enquete Commission "Protecting the Earth's Atmosphere", 1992), 11

⁸⁶ Dr. Brian E Lloyd, *Climate Change and Global Warming The Science, issues, attitudes and actions, from published material* (Histec Publications, AM, September 2007), 1

⁸⁷ Dr. Brian E Lloyd, *Climate Change and Global Warming The Science, issues, attitudes and actions, from published material* (Histec Publications, AM, September 2007), 2

climate change however depends on the physical and socioeconomic implications of a changing climate.⁸⁸ Climate change might have several effects:

(a) **More extreme weather**

Extreme weather events have become more common in recent years, and this trend will continue in the future. Climate change has a significant effect on local weather patterns and, in turn, these changes can have serious impacts on human societies and the natural world. Some of the indications of the extreme weather are:

Stronger Hurricanes: Scientists have confirmed that hurricanes are becoming more intense. Since hurricanes draw their strength from the heat in ocean surface waters, hurricanes have the potential to become more powerful as the water warms. A recent peer-reviewed assessment of the link between hurricanes and climate change concluded that “higher resolution modeling studies typically project substantial increases in the frequency of the most intense hurricanes. This trend toward stronger hurricanes is noteworthy because of the vulnerability of coastal communities to these extreme events.”⁸⁹

Hotter, Wetter Extremes: Average temperatures are rising, but extreme temperatures are rising even more: in recent decades, hot days and nights have grown more frequent and cold days and nights less frequent. There have been more frequent heat waves and hotter high temperature extremes. More rain is falling in extreme events now compared to 50 years ago, resulting in more

⁸⁸ Jason Shgren and Michael Toman, *Climate Change Policy*, (Discussion Paper 00-22, Resources for the Future May 2000), 7

⁸⁹CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 4-5 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

frequent flash flooding. In 2003, Europe experienced a heat-wave so hot and so long that scientists estimated that such an extreme event had not occurred there in at least 500 years. That heat wave caused more than 30,000 excess deaths throughout southern and central Europe. A similarly historic heat wave struck Russia and other parts of Eastern Europe in the summer of 2010, killing thousands of people and destroying a large fraction of Russia's wheat crop.⁹⁰

(b) **Effects on Water**

It is expected that climate change will alter the quantity and quality of available fresh water and increase the frequency and duration of floods, droughts, and heavy precipitation events. Although climate change will affect different regions in different ways, it is generally expected that dry regions of the world will get drier and wet regions will get wetter. Some of the adverse effects of climate change regarding water are:

More Floods and Droughts: A number of factors are expected to contribute to more frequent floods. More frequent heavy rain events will result in more flooding. Coastal regions will also be at risk from sea level rise and increased storm intensity. While some regions will suffer from having too much water, others will suffer from having too little. Diminished water resources are expected in semi-arid regions where water shortages often already pose challenges. Areas affected by drought are also expected to increase. As the atmosphere becomes warmer, it can hold more water, increasing the length of time between rain events and the amount of rainfall in an individual event. As a result, areas where the average annual rainfall increases may also experience more frequent and longer droughts.

⁹⁰ CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 5 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

According to the available data, a significant increase in the intensity precipitation of events occurred over the second half of the 20th century. In December 1999 for instance, Venezuela saw its highest monthly rainfall in 100 years, with massive landslides and flooding that killed approximately 30,000 people. On two days in the city of Maiquetia, rains fell with an intensity normally just once in 1,000 years.⁹¹

Altered Availability and Quality: Warmer temperatures threaten the water supplies of hundreds of millions of people who depend on water from the seasonal melting of mountain ice and snow in several ways: (i) by increasing the amount of seasonal melt from glaciers and snowpack, (ii) by increasing the amount of precipitation that falls as rain instead of snow and (iii) by altering the timing of snowmelt. In the near term, the melting of mountain ice and snow may cause flooding; in the long term, the loss of these frozen water reserves will significantly reduce the water available for humans, agriculture, and energy production. Earlier snowmelt brings other impacts as well: Western states have experienced a six-fold increase in the amount of land burned by wildfires over the past three decades because snowmelt has occurred earlier and summers are longer and drier.

Climate change will also affect the quality of drinking water and impact public health. As sea level rises, saltwater will infiltrate coastal freshwater resources. Flooding and heavy rainfall may overwhelm local water infrastructure and increase the level of sediment and contaminants in the water supply. Increased rainfall could also wash more agricultural

⁹¹ See the Executive Summary by Dr. James Wang and Dr. Bill Chameides in *Global Warming's Increasingly Visible Impacts* (Environmental Defense, 2005), v

fertilizer and municipal sewage into coastal waters, creating more low-oxygen “dead zones.”⁹²

(c) Effects on Human Health

Climate change is expected to affect human health directly from heat waves, floods, and storms and indirectly by increasing smog and ozone in cities, contributing to the spread of infectious diseases, and reducing the availability and quality of food and water.⁹³ Medical groups are among those urging for action to combat climate change. The American Medical Association, for instance, promotes programs that prevent or reduce the human and environmental health impacts from global climate change and environmental degradation. The Association determined that the threat to climate change on health is extremely serious. Medical groups have attributed medical conditions such as allergies and cholera outbreaks to climate change.⁹⁴

(d) Threats to Ecosystems

Climate change is threatening ecosystems around the world, affecting plants and animals on land, in oceans, and in freshwater lakes and rivers. Some ecosystems are especially at risk, including the arctic and sub-arctic because they are sensitive to temperature and likely to experience the greatest amount of warming; coral reefs because they are sensitive to high water temperatures and ocean acidity, both of which are rising with atmospheric carbon

⁹²CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 5-6 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

⁹³CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 6 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

⁹⁴Susan J. Landers, *Health risks heating up? Global warming could affect patient symptoms*, available at www.ama-assn.org/amednews/2008/04/21/hlsa0421.htm <accessed on August 28, 2012>

dioxide levels; and tropical rainforests because they are sensitive to small changes in temperature and precipitation.

Clear evidence exists that the recent warming trend is already affecting ecosystems. Entire ecosystems are shifting toward the poles and to higher altitudes. This poses unique challenges to species that already live at the poles, like polar bears, as well as mountain-dwelling species already living at high altitudes. Different species are responding at different rates and in different ways, which has caused some species to get out of sync with their food sources.⁹⁵ Kenya reported in her National Climate Change Strategy that the impact of climate change on Kenya's marine ecosystems include the likely submergence of approximately 17% of Mombasa or 4,600 hectares of land area with a sea level rise of only 0.3m.⁹⁶

(e) Shrinking Arctic Sea Ice

Arctic sea ice has seen dramatic declines in recent years. The importance of sea ice decline comes from the role it plays in both the climate system and large Arctic ecosystems.⁹⁷ Snow and ice reflect sunlight very effectively, while open water tends to absorb it. As sea ice melts, the earth's surface will reflect less light and absorb more. Consequently, the disappearance of Arctic ice will actually intensify climate change.⁹⁸ Ground-based observations show that there is very likely to have been a reduction of about two weeks in the annual duration of lake acid

⁹⁵CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 6 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

⁹⁶ National Climate Change Response Strategy (Government of Kenya, April 2010), 32

⁹⁷ Marine animals that depend on the sea ice include seals, polar bears, and fish.

⁹⁸CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 6-7 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

river ice cover in the mid- and high latitudes of the Northern Hemisphere over the 20th Century.⁹⁹

(f) Rising Sea Level

Among the most serious and potentially catastrophic effects of climate change is sea level rise, which is caused by a combination of the “thermal expansion” of ocean water as it warms and the melting of land-based ice. Sea levels have risen between four and eight inches in the past 100 years. Current projections suggest that sea levels could continue to rise between 4 inches and 36 inches over the past 100 years. It is estimated that “a 36-inch increase in sea levels would swamp *every* city on the East Coast of United States, from Miami to Boston”.¹⁰⁰ To date, most climate-related sea level rise can be attributed to thermal expansion. Going forward, however, the largest potential source of sea level rise comes from melting land-based ice, which adds water to the oceans. By the end of the century, if nothing is done to rein in greenhouse gas emissions, global sea level could be three to six feet higher than it is today, depending on how much land-based ice melts. Even small amounts of sea level rise will have severe impacts in many low-lying coastal communities throughout the world, especially when storm surges are added on top of sea level rise. Loss of Glaciers, Ice Sheets, and Snow Pack are the main contributors of sea level rise.¹⁰¹ Raising seas threaten to inundate low-lying areas and islands, threaten dense coastal populations, erode shorelines, damage

⁹⁹ Climate Change 2001: The Scientific Basis (contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press), 4

¹⁰⁰ The Nature Conservancy, Climate Change Impacts *Rising Seas, Higher Sea Levels* (February 28, 2011) available at www.nature.org/ourinitiatives/urgentissues/climatechange/threats/impacts/rising-seas.xml <accessed on August 28, 2011>

¹⁰¹ CLIMATE CHANGE 101, SCIENCE AND IMPACTS (Pew Centre on Global Climate Change and the Pew Centre on the States, January 2011) 7 also available at http://www.c2es.org/docUploads/101_Science_Impacts.pdf

property and destroy ecosystems such as mangroves and wetlands that protect coasts against storms.¹⁰²

The weight of evidence of anthropogenic climate change urges the need for strong and urgent action on climate change. The case for immediate action is driven by the science – by the flow-stock mechanisms that determine atmospheric concentrations of greenhouse gases. Unabated climate change poses serious environmental, economic and social risks, and the ratchet effect of the flow-stock process, particularly since carbon dioxide has such a long residence time in the atmosphere.¹⁰³

2.5 The Relationship between Climate Change and Sustainable Development

*The CO₂ problem, or rather the problem of a possibly changing climate due to emissions of greenhouse gases into the atmosphere, cannot be considered in isolation. It is one of the many environmental problems that must be addressed but in long-term perspective probably the most important one.*¹⁰⁴

Both climate change and sustainable development are terms that came into prominence in the late 1980s. In the case of climate change, the report of the World Commission on Environment and Development (WCED) of 1987 brought this issue to the attention of policy-makers in a way

¹⁰² The Nature Conservancy, Climate Change Impacts *Rising Seas, Higher Sea Levels* (February 28, 2011) available at www.nature.org/ourinitiatives/urgentissues/climatechange/threats/impacts/rising-seas.xml <accessed on August 28, 2011>

¹⁰³ Simon Dietz, Chris Hope, Nicholas Stern & Dimitri Zenghelis, *Reflections on the Stern Review* (World Economics, Vol. 8 No. 1, January – March 2007), 124

¹⁰⁴ Bolin Warrick and Döös Jäger James, eds., *The Greenhouse Effect Climatic Change and Ecosystems* (Scientific Committee on Problems of the Environment (SCOPE), 1986), 1-2

that was hard to ignore, and that sparked a whole series of subsequent scientific and political activities. In the case of sustainable development, the concept was brought to popular attention by the activities of the World Commission on Environment and Development, and the publication of their report, *Our Common Future*, in 1987 also known as the Brundtland report.¹⁰⁵ And certainly, climate change is one of the major problems of sustainable development cited in the Brundtland report and in other sustainable development writings¹⁰⁶ such as *Earth Time* (David Suzuki, Stoddart, 1998); *Sustainable Development Critical Issues* (OECD Publishing, 28 Jun 2001); *Limits to Growth: the 30 year up-date* (Donella Meadows, Dennis Meadows, Jorgen Randers, Chelsea Green Publishing, 2004). For a long time environmental protection and poverty alleviation were seen as separate and even contradictory goals. WCED and the Brundtland Report put sustainable development in the centre of the environment/development and North/South discourses.

Sustainable development constitutes 3 interdependent pillars being: economic development, social development and environmental protection which are brought together under one societal goal of sustainability. The 3 strands of sustainable development identified are mutually reinforcing and tie together the concern of the carrying capacity of natural systems with the social challenges faced by humanity.

The risk in global warming potentials is the survival of our civilization and habitability of the Earth: Climate change is one of the all-encompassing global environmental changes likely to

¹⁰⁵ World Commission on Environment and Development, *Our Common Future* (Oxford University Press, New York, 1987)

¹⁰⁶ Stewart Cohen, David Demeritt, John Robinson, Dale Rothman, *Climate Change and Sustainable Development: Towards Dialogue* (Global Environmental Change, Vol. 8, No. 4, pp 341-371, 1988, Elsevier Science Ltd), 343

have deleterious effects on natural and human systems, economies and infrastructure.¹⁰⁷ It is likely to undermine the sustainability of livelihoods as well as development.¹⁰⁸ There are various cross-cutting issues that influence the approach to evolution of climate policy options and recommended course of action. As seen earlier in this chapter, these cross-cutting issues concern health, crop failure, unemployment, destabilized food security, competition for scarce resources and increase in social inequity.¹⁰⁹ The climate change issue is, in its essence, a development issue. Any successful solution to the climate problem will have to come from within the development process; it will need to begin rather than end.¹¹⁰ Successfully limiting global climate change to “safe” levels in the long-term therefore is likely to require connecting climate change policies to sustainable development strategies in both developing and industrialized countries.¹¹¹

Unsustainable human activities lead to natural resources being used up faster than they can be replenished. Inherently, sustainability requires that human activity only uses nature’s resources at a rate which they can be replenished naturally. If the natural environment undergoes significant degradation so too does the potential to improve people’s lives - both in this and subsequent generations.¹¹²

¹⁰⁷ See *Adaptation to Climate Change in the context of Sustainable Development* (Background paper) 1 available at www.teriin.org/events/docs/adapt.pdf <accessed on August 27, 2012>

¹⁰⁸ Tariq Banuri and Hans Opschoor, *Climate Change and Sustainable Development* (Economic & Social Affairs, DESA Working Paper No. 56, October 2007), 2

¹⁰⁹ Noreen Beg and others, *Linkages between Climate Change and Sustainable Development* (Climate Policy 2 (2002) 129-144, Elsevier Science Ltd) 131, 133

¹¹⁰ Tariq Banuri and Hans Opschoor, *Climate Change and Sustainable Development* (October 2007, DESA Working Paper No. 56), 9

¹¹¹ Noreen Beg and others, *Linkages between Climate Change and Sustainable Development* (Climate Policy 2 (2002) 129-144, Elsevier Science Ltd), 130

¹¹² United Nations Development Programme, *Case Studies of Sustainable Development in Practice, Triple Wins for Sustainable Development* (June, 2012), 2

The interest and need to protect and preserve the environment therefore led to the need for desirable limits and standards to be established for sustainable and environmental friendly practices and replacement of unsustainable practices with more appropriate mechanisms thereby linking climate change objectives with the implementation of sustainable development.¹¹³

The *environmental* interpretation of sustainability focuses on the overall viability and health of ecological systems¹¹⁴ – defined in terms of a comprehensive, multiscale, dynamic, hierarchical measure of resilience, vigor and organization. Natural resource degradation, pollution and loss of biodiversity are detrimental because they increase vulnerability, undermine system health, and reduce resilience. The notion of a "safe threshold" and the related concept of "carrying capacity" are important, for example, to avoid catastrophic ecosystem collapse.¹¹⁵ Carrying capacity implies that an ecological system can only carry a critical limit; that going beyond this limit results in underuse of resources and eventual collapse of the population. The hypothesis underlies the notion that the 3 main dimensions in society: economic, social and environmental, are complex, dynamic, self-organising and evolving in their own rights, making the coupled system one of tremendous complexity. For that reason, to be sustainable, each of those systems has to maintain its capability to survive and evolve, while the interlinkages of the subsystems must enable a permanent co-evolution.¹¹⁶

¹¹³ See the Preamble to the United Nations Framework Convention on Climate Change

¹¹⁴ Also see John Morelli, *Environmental Sustainability: A Definition for Environmental Professionals* (Journal of Environmental Sustainability). At page 23 environmental sustainability is defined as limited to, and in fact, becomes a subset of ecological sustainability.

¹¹⁵ Mohan Munasinghe, *Analysing The Nexus of Sustainable Development and Climate Change* (OECD, 2003), 9

¹¹⁶ Joachim H. Spangenberg, *Economic sustainability of the economy: concepts and indicators* (Int. J. Sustainable Development, Vol. 8, Nos. ½, 2005), 47

The idea of sustainable development on the other hand is that *development* should help to improve, as well as to avoid unnecessary damage to the environment, whether in global, regional or local terms. A number of definitions of sustainable development have been produced. The following two well capture the idea: According to the Bruntland Commission Report *Our Common Future*, earlier mentioned, sustainable development is the ‘meeting the needs of the present without compromising the ability of future generations to meet their own needs’. A more detailed definition is contained in the White Paper *This Common Inheritance*, published by the United Kingdom Department of the Environment in 1990:¹¹⁷ ‘sustainable development means living on the Earth’s income rather than eroding its capital’ and ‘keeping the consumption of renewable natural resources within the limits of their replenishment’.¹¹⁸

Based on this conceptualization of sustainability, the extended perspective is that the essence of sustainable development lies precisely at the interfaces and trade-offs between the often conflicting objectives of economic and social development, and environmental protection.¹¹⁹ The reality of this conflict was clearly manifest in the United Nations Conference on Sustainable Development (UNCSD or Rio+20) held in Rio de Janeiro, Brazil, from 13-22 June 2012. The talks at the Conference resulted in a political agreement called *The Future We Want*. It is reported however that the decision by Member States to approve the Outcome Document was not easily achieved.¹²⁰ The UNCSD was charged with securing renewed political commitment for sustainable development, assessing progress and implementation gaps in meeting previously

¹¹⁷ This Common Inheritance: a summary of the White Paper on Environment (Volume 1200 of Cm (series) Great Britain Department of Environment, 1990)

¹¹⁸ John Theodore Houghton, *Global Warming: The Complete Briefing* (Cambridge University Press, 2004, Third Edition), 226

¹¹⁹ Markku Lehtonen, The Environmental-social interface of sustainable development: capabilities, social capital, institutions (*Ecological Economics* 49 (2004) 199-214), 200

¹²⁰ Outreach, RIO+20 United Nations Conference on Sustainable Development (Published by Stakeholder Forum, June 21, 2012), 1

agreed commitments, and addressing new and emerging challenges. UNCSD reports indicate that while many had held out hope that Rio+20 would launch new processes and significantly alter the present international framework, the UNCSD Outcome Document was much more modest due to strained compromises. Some criticized the document for “kicking the can” down the road and missing an opportunity to boldly redirect sustainable development actions.¹²¹

WCED identified the need for long term solutions and the integration of environmental and development objectives. As mentioned earlier in this chapter, it is this strategy that first used the terminology ‘development that is sustainable’ to mean the kind of development that provides real improvements in the quality of human life and at the same time conserves the validity and diversity of the earth. The target is for the 3 strands of sustainable development not to have one dimensional goals but, to devotedly apply the concept of sustainable development to the interlinkages within them in order for the vision of sustainable development to materialize.

The hypotheses of environmental interpretation of sustainability and that of development above illuminate the dual relationship between climate change and sustainable development: On the one hand, climate change influences key natural and human living conditions and thereby also the basis for social and economic development, while on the other hand, society’s priorities on sustainable development influence both the greenhouse gas emissions that are causing climate change and the vulnerability.¹²² Human-induced climate change poses a palpable threat to the achievement of Millennium Development Goals (MDGs), related national poverty alleviation

¹²¹ Earth Negotiations Bulletin, *Summary of the United Nations Conference on Sustainable Development: 13-22 June 2-12* (Published by International Institute for Sustainable Development (IISD) Vol. 27 No. 51, June 25, 2012) 2

¹²²B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), *Climate Change 2007, Mitigation of Climate Change*, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007 (Cambridge University Press, Cambridge, United Kingdom and New York, USA)

and sustainable development. It is expected to have deleterious effects on agricultural and hydrological systems, forests, fisheries, and human health; economies and infrastructure and result in increases in the magnitude of extreme events. Human health and well being which are dependent on the sustained resilience and robustness of ecosystems, hence, get debilitated, worsening existing conditions of poverty, malnutritions and illness, and pressure on natural resources.¹²³

Due to this interaction between climate change and sustainable development, sustainable development and climate change response strategies should be mutually reinforcing. This amounts to viewing sustainable development through a climate change lens. It leads to a strong focus on integrating sustainable development goals and consequences into the climate policy framework.¹²⁴

Viewing climate change in the context of sustainable development has a number of implications. Such an approach means that poverty eradication and socio-economic development are necessary for combating climate change. Climate change impacts on development prospects have also been described in an interagency project on poverty and climate change as ‘Climate Change will compound existing poverty. Its adverse impacts will be most striking in the developing nations because of their dependence on natural resources, and their limited capacity to adapt to a

¹²³ TERI, *Adaptation to Climate Change in the context of Sustainable Development* (Background Paper, teri), 18
Also available at <http://www.teriin.org/events/docs/adapt.pdf>

¹²⁴ IPCC Fourth Assessment Report: Climate Change 2007, Working Group III available at www.ipcc.ch/publications_and_data/ar4/wg3/en/ch12s12-1-1.html <accessed on August 27, 2012>

changing climate. Within these countries, the poorest, who have the least resources and the least capacity to adapt, are the most vulnerable'.¹²⁵

Therefore, the idea of sustainable development has expanded to the freedoms that people ought to enjoy: now it is discussed under the purview of – the human right to have an environment adequate to support life and well being¹²⁶. The common resolve adopted at the World Summit on Sustainable Development¹²⁷ was that peace, security, stability and respect for human rights and fundamental freedoms are essential for achieving sustainable development. This seems to be an evolution of the concept in line with hypotheses that have developed over the concept of development: Amartya Sen constructed a persuasive analysis of development in his piece *Development as a Freedom: The end and means of Development*¹²⁸. Here, Sen urged the discourse that development is the process of expanding human freedoms and individual capabilities such that, the assessment of development must be informed by this consideration. The instrumental role of freedom would thereby concern the way different kinds of rights, opportunities, and entitlements contribute to the expansion of human freedom in general and thus promoting development and enhance human capabilities.¹²⁹

Considering Sen's analysis in the contrary, therefore, it would not amount to development if the concepts and techniques adopted do not facilitate eradication of any condition/situation that that

¹²⁵ B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), *Climate Change 2007, Mitigation of Climate Change*, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007 (Cambridge University Press, Cambridge, United Kingdom and New York, USA)

¹²⁶ David Hughes & others, *Environmental Law* (Fourth Edition, Oxford University Press, 2005), 22

¹²⁷ Johannesburg, 26 August to 4 September 2002.

¹²⁸ Amartya Sen, *Development as a Freedom: The end and means of Development*, (Oxford University Press, Oxford, 1999)

¹²⁹ Amartya Sen, *Development as a Freedom: The end and means of Development*, (Oxford University Press, Oxford, 1999), 38-43

does not enhance and or degenerates human capabilities. The purpose of development is to offer people more options such as long life. This is the central message of the Human Development Report: that while growth in national production (GDP) is absolutely necessary to meet all essential human objectives, what is important is to study how growth translates or fails to translate into human development in various societies.¹³⁰

Thus climate change impacts are part of the larger question of how complex social, economic, and environmental sub-systems interact and shape prospects for sustainable development. There are multiple links. Economic development affects ecosystem balance and, in turn, is affected by the state of the ecosystem. Poverty can be both a result and a cause of environmental degradation. Material- and energy-intensive life styles and continued high levels of consumption supported by non-renewable resources, as well as rapid population growth are therefore not likely to be consistent with sustainable development paths. Similarly, extreme socio-economic inequality within communities and between nations may undermine the social cohesion that would promote sustainability and make policy responses more effective. At the same time, socio-economic and technology policy decisions made for non-climate-related reasons have significant implications for climate policy and climate change impacts, as well as for other environmental issues. In addition, critical impact thresholds, and vulnerability to climate change impacts, are directly connected to environmental, social and economic conditions, and institutional capacity.¹³¹

¹³⁰ See Forward by William H. Draper III in Human Development Report 1990, United Development Programme (Oxford University Press)

¹³¹ Economica Verlag, Bonn and Verlag C. F. Muller, Karlsruhe, *Climate Change. A Threat to Global Development: Acting Now to Safeguard the Future* (First Report Submitted by the 12th German Bundestag's Enquete Commission "Protecting the Earth's Atmosphere", 1992), 15

2.6 Conclusion

The nature and extent of the effect of climate change on the 3 strands of sustainable development will ultimately have an important role in determining whether or not sustainable development goals can be achieved. This chapter has covered climate change, climate change impacts and the consequences of climate change impacts. It has also discussed the linkages for sustainable development components that connect sustainable development activities and climate change. In the next chapter we shall look at the regulatory efforts and considerations to address climate change and to accomplish sustainable development goals.

CHAPTER 3

THE INTERNATIONAL CLIMATE CHANGE LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Introduction

The preceding discussions have appraised the climate change phenomenon and the science of global warming. The nexus between climate change and sustainable development has also been hypothesized. This chapter provides a broad overview of the legal system and key institutions that directly address the global warming threat. The chapter presents a review of the most significant features of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol focusing particularly to gain a comprehensive understanding of the measures introduced for climate change mitigation. It also looks at key substantive legal principles that characterize response to the climate change threat in order to express the customary international law that has been developed by States.

3.2 Evolution of the climate change regime, the principal international agreements and the principles that apply to the greenhouse threat

The development of the climate change regime until the conclusion of the Kyoto Protocol in 1997 can usefully be divided into five periods: the foundational period, during which scientific concern about global warming developed; the agenda-setting phase, from 1985 to 1988, when climate change was transformed from a scientific into a policy issue; a pre-negotiation period from 1988 to 1990, when governments became heavily involved in the process; the formal

intergovernmental negotiations phase, leading to the adoption of the Framework Convention on Climate Change in May 1992; and a post-agreement phase focusing on the elaboration and implementation of the Framework Convention on Climate Change and the initiation of negotiations on additional commitments, leading to the adoption of the Kyoto Protocol in December 1997.¹³²

However, the history behind the climate change regime dates back to the key events that led to the formulation of the principle of sustainable development. One of the Key publications on the ability of the Earth to sustain its population is 'The Tragedy of the Commons' of 1968 written by Garret Hardins,¹³³ which considered the problem of excessive use of natural resources. This article highlighted the need for a moral stance to maintain public resources and reported that technological advances were no longer enough. The hypothesis used in this text is a pasture in which farmers can graze their cattle: each individual seeks to maximize their individual utility while at the same time not paying the full cost for it. The tragedy of the commons reappears in problems of pollution which is a population problem. Here it is not a question of taking something out of the commons, but of putting something in - noxious and dangerous fumes into the air.¹³⁴ These widespread public concerns raised in the 1960s led to one of the key events in environmental monitor which is the 1972 United Nations Conference on the Human Environment (UNCHE) in Stockholm. The Conference held from June 5 to 16, 1972 adopted a basic Declaration and a detailed resolution on institutional and financial arrangements and also

¹³² Daniel Bodansky, *The History of the Global Climate Change Regime*, 23-24, available at <http://graduateinstitute.ch/webdav/site/iheid/shared/iheid/800/luterbacher/luterbacher%20chapter%202%20102.pdf> <accessed on August 7, 2012>

¹³³ Garrett Hardin, *The Tragedy of the Commons* (SCIENCE, Vol. 162, 13th December, 1968) 1243 – 1248 also available at <http://www.sciencemag.org/content/162/3859/1243.full.pdf>

¹³⁴ See <http://dieoff.org/page95.htm> <accessed on September 11, 2012>

109 recommendations comprising an ambitious action plan. The Declaration contains a set of “common principles to aspire and guide the peoples of the world in the preservation and enhancement of the human environment.”¹³⁵

Anthropogenic climate change has a number of wide-ranging impacts on the natural environment and on society with various human activities and sectors of society contributing to increased concentrations of greenhouse gases in the atmosphere. Different aspects of the problem are covered by a range of international legal instruments, covering topics such as biological diversity, desertification, ozone depletion, oceans and seas, energy, and trade and investment. Notwithstanding these diverse instruments, the main body of international law on climate change is to be found in the United Nations Framework on Climate Change (UNFCCC) and its Kyoto Protocol, as well as decisions taken by the Conference of the Parties (COP) to the UNFCCC and the Conference of the Parties (COP/MOP) to the Protocol.¹³⁶

3.2.1 The framework agreement on climate change

As already mentioned, the United Nations Framework Convention on Climate Change is the legal basis of international action on anthropogenic climate change. It is a “Rio Convention”, one of three adopted at the “Rio Earth Summit” in 1992: Its sister Rio Conventions are the UN Convention on Biological Diversity and the Convention to Combat Desertification. The three are intrinsically linked and it is in this context that a Joint Liaison Group was set up to boost cooperation among the three Conventions, with the ultimate aim of developing synergies in their

¹³⁵ Louis B. Sohn, *The Stockholm Declaration on the Human Environment* (The Harvard International Law Journal, Vol. 14, No. 3, Summer 1973) 423

¹³⁶ Harro Van Asselt, Francesco Sindico and Michael A. Mehling, *Global Climate Change and Fragmentation of International Law* (Baldy Center for Law and Social Policy, Vol. 30, No. 4, October 2008) 423-424

activities on issues of mutual concern. It now also incorporates the Ramsar Convention on Wetlands.¹³⁷

The principal goals of the Framework Convention on Climate Change are to protect the atmosphere and to promote the aspects of sustainable economic development.¹³⁸ The framework agreement on climate change was signed by 154 nations¹³⁹ during the United Nations Conference on Environment and Development. The Convention came into effect on March 21, 1994 when more than 50 nations ratified the agreement. The carefully chosen but often contorted language in the Convention was the end result of more than two years of intense international negotiations and debate between the United States (U.S.) and European Community (E.C.) countries on approaches and commitments toward stabilizing greenhouse gases, and between developed and developing nations.¹⁴⁰ The Convention represents a delicate balance of many interests. It embodies a comprehensive approach embracing all greenhouse gases, their sources and sinks, and promotes action to modify net emissions trends of all gases not controlled by the 1987 Montreal Protocol on substances that Deplete the Ozone Layer.¹⁴¹

The core of the Convention's goal is set out in Article 2 – the 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic

¹³⁷ See *First steps to a safer future: Introducing The United Nations Framework Convention on Climate Change* available at http://unfccc.int/essential_background/convention/items/6036.php <accessed on September 11, 2012>

¹³⁸ Irving M. Mintzer and J. A. Leonard ed., *Negotiating Climate Change The Inside Story of the Rio Convention* (Cambridge University Press and Stockholm Environment Institute, 1994), 4

¹³⁹ There are now 196 parties to the Convention (see http://unfccc.int/essential_background/items/6031.php)

¹⁴⁰ Alan D. Hecht and Dennis Tirpak, *Climate Change, Framework Agreement on Climate Change: a scientific and policy history* (Earth and Environmental Science, Vol. 29, No.4, 1995) 371-402

¹⁴¹ S. G. Cornford, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNA Oxford, 2nd March 1999) available at http://una.oxfordcity.org/index.php?option=com_content&task=view&id=33 <accessed on September 12, 2012>

interference with climate system'.¹⁴² The language and objective is framed in terms of stabilizing concentrations, not emissions, of greenhouse gases. According to the First Scientific Assessment Report of the IPCC, stabilizing atmospheric concentrations of greenhouse gases will require a reduction in the rates of emission of the long-lived gases by 60 to 80 percent relative to their 1990 levels. Thus, Article 2 sets the Parties on a path to future emission reductions that extends far beyond the commitments agreed to in the present treaty.¹⁴³

The Convention's goal embraces one of the dominant discourses of international environmental law – the 'Precautionary Principle'. The precautionary principle was a key clause in the Rio Conference where it was agreed that 'where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'.¹⁴⁴ The precautionary principle is articulated in Article 3.3 of the Convention that – the Parties should take precautionary measures to anticipate, prevent or minimize the cause of climate change and mitigate its adverse effects and that to achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks, reservoirs of greenhouse gases and adaptation, and comprise all economic sectors.

The challenge of Article 2 and the precautionary principle is the undefined and subjective use of terms such as 'dangerous' and 'serious' and the attribution problems posed by the focus on

¹⁴² Diana M. Liverman, Conventions on Climate Change: *constructions of danger and the dispossession of the atmosphere* (Journal of Historical Geography 35(2009) 279-296), 284

¹⁴³ Irving M. Mintzer and J. A. Leonard ed., *Negotiating Climate Change The Inside Story of the Rio Convention* (Cambridge University Press and Stockholm Environment Institute, 1994), 17-18

¹⁴⁴ Diana M. Liverman, Conventions on Climate Change: *constructions of danger and the dispossession of the atmosphere* (Journal of Historical Geography 35(2009) 279-296), 284

'anthropogenic interference'. Dangerous anthropogenic interference has generally been measured in terms of emissions, concentrations or temperature changes that can be linked to impacts of concern.¹⁴⁵ However, other analyses commend the Framework Convention on Climate Change for adopting the precautionary approach as this has enabled the Convention deal with the complex uncertainties of the climate change problem.¹⁴⁶

The Framework Convention on Climate Change also specifies several other 'principles in Article 3 to guide the pursuit of the ultimate objective of the Convention. They include: equity, common but differentiated responsibilities and right to sustainable development. Another element underpinning the Framework Convention on Climate Change is the polluter pays principle. This means that the party responsible for producing pollution is responsible for paying for the damage done to the natural environment.¹⁴⁷

Another key element of the Framework Convention on Climate Change is that parties should act to protect the climate system "on the basis of equality and in accordance with their common but differentiated responsibilities and respective capabilities." The principle of 'common but differentiated responsibility' includes two fundamental elements. The first is the common responsibility of Parties to protect the environment, or parts of it, at the national, regional and global levels. The second is the need to take into account the different circumstances, particularly each Party's contribution to the problem and its ability to prevent, reduce and control the

¹⁴⁵ Diana M. Liverman, Conventions on Climate Change: *constructions of danger and the dispossession of the atmosphere* (Journal of Historical Geography 35(2009) 279-296), 284

¹⁴⁶ Joyeeta Gupta, *The Climate change Convention and Developing Countries: from conflict to consensus* (Kluwer Academic Publishers, 1997), 16

¹⁴⁷ See CLIMATE LEADERS, *What is the UNFCCC & the COP?* Available at <http://www.climate-leaders.org/climate-change-resources/india-at-cop-15/unfccc-cop> <accessed on September 13, 2012>

threat.¹⁴⁸The 'common but differentiated' responsibilities approach addressed the North/South dimension that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries and 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.¹⁴⁹

There is also importance accorded by the Framework Convention on Climate Change to sustainable development. Article 3.4 of the Convention outlines that the Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change.

Taken together, these principles emphasize the need to protect the global environment and to maintain equity in international economic relationships. To this end, Article 4 outlines the commitments shared by all countries, reflecting their common but differentiated responsibilities.¹⁵⁰The commitments include *inter alia*: to promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport,

¹⁴⁸ CLIMATE LEADERS, *What is the UNFCCC & the COP?* Available at <http://www.climate-leaders.org/climate-change-resources/india-at-cop-15/unfccc-cop> <accessed on September 13, 2012>

¹⁴⁹ See the Preamble to the United Nations Framework Convention on Climate Change

¹⁵⁰ Irving M. Mintzer and J. A. Leonard ed., *Negotiating Climate Change The Inside Story of the Rio Convention* (Cambridge University Press and Stockholm Environment Institute, 1994), 18

industry, agriculture, forestry and waste management sectors;¹⁵¹ promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system;¹⁵² promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change¹⁵³ and, promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations.¹⁵⁴

3.2.1.1 Institutional arrangements

Articles 7 to 15 of the Framework Convention on Climate Change outline the institutional structures and cooperative process established to implement the Convention. These institutional structures include:

Conference of the Parties (COP)

The Framework Convention on Climate Change established under its Article 7 the COP as the supreme body to the Convention which consists of negotiators from ratifying countries, and is tasked to review the implementation of the Convention and to take decisions on how to improve the implementation process. Both developing and industrialized countries can meet regularly, review the state of atmospheric science, evaluate the adequacy of the international policy response, and adapt existing institutions to meet the new challenges. Through this cooperative

¹⁵¹ Article 4.1 (c) of the United Nations Framework Convention on Climate Change.

¹⁵² Article 4.1 (g) of the United Nations Framework Convention on Climate Change.

¹⁵³ Article 4.1 (h) of the United Nations Framework Convention on Climate Change.

¹⁵⁴ Article 4.1 (i) of the United Nations Framework Convention on Climate Change.

mechanism, the Convention creates momentum for change and increases public awareness of the linkages between environment and development issues.¹⁵⁵

Secretariat

A Secretariat is established under Article 8 of the Convention to undertake the day to day activities of coordinating the implementation of the Convention through making arrangements for the sessions of the COP, compiling and transmitting reports submitted to it and facilitating assistance of the Parties on requests, in compilation and communication of information.

Subsidiary bodies

The Convention established two permanent subsidiary bodies: the Subsidiary Body for Scientific and Technological Advice (SBSTA) under Article 9 to advise the COP about the latest developments in the scientific and technological area and to provide policy recommendations and, the Subsidiary Body for Implementation (SBI) under Article 10 to assist COP in reviewing the domestic implementation of the Convention.

Other mechanisms

Besides these institutions, the Framework Convention on Climate Change depends on the formulation of mechanisms to implementation of the Convention. Mechanisms to promote bilateral and multilateral actions include: transfer of technology under Articles 4, 9 and 11; transfers through the financial mechanism under Article 11; Joint Implementation under Articles 3.3, 4.2, 7.2 and 11.5 and, scientific cooperation under Article 5. Other mechanisms are

¹⁵⁵ Irving M. Mintzer and J. A. Leonard ed., *Negotiating Climate Change The Inside Story of the Rio Convention* (Cambridge University Press and Stockholm Environment Institute, 1994), 17

communications and review of communications under Articles 4 and 12; resolution of questions regarding implementation under Article 13 and, dispute prevention, conciliation and settlement under Article 14.¹⁵⁶

Two Mechanisms are of special importance in the cooperation between countries. First, a financial mechanism has been established under Article 11 to facilitate the funding on grant or concessional basis to developing countries of the incremental costs of specific climate relevant measure. Under Article 21.3, the Global Environment Facility (GEF) of the United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP) and the World Bank has been entrusted with the operation of the financial mechanism of the Convention.¹⁵⁷

The United Nations (UN) negotiations on climate change are also supported by work of the UN Intergovernmental Panel on Climate Change (IPCC). The IPCC was formed in 1988 by the two UN bodies - United Nations Environment Programme (UNEP) and World Meteorological Organization (WMO), to provide objective information about climate change to the public and to policy-makers. IPCC is made up of scientists and experts from all over the world and promotes the UN goals of human development. IPCC's mandate includes comprehensive review and recommendations with respect to the science of climate change, social and economic impact(s), possible policy responses by Governments to delay, limit or mitigate the impact of adverse climate change, relevant treaties and other instruments dealing with climate change, (and)

¹⁵⁶ Joyeeta Gupta, *The Climate change Convention and Developing Countries: from conflict to consensus*, 13

¹⁵⁷ Joyeeta Gupta, *The Climate change Convention and Developing Countries: from conflict to consensus* (Kluwer Academic Publishers, 1997), 14

elements for possible inclusion in a future international convention on climate.¹⁵⁸ IPCC's action, based on the said mandate, has been to consider various aspects of climate being scientific findings, interpretations, costs of inaction and of action based on the scientific findings, ideas, opinions, strategies and conclusions.

3.2.2 The Kyoto Protocol

The Framework Convention on Climate Change as we have seen establishes a set of principles, norms and goals for cooperation on the issue of climate change rather than impose binding obligations. The Kyoto Protocol, in contrast incorporates a legally binding commitment among Annex I countries (as listed in Annex I of the Convention) to fix greenhouse gas emissions at a set percentage of base year emissions¹⁵⁹ bringing the Protocol to a higher degree of legal obligation under the principle of *pacta sunt servanda*. The Protocol promotes the Convention's goal of "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". Accordingly, Kyoto creates legally binding obligations for developed countries that require them to gradually reduce human-induced greenhouse gas emissions to an average of 5.2 percent below their 1990 emission levels.¹⁶⁰

Negotiations on what was to become the Kyoto Protocol were launched by the Conference of the Parties at its first session (Berlin, March/April 1995) when it adopted its decision 1/CP.1 (the

¹⁵⁸ Shardul Agrawala, *Context and Early Origins of the Intergovernmental Panel on Climate Change* (Climate Change 39, Kluwer Academic Publishers, 1998) 616

¹⁵⁹ Jana Von Stein, *The International Law and Politics of Climate Change Ratifications of the United Nations Framework Convention and the Kyoto Protocol* (Journal of Conflict Resolution, Vol. 52, No.2, Sage Publications, April 2008) 247

¹⁶⁰ Cinnamon Carlarne, *The Kyoto Protocol and the WTO: Reconciling tensions between trade and environmental objectives* (Colo. J. Int'l Env'tl. L & Policy, Vol. 17:1, 2006) 47

“Berlin Mandate”). This decision established that the commitments in Article 4.2 (a) and (b) of the Convention were “not adequate”, and launched a process to “take appropriate action beyond the year 2000, including the strengthening of commitments of Annex I Parties through the adoption of a Protocol or another legal instrument”. The Berlin Mandate stated that the process should, to this end, “elaborate policies and measures” for Annex I Parties, as well as “set quantified emission limitation and reduction objectives” (QELROs) for these Parties. The decision also specified that the negotiation process should “not introduce any new commitments” for non-Annex I Parties, “but reaffirm existing commitments in Article 4.1 (on general commitments for all Parties) and continue to advance the implementation of those commitments in order to achieve sustainable development”.¹⁶¹

The Kyoto Protocol is quite complex, reflecting the complicated political, economic, scientific and legal issues raised by human-induced climate change.¹⁶² The Kyoto Protocol commits ratifying nations to reduce GHG emissions (six greenhouse gases mainly CO₂).¹⁶³ The Kyoto obligations are *erga omnes* obligations, that is, obligations that can be invoked by one state on behalf of all and it is conceivable that even non-Parties could challenge non-compliant Kyoto Parties.¹⁶⁴

¹⁶¹ Joanna Depledge, Tracing the Origins of the Kyoto Protocol: *An Article-by-Article Textual History* (UNITED NATIONS, FCCC/TP/2000/2, 25th November, 2000) 6-8

¹⁶² Clare Breidenich, Daniel Magraw, Anne Rowley and James W. Rubin, *The Kyoto Protocol to the United Nations Framework Convention on Climate Change* (American Journal of International Law, Vol. 92, No. 2, April 1998) 315

¹⁶³ Dr. Brian E Lloyd, Climate Change and Global Warming *The Science, issues, attitudes and actions, from published material* (Histec Publications, AM, September 2007), 18

¹⁶⁴ Richard S. J. Tol and Roda Verheyen, *State responsibility and compensation for climate change damages – a legal and economic assessment* (Energy Policy 32 (2004) 1109-1130) 1115

The overarching goal of the Kyoto Protocol is to reduce greenhouse gas emissions and to facilitate sustainable development.¹⁶⁵ The main focus of the Kyoto Protocol is to decrease carbon dioxide emissions. Accordingly, it establishes emission-related targets for Annex I Parties (countries included in Annex I of the Convention). Contrary to the goal of combating climate change, these emission-related targets allow some countries to increase their emissions; these targets also exclude developing countries which are experiencing rapid growth.¹⁶⁶

It is worth noting that different percentage emissions limits were agreed by Annex I countries in the Kyoto Protocol. The differentiated targets among Annex I countries were not based on a standardized formula but rather on complex negotiations on multiple issues. In addition, Article 4 of the Protocol allows groups of countries to negotiate a redistribution of their collective greenhouse gas emissions limits.¹⁶⁷

The fundamental architecture of the Kyoto Protocol is marked by several defining features. It makes allowance for flexibility with respect to the Parties' national implementation of their commitments. It also allows for flexibility in the international context by providing for the use of emissions trading and other market-based mechanisms including a mechanism for cooperative projects between the developed world and developing countries. In addition, it takes a comprehensive approach by covering both greenhouse gas emissions and sequestration by sinks, and by including not only CO₂, methane (CH₄) and nitrous oxide (N₂O), but also the three

¹⁶⁵ See Article 2.1 of the Kyoto Protocol

¹⁶⁶ Sirai Cosgrove, *The United Nations Framework Convention on Climate Change*, 15th Conference of the Parties – The Copenhagen Protocol (UNFCCC COP 15, Background Paper, AMUNC 2009) 3

¹⁶⁷ Marina Cazorla and Michael Toman, *International Equity and Climate Change Policy* (Climate Issue Brief No. 27, Resources for the Future, December 2000) 2

synthetic greenhouse gases¹⁶⁸ - hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6).

Kyoto commitments are expressed in terms of emissions allowances, or Assigned Amount Units, that are equal to a nation's allowable greenhouse gas emissions. In order to facilitate compliance with the treaty obligations and reduce the cost of emission reductions, the Kyoto Protocol provides three key flexibility mechanisms through which Annex I Parties may directly 'reduce' their greenhouse gas emissions. The flexibility mechanisms – (1) Joint Implementation under Article 6 of the Protocol, (2) the Clean Development Mechanism under Article 12 of the Protocol, and (3) Emissions Trading under Article 17 of the Protocol – enable parties to trade and transact Emission Reduction Units and Certified Emission Reductions in order to 'efficiently' meet the Assigned Amount Units.¹⁶⁹ These three instruments created an artificial economy through which countries may buy and sell credits this scheme.¹⁷⁰ Kyoto's obligations represent the first time that developed countries have jointly agreed to reduce emissions from such a wide range of gases across such a large cross-section of the economy.¹⁷¹

The mainstay of the Kyoto Protocol however is emissions trading. Emissions trading constitutes a flexibility mechanism whereby a fully-fledged market mechanism is established. It is modeled on tradable emission permits, credits and offsets schemes. Under the Kyoto Protocol, emissions

¹⁶⁸ Clare Breidenich, Daniel Magraw, Anne Rowley and James W. Rubin, *The Kyoto Protocol to the United Nations Framework Convention on Climate Change* (American Journal of International Law, Vol. 92, No. 2, April 1998) 319

¹⁶⁹ Cinnamon Carlarne, *The Kyoto Protocol and the WTO: Reconciling Tensions Between Free Trade and Environmental Objectives* [Colo. J. Int'l Envtl. L. & Pol'y, Vol. 17:1, 2006], 47 - 48

¹⁷⁰ Sirai Cosgrove, *The United Nations Framework Convention on Climate Change*, 15th Conference of the Parties – The Copenhagen Protocol (UNFCCC COP 15, Background Paper, AMUNC 2009) 3

¹⁷¹ Cinnamon Carlarne, *The Kyoto Protocol and the WTO: Reconciling Tensions Between Free Trade and Environmental Objectives* [Colo. J. Int'l Envtl. L. & Pol'y, Vol. 17:1, 2006], 48

trading can only take place among countries with commitments and must be supplemental to domestic actions.¹⁷²

The Kyoto Protocol creates no new bodies but it delegates to the Conference of the Parties and its subsidiary bodies two important tasks: (1) monitoring Annex 1 Parties' implementation and compliance, and (2) overseeing implementation of the Protocol's flexibility provisions.¹⁷³

3.2.3 The Post Kyoto developments

Given the expiration date of the Kyoto Protocol, countries agreed in the 2007 Bali Roadmap to negotiate a post-2012 climate agreement. The Bali Climate Change Conference brought together more than 10,000 participants, including representatives of over 180 countries together with observers from intergovernmental and non-governmental organisations and the media. Governments adopted the Bali Road Map - a set of decisions that represented the various tracks that were seen as key to reaching a global climate deal. The Bali Road Map includes the Bali Action Plan, which launched a "new, comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012", with the aim of reaching an agreed outcome and adopting a decision at COP15 in Copenhagen. Governments divided the plan into five main categories: shared vision, mitigation, adaptation, technology and financing.¹⁷⁴

¹⁷² See Article 17 of the Kyoto Protocol

¹⁷³ Jana Von Stein, *The International Law and Politics of Climate Change Ratifications of the United Nations Framework Convention and the Kyoto Protocol* (Journal of Conflict Resolution, Vol. 52, No.2, Sage Publications, April 2008) 247 - 248

¹⁷⁴ See the full text at http://unfccc.int/meetings/bali_dec_2007/meeting/6319.php <accessed on August 13, 2012>

Following the Bali Roadmap, the 2009 United Nations Climate Change Conference, commonly known as the Copenhagen Summit, was held at the Bella Center in Copenhagen, Denmark, between 7 December and 18 December. The conference included the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change and the 5th Meeting of the Parties (MOP 5) to the Kyoto Protocol. The conference was preceded by the Climate Change: Global Risks, Challenges and Decisions scientific conference, which took place in March 2009 and was also held at the Bella Center. The Copenhagen Accord, which was drafted at the end of the conference, recognized that climate change is one of the greatest challenges of the present day and that actions should be taken to keep any temperature increases to below 2 °C. The document is not legally binding and does not contain any legally binding commitments for reducing CO₂ emissions.¹⁷⁵

The 2010 Cancun Agreement reinforced the content of the Copenhagen Accords. These marked the first steps on the path towards a global climate architecture that includes industrialised and developing countries alike and thereby signals a departure from the selective Kyoto Protocol approach of placing the sole responsibility for mitigation on the industrialised countries' shoulders. States agreed for the first time that global temperature increase is to be kept below 2°C and that all, even the developing countries, should contribute to achieving this objective, within the limits of common but differentiated responsibilities, by nationally appropriate mitigation activities and stronger action on forests. To achieve this target, industrialised countries

¹⁷⁵ Antonio G. M. La Viña and Lawrence G. Ang *From Copenhagen to Cancun: Challenges and Prospects for the UNFCCC Negotiations* (Working Paper, London: Foundation for International Environmental Law and Development, 2010, www.field.org.uk/files/lavinaang_from_copenhagen_to_cancun.pdf) 2-5 <accessed between July 24 and August 13, 2012>

provide financial assistance via the Global Climate Fund to facilitate the transfer of low carbon technologies and support capacity-building.¹⁷⁶

The 2011 negotiations in Durban, South Africa resulted in a second commitment period of the Kyoto Protocol (however, without the participation of the United States, Canada and Japan) and the “Durban Platform on Enhanced Action”. This was made possible by the European Union that agreed to a second commitment period of the Kyoto Protocol – the major demand of the G77 developing countries – in exchange for India, China and the United States agreeing to negotiate a follow-up treaty by 2015 taking effect in 2020, which includes all major emitters of greenhouse gases.¹⁷⁷

Rio+20 (13 June – 22 June 2012)

In June 2012, the United Nations Conference on Sustainable Development (UNCSD or Rio+20) held in Rio de Janeiro, Brazil brought together world leaders along with thousands of participants from the private sector, NGOs and other groups, to shape how the United Nations can reduce poverty, advance social equity and ensure environmental protection on an ever more crowded planet.¹⁷⁸ The official discussions focused on two main themes: (1) how to build a green economy to achieve sustainable development and lift people out of poverty, including support for developing countries that will allow them to find a green path for development; and (2) how to

¹⁷⁶ Earth Negotiations Bulletin: Summary of the Cancun Climate Change Conference (Vol. 12 No. 498, International Institute for Sustainable Development (IISD, 2012) 21

¹⁷⁷ Earth Negotiations Bulletin: Summary of the Durban Climate Change Conference (Vol. 27 No. 10, International Institute for Sustainable Development (IISD, 2012) 14-15

¹⁷⁸ UNITED NATIONS, RIO+20 *the future we want* available at <http://www.un.org/en/sustainablefuture/about.shtml> <accessed on September 15, 2012>

improve international coordination for sustainable development. The talks at the Conference resulted in a political agreement called *The Future We Want*.

Rio+20, is a separate process from the UN's long-running climate change talks (overseen by the UNFCCC) that were borne out of the original Earth Summit in Rio back in 1992. The crossover between the objectives of the two, is obvious and the opportunities for progress enormous. On climate change, however, there are a number of direct and indirect references that could boost efforts to cut emissions and increase resilience.¹⁷⁹ Paragraph 25 for instance acknowledged that climate change is a cross-cutting and persistent crisis and expressed concern that the scale and gravity of the negative impacts of climate change affect all countries and undermine the ability of all countries in particular, developing countries, to achieve sustainable development and the MDGs and threaten the viability and survival of nations. Paragraph 128 recognized that improving energy efficiency, increasing the share of renewable energy, cleaner and energy-efficient technologies are important for sustainable development, including in addressing climate change.

There is designated a climate change section from paragraphs 190 onwards of the *Future We Want*.¹⁸⁰ Parties affirmed in paragraph 190 that climate change is one of the greatest challenges of our time, and expressed profound alarm that emissions of greenhouse gases continue to rise globally. Parties further emphasized that adaptation to climate change represents an immediate and urgent global priority. At paragraph 191, Parties underscored that the global nature of

¹⁷⁹ John Parnell, *Rio+20: What does the Earth Summit's outcome mean for climate change?* (RTCC (Responding to climate change, 25 June 2012) available at <http://www.rtcc.org/policy/rio20-what-does-the-earth-summit%E2%80%99s-outcome-mean-for-climate-change/>)

¹⁸⁰ Full final text available at <http://www.scribd.com/doc/98170809/The-Future-We-Want-Final-Documnt>

climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions. Parties recalled that UNFCCC provides that 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. Parties further noted with grave concern the significant gap between the aggregate effect of Parties' mitigation pledges in terms of global annual emissions of greenhouse gases by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2 °C or 1.5 °C above pre-industrial levels. Parties recognized the importance of mobilizing funding from a variety of sources, public and private, bilateral and multilateral, including innovative sources of finance, to support nationally appropriate mitigation actions, adaptation measures, technology development and transfer and capacity- building in developing countries. Paragraph 192 urged Parties to the UNFCCC and Parties to the Kyoto Protocol to fully implement their commitments, as well as decisions adopted under those agreements.

It is reported however that the decision by Member States to approve the Outcome Document was not easily achieved: ¹⁸¹as a result, a strong agreement was not possible. Instead, achievements were limited to a document with vague language and few concrete steps. Participants voted for as many recommendations in as many topics as they support. The order in which the topics and the recommendations were presented was randomized to prevent bias resulting from the survey interface. At the preliminaries, some of the most supported

¹⁸¹ Outreach, RIO+20 United Nations Conference on Sustainable Development (Published by Stakeholder Forum, June 21, 2012) 1

recommendations of the designated topics were: Parties to take concrete steps to eliminate fossil fuel subsidies; to restore up to 150 million hectares of deforested and degraded lands by 2020; to secure water supply by protecting biodiversity, ecosystems and water sources; to promote food systems that are sustainable and contribute to improvement of health; avoid ocean pollution by plastics through education and community collaboration and to promote global education to eradicate poverty and to achieve sustainable development.¹⁸²

Rio+20 saw several positive outcomes, the most high-profile of which was the decision to establish Sustainable Development Goals (SDGs) next year. The SDG topics will encompass all three aspects of sustainable development - economic, social and environmental - and will seek to perpetuate momentum in international development work beyond the poverty-eradicating mission of the Millennium Development Goals, which will lapse in 2015. Rio+20 also saw other accomplishments. Governments, private companies, and multilateral agencies committed themselves to voluntary pledges worth \$513 billion toward a series of development projects. Eight international development banks agreed to invest \$175 billion to sustainable public transport systems over the next decade. Private sector companies pledged to contribute \$50 billion to a plan to provide energy to the entire global population by 2030. However, the degree to which these pledges will be fulfilled remains uncertain, particularly in a time of persistent global economic downturn. Rio+20 also managed to bring attention to the fact that the path to a green economy lies at the national and local level.¹⁸³

¹⁸² RIO+20 United Nations Conference on Sustainable Development, the future we want, www.uncsd2012.org available at http://www.un.org/en/sustainablefuture/pdf/conf_brochure.pdf <accessed on September 15, 2012>

¹⁸³ *Examining Rio+20's Outcome*, Expert Roundup (Council on Foreign Relations) available at <http://www.cfr.org/energyenvironment/examining-rio20s-outcome/p28669> <accessed on September 15, 2012>

In the climate change context, some analysts opine that the Rio+20 outcome moves climate action no further forward and that the true effects of the document are impossible to predict as the wording places practically no pressure on politicians to do anything;¹⁸⁴ Rio+20 did not forge new agreements and did not lead to new commitments.

3.4 Conclusion

The discussion in this chapter has largely centered on the international legal regime and framework to combat the negative effects of climate change. This chapter has taken stock of the policy interventions to address human induced climate change and where there's been emphasis and or acceptability so far. At this point, the purpose is merely to introduce the policy initiatives and institutions that are applicable and key features of the policy initiatives so that they can be raised in the debate within the purview of this research project, namely, whether the economic incentives approach in dealing with human induced global warming replenish concepts and policies of sustainable development. Moving forward, it is important to address the challenges to the framework, which shall be done in chapter 4. Chapter 4 will review as well as analyze emissions trading by first providing an overview of carbon trading and the Kyoto flexibility mechanisms and thereafter assessing whether the prevailing approach is supportive of the UNFCCC goals of achieving an integrated approach to climate policy and sustainable development or, whether adjustments need to be made.

¹⁸⁴ John Parnell, *Rio+20: What does the Earth Summit's outcome mean for climate change?* (RTCC (Responding to climate change, 25 June 2012) available at <http://www.rtcc.org/policy/rio20-what-does-the-earth-summit%E2%80%99s-outcome-mean-for-climate-change/>)

CHAPTER 4

THE ARCHITECTURE AND IMPLICATIONS OF EMISSIONS TRADING ON CLIMATE CHANGE AND SUSTAINABILITY AGENDA

4.0 Introduction

In the global effort to address climate change, there are three market-based instruments: Emissions Trading, Joint Implementation and the Clean Development Mechanism which were introduced in the Kyoto Protocol¹⁸⁵ to help countries meet their targets and effectively created the “carbon market”. For purposes of this paper, the term “emissions trading” is used deliberately in a broad sense to refer to credit-and-trade (Clean Development Mechanism and Joint Implementation) as well as cap-and-trade systems in the Kyoto Protocol which shall be discussed in this chapter and, any other innovative forms of economic incentives that shall be aimed at mobilizing action for emissions reduction and climate change mitigation: Nonetheless, “emissions trading”, “carbon trading” and “carbon emissions trading” are used interchangeably in this paper.

Carbon trading has been a controversial subject. Proponents opine that the carbon market has a critical role to play in alleviating the worst effects of climate change.¹⁸⁶ They advocate that the power of the market can be harnessed and channeled towards the achievement of environmental goals, through an economic incentives approach to regulation.¹⁸⁷ Detractors argue that during the Kyoto negotiations, corporations pulled governments towards a US styled trading scheme in

¹⁸⁵ Article 17, Article 6 and Article 12 respectively

¹⁸⁶ Felicia Jackson, *Conquering Carbon: Carbon Emissions, Carbon Markets and the Consumer* (New Holland Publishers (UK) Limited, 2009) 13

¹⁸⁷ T. H. Tietenberg, *Economic Instruments for Environmental Regulation* (Oxford Review of Economic Policy Limited, Vol. 6, No. 1) 17

framing the Kyoto targets, designed to gain themselves maximum benefit with minimum likelihood of needing to control greenhouse gas:¹⁸⁸ that the Kyoto mechanisms commoditize the Earth's atmosphere in a manner that will allow dubious projects and the exchange of "hot air" to substitute for serious engagement on climate change.¹⁸⁹ Opposing views consider carbon trading to be aimed at the wrong target: that it does not address global warming because solving global warming means figuring out how to keep most remaining fossil fuels in the ground.¹⁹⁰ Another main concern is that emissions trading systems provide strategy for the main emitters to avoid significant domestic action¹⁹¹ and that the economic nature of the mechanisms do not anticipate the potentially devastating effects of climate change.

There is ready agreement from the data and facts evaluated in chapter 2 that sustainable development implies linking what is to be sustained and what is to be developed. Drawing from the surveyed literature, the observations in chapter 2 show that sustainable development requires the participation of both developing and industrialized countries. In this sense, the sustainable development paradigm should be viewed as shared and inter-linked responsibilities of environmental protection and human development through changing unsustainable patterns of consumption and production.

¹⁸⁸ Professor Clive L. Splash, *The Brave New World of Carbon Trading* (New Political Economy, Vol. 15, No. 2, 2010) 3

¹⁸⁹ Cameron Hepburn, *Carbon Trading: A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007, 32:375-393) 375

¹⁹⁰ Larry Lohmann, *Six Arguments Against Carbon Trading* (The Corner House, posted September 2008, originally posted in *Opposing Views*) available at <http://climateandcapitalism.com/2008/09/29/carbon-trading-the-wrong-way-to-deal-with-global-warming/> <accessed on September 4, 2012>

¹⁹¹ Jon Birger Skjaereth and Jorgen Wettestad, *Emissions Trading and Implementation* (Ashgate Publishing Limited, 2008) 66

The main concern and criticism emanating from advocates and theorists of sustainable development have been that economic conceptions of development are dominant and that they are particularly problematic in relation to sustainable development.¹⁹² There is also the view that the international trading markets have contributed far less to sustainable development than more targeted programs¹⁹³ such as renewable energy programs, combating deforestation, conservation of biological diversity, managing fragile ecosystems and management of land resources and, whose long-term objective is environmental protection and human development.

The aim of this chapter is to explore emissions trading's implications with the key premise to determine whether carbon trading has any sustainable development benefits in relation to the lines of evidence on climate change that have been discussed in chapter 2 and or whether one form of emissions trading or another can achieve the thresholds that must be met for sustainability and climate change abatement. This chapter shall therefore be important in providing a well informed policy alternative to be discussed in chapter 5.

4.1 The Conceptual Model of Emissions Trading and Features of Emissions Trading Programs

Faced with the looming climate crisis, the global community of states response has been the passage of the Kyoto Protocol in 1997, slowly ratified by 156 countries, and infamously rejected by the world's biggest polluter – the United States (US).¹⁹⁴ At the core of the Protocol is an

¹⁹² Keith Nurse, *Culture as the Fourth Pillar of Sustainable Development* (prepared for Commonwealth Secretariat, Malborough House, Pall Mall, London, UK, June 2006) 34

¹⁹³ See the Abstract by David M. Driesen in *Sustainable Development and Market Liberalism's Shotgun wedding: Emissions Trading under the Kyoto Protocol* (bepress Legal Series, Paper 1643, September 20, 2006)

¹⁹⁴ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 2

Agreement to reduce emissions by an average of 5.2 percent below 1990 levels of greenhouse gases within the commitment period discussed in paragraph 3.2.3 of chapter 3. Also agreed upon in 1997 was the main market-based mechanism for achieving this target, tabled by the US in response to heavy corporate lobbying: emissions trading.¹⁹⁵

Under the Kyoto Protocol the “polluters” are countries that have agreed to targets for reducing their emissions of gases in a pre-defined time period. The polluters are given a number of “emissions credits” equivalent to their 1990 levels of emissions minus their reduction commitment. These credits are measured in units of greenhouse gases, so one ton of carbon dioxide (CO₂) would equal one credit. The credits are licenses to pollute up to the limits set by the commitment to achieve the average reduction limits agreed in Kyoto. The countries then allocate their quota of credits on a nation-wide basis, mostly by “grandfathering,” so that the most polluting industries will receive the biggest allocation of credits.¹⁹⁶

Emissions trading takes two main forms: ‘cap and trade’ and ‘offsetting’. It has risen in popularity to become the most broadly favoured government strategy. Carbon permits have then quickly been developed as a serious financial instrument in markets turning over billions of dollars a year.¹⁹⁷ However, carbon trading is not a radically new idea; the conceptual underpinnings of carbon trading began in 1920 with Pigou,¹⁹⁸ who pointed out the “social

¹⁹⁵ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 2

¹⁹⁶ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 3

¹⁹⁷ Professor Clive L. Splash, *The Brave New World of Carbon Trading* (New Political Economy, Vol. 15, No. 2, 2010) 1

¹⁹⁸ Pigou A. *The Economics of Welfare* (London: Macmillan, 1920)

benefits” of forcing companies to pay for the costs of their pollution.¹⁹⁹ Nor is the practice of emissions trading particularly novel; trading of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) began in the US in the 1990s.²⁰⁰

4.1.1 ‘Cap and trade’

A key feature of the carbon market is cap-and-trade schemes, which allow companies to buy or sell “credits” that collectively bind all participating companies to an overall emissions limit.²⁰¹ In this scheme, each large-scale emitter, or company, will have a limit on the amount of greenhouse gas that it can emit. The firm must have an “emission permit” for every ton of carbon dioxide it releases into the atmosphere. The permits set an enforceable limit, or cap, on the amount of greenhouse gas pollution that the company is allowed to emit. Since it will be relatively cheaper or easier for some companies to reduce their emissions below the required limit than others, these more efficient companies, who emit less than their allowance, can sell their extra permits to companies that are not able to make reductions as easily.²⁰²

These carbon credits can in theory be bought by the Governments which are obliged by the Kyoto Protocol to cut their emissions, to count against their targets. In practice, however, the US refusing to ratify Kyoto and big emerging economies such as China, India and Mexico carrying

¹⁹⁹ Cameron Hepburn, Carbon Trading: *A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007.32:375-393), 376

²⁰⁰ Cameron Hepburn, Carbon Trading: *A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007, 32:375-393) 376

Also see Burtraw D, Evans DA, Krupnick A, Palmer K, Toth R. 2005. Economics of pollution trading for SO₂ and NO_x. *Annu. Rev. Environ. Resour.* 30:253-289

²⁰¹ See <http://www.bnet.com/article/what-is-carbon-credit/187036> <accessed on April 24, 2011>

²⁰² Centre for American Progress, *What is Cap and Trade, and How can we Implement it Successfully?* (Cap and Trade 101) available at www.americanprogress.org/issues/green/news/2008/01/16/3816/cap-and-trade-101/ <accessed on September 29, 2012>

no emissions-cutting obligations under the treaty, Europe is the only market of any size.²⁰³ The European Union Emissions Trading Scheme (EU ETS) has its own cap and trading scheme and it is the largest trading block.²⁰⁴ By October 2003 the European Emissions Trading Directive was passed into law, with the scheme coming into effect on 1 January 2005.²⁰⁵ Since then, the EU ETS has become the largest carbon trading scheme in the world. The tradable instrument under the European Union is distributed to firms according to National Allocation Plans (NAPs) which are determined by discussion and negotiation between member states and the participating firms. The NAPs are then submitted to the European Commission for approval.²⁰⁶ Analysts review that perhaps the most remarkable feature of the EU ETS is that it exists at all, given that its creation involved extraordinary challenges of coordinating between European bodies, member states, and a variety of different private entities – each with different interests. On the other hand, they acknowledge that the achievements of the EU ETS are simply too modest when compared with the magnitude of the problem at hand. One important problem that is highlighted is that the determination of the NAPs involves asymmetric information and lobbying: That Government is relying upon firms to reveal their abatement cost curve in order to determine an appropriate NAP – yet firms have an incentive to bias their cost estimates upward in order to obtain a more generous allowance and looser cap.²⁰⁷

²⁰³ Fiona Harvey, *Global Carbon Trading System has 'Essentially Collapsed'*, (theguardian, September 10, 2012) available at www.guardian.co.uk/environment/2012/sep/10/global-carbon-trading-system <accessed on September 29, 2012>

²⁰⁴ World Bank Report, *State and Trends of the Carbon Market 2009* (World Bank, Washington DC, 2009)

²⁰⁵ Marcel Braun, *The evolution of emissions trading in the European Union – The role of policy networks, knowledge and policy entrepreneurs* (Rupprecht Consult, Forschung und Beratung GmbH, Cologne, Germany, 2008) 2

²⁰⁶ Cameron Hepburn, *Carbon Trading: A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007, 32:375-393), 379 - 380

²⁰⁷ Cameron Hepburn, *Carbon Trading: A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007, 32:375-393), 383-384

In the cap-and-trade scheme, a regulator sets a cap on aggregate emissions, distributes the right to emit to regulated facilities (with their emission allowances totaling less than the aggregate emissions), and permits the market to determine the emission price and degree of abatement at individual facilities. If the regulator allows regulated facilities to transfer their emission allowances, the distribution of emission reductions among facilities will be equal to the marginal cost of emission reductions among facilities. If the marginal cost of emission reductions varies among facilities, total costs can be lowered by reallocating greater effort to the facility that can lower emissions at a lower cost. Thus, when marginal cost is equal among facilities, total costs are lowest and the environmental target is reached.²⁰⁸ The theory is that the availability of carbon permits will gradually be reduced, ensuring scarcity, so that the market retains its value while at the same time forcing a reduction in the overall level of pollution: This is thought to create a system that guarantees a set level of overall reductions, while rewarding the most efficient companies and ensuring that the cap can be met at the lowest possible cost to the economy.²⁰⁹

Accordingly, parties that may otherwise not meet their commitments are thereby able to trade units in the form of assigned amount units, certified emission reductions, emission reduction units, and removal units.²¹⁰ Here, the basic principle is to set a limit on the total quantity of pollutants for a given time period (the “cap”). Each participant in the scheme receives an individual cap or allowance. Within the overall cap, individual allowances may be determined in a number of ways, for example from historical baselines, or auctioning allowances to

²⁰⁸ Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Third Edition, Oxford University Press, 2009), 364

²⁰⁹ Fiona Harvey, *Global Carbon Trading System has ‘Essentially Collapsed’*, (theguardian, September 10, 2012) available at www.guardian.co.uk/environment/2012/sep/10/global-carbon-trading-system <accessed on September 29, 2012>

²¹⁰ See *Article 17* of the Kyoto Protocol.

participants. Trading can take place: for the specified time period for which allowances are set; a participant who emits less than their allowance may then sell the unused balance to another participant who has exceeded their allowance. The price for allowance units is determined by the market. Those who are able to reduce emissions cheaply, for instance by investing in more efficient technology, have the incentive to do so, in order to benefit from selling their unused allowances. Likewise, those who find it difficult or expensive to reduce emissions may find it cheaper to purchase allowances from others.²¹¹

A successful cap-and-trade scheme relies on a strict but feasible cap that decreases emissions over time. If the cap is set too high, an excess of emissions will enter the atmosphere and the scheme will have no effect on the environment. A high cap can also drive down the value of allowances, causing losses in firms that have reduced their emissions and banked credits. If the cap is set too low, allowances are scarce and overpriced. Some cap-and-trade schemes have safety valves to keep the value of allowances within a certain range. If the price of allowances gets too high, the Scheme's governing body will release additional credits to stabilize the price. The price of allowances is usually a function of supply and demand.²¹²

4.1.2 'Offsetting'

Carbon offsets are analogous to tradeable emissions permits²¹³; in the sense that conceptually, a permanent net carbon offset should be equivalent to a tradeable emissions permit. The 1997

²¹¹ Marcus Lee and Kimberly Colopinto of the World Bank's Urban Development and Local Government Unit, *Tokyo's Emissions Trading System: A Case Study* (Directions in Urban Development, June 2010)

²¹² Sarah Dowdey, *How Carbon Trading Works* available at <http://www.science.howstuffworks.com/environmental/green-science/carbon-trading.htm> <accessed on September 29, 2012>

²¹³ Eric C. Betteheim and Gilonned' Origny, Carbon sinks and emissions trading under the Kyoto Protocol: *a legal analysis* (Phil. Trans. R. Soc. Lond. A (2002) 360, 1827-1851) 1831

Kyoto Protocol formalized offsetting within the set of flexible mechanisms for achieving emission reductions. The Kyoto Protocol requires nations to find ways to reduce their emissions, or else trade with other nations in order to acquire emissions reductions to offset their greenhouse gas production exceeding their allotment. Carbon offsets are credits for reductions in greenhouse gas emissions made at another location and reduce the need for fossil-fuel powered energy: Instead of cutting emissions at source, companies, and sometimes international financial institutions, governments and individuals, finance 'emissions-saving projects' outside the capped area.

Carbon offsets comprise one of the international climate regime's core strategies for reducing greenhouse gas emissions in the developing world. Carbon offsetting involves purchasing 'credits' from projects that reduce greenhouse gas emissions. By investing in such projects, emitters can compensate for emissions that an individual, organization or country is unwilling or unable to reduce domestically. Offsetting projects include energy efficiency, renewable energy and forestry, and include the full range of greenhouse gases through projects such as capture and destruction of industrial gases and methane from landfills.²¹⁴

Carbon offsets are quantified and sold in metric tonnes of carbon dioxide equivalent (CO₂e). Buying one tonne of carbon offsets means there will be one less tonne of carbon dioxide in the atmosphere than there would otherwise have been. This could be, for example, a project to swap coal-fired power stations with solar panels or hydro power. Carbon offsetting is often stated to be the fastest way to achieve the deepest reductions within businesses and that it also often

²¹⁴ Diana M. Liverman, *Carbon offsets, the CDM, and sustainable development*, 134 available at <http://www.environment.arizona.edu/files/env/profiles/liverman/nobelcausebookchapter112.pdf> <accessed on February 21, 2012>

delivers added benefits at the project site, such as employment opportunities, community development programmes and training and education.²¹⁵

For a carbon offset to be credible it must meet essential quality criteria, including proof that it is additional (the reduction in emissions would not have occurred without the carbon finance), that it will be retired from the carbon market so it cannot be double counted, and that it addresses issues such as permanence (it delivers the reductions it stated) and leakage (the emission reduction in one area does not cause an increase in emissions somewhere else).²¹⁶

They are managed under the flexible carbon trading options of the Kyoto Protocol known as Clean Development Mechanism (CDM) and Joint Implementation (JI). The two mechanisms, Joint Implementation and Clean Development Mechanism are similar in concept:²¹⁷The key difference is that Joint Implementation involves projects hosted in countries that already have binding targets for the reduction of their greenhouse gas emissions.²¹⁸

4.1.2.1 The Joint Implementation Mechanism

Joint implementation projects occur between two Annex I countries: a host and an investor, with the view of reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks (Kyoto Protocol, Article 6.1).²¹⁹The joint implementation mechanism aims to offer

²¹⁵The Carbon Neutral Company, *Carbon offsetting explained*, available at <http://www.carbonneutral.com/knowledge-centre/offsetting-explained/> <accessed on September 29, 2012>

²¹⁶The Carbon Neutral Company, *Carbon offsetting explained*

²¹⁷Eric C. Betteheim and Gilonned' Origny, Carbon sinks and emissions trading under the Kyoto Protocol: *a legal analysis* (Phil. Trans. R. Soc. Lond. A (2002) 360, 1827-1851), 1831

²¹⁸Tamra Gilbertson and Oscar Reyes, Carbon Trading *How it works and why it fails* (Dag Hammarskjöld Foundation, Critical Currents No. 7, November 2009) 24

²¹⁹Eric C. Betteheim and Gilonned' Origny, Carbon sinks and emissions trading under the Kyoto Protocol: *a legal analysis* (Phil. Trans. R. Soc. Lond. A (2002) 360, 1827-1851), 1831

parities flexible and cost efficient means of fulfilling a part of their Kyoto commitments, while the host benefits from foreign investments and technology transfer. A Joint Implementation mechanism project must provide a reduction in emissions by sources, or an enhancement of removals by sinks,²²⁰ that is additional to what would otherwise have occurred and be supplemental to domestic actions aimed at meeting the Parties' respective reduction commitments. The projects must have approval of the host party and participants have to be authorized to participate by a party involved in the project.²²¹

These project trades apply not at the country level but basically at a country union where the countries are an integrated economy like the European Union. The mechanism is known as joint implementation as in this scheme, the countries within the Union realize that they are an integrated economy and they may have serious implications if one or more countries within the Union cannot meet their obligation.

4.1.2.2 The Clean Development Mechanism

Under Article 12 of the Kyoto Protocol, the CDM was established to help non-Annex I countries in "achieving sustainable development" and to provide Annex I countries with an alternative mechanism for complying with their targets.²²² Article 12 (5) provides that Certified Emission Reductions (CERs) are only created if all parties give their voluntary approval and if the emissions reductions are real, measurable, and additional. Additionality is the requirement that

²²⁰ Illum K, Meyer NI. 2004. *Joint implementation: Methodology and policy considerations*. Energy Policy 32(8): 1013-23.

²²¹ Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Third Edition, Oxford University Press, 2009), 366.

²²² Cameron Hepburn, *Carbon Trading: A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007, 32:375-393), 381

the greenhouse gases emissions after implementation of a CDM project activity are lower than those that would have occurred in the most plausible alternative scenario to the implementation of the CDM project activity. Any certified emission reductions which a Party acquires in accordance with the provisions of Article 12 of the Protocol shall be added to the assigned amount for the acquiring party. As only Annex I countries are intended acquirers of such reductions, albeit asymmetrical, between the developed and developing worlds, which had not been originally contemplated.²²³

The establishment of a project is procedurally intricate. It can be divided into phases - the development phase and the implementation phase. The process starts by the Designated National Authority of the host party providing the letter of approval to project participants, confirming that the project activity contributes to sustainable development in the country.²²⁴ Projects are proposed in a formal Project Design Document, which presents detailed information, including a study of what would have occurred without the project, a monitoring and verification plan to determine the quantity of emissions reduced that are additional to the status quo, coupled with an estimate of expected emission reductions.²²⁵ The process is then followed by validation, which consists of an evaluation of the project activity by a Designated Operational Entity (DOE)²²⁶ against the requirements of CDM. After the validation stage and after a request made by the

²²³ Eric C. Betteheim and Gilonned' Origny, Carbon sinks and emissions trading under the Kyoto Protocol: *a legal analysis* (Phil. Trans. R. Soc. Lond. A (2002) 360, 1827-1851), 1832

²²⁴ 3/CMP 1, Annex, paras 29; 40(a); EB 25, PARA 95.

²²⁵ 3/CMP 1, Annex, Appendix B.

²²⁶ A DOE is an independent private entity, which, in order to be recognized in the CDM regime, needs to be accredited by the EB and designated as a Conference of the Parties serving as the Meeting of the Parties of the Protocol (CMP).

DOE, the Executive Board can register the project.²²⁷ After registration, the project's monitored emission reduction are periodically verified and certified by a Designated Operational Entity. On the basis of a certification report, the CDM Executive Board (EB) issues CERs via the CDM registry and forwards them into the account(s) specified by project participants.

The CDM has been called the Kyoto 'surprise' in that it provides a benefit to the developing world through allowing for emission reduction projects in the South. Such projects would produce CERs that could be purchased and used to meet emission commitments under the Protocol.²²⁸

The CDM is now a significant instrument, although concerns remain about its environmental integrity.²²⁹ Some argue that the current CDM does not reflect real reductions in GHG emissions and as a result the CDM represents little more than a forum for wealth transfer. Another point of contention is the extent that CDM projects contribute to sustainable development.²³⁰ All CDM host countries are required to assess projects to ensure they are compatible with their sustainable development objectives. There have been a range of different approaches adopted by countries in terms of how they screen projects for achievement of these objectives. HFC-23²³¹ destruction and nitrous oxide projects are the most contentious in this regard, attracting criticism about their

²²⁷ David Rossati, *The Clean Development Mechanism Governance in the Post-Kyoto Reforms: Strengthening the Rule of Law in the Executive Board* (Paper N°1/2009) 3 available at http://www.kyotochiamaitalia.com/papers/David-Rossati_CDM_Governance_Executive_Board_Climate_Change.pdf <accessed on September 3, 2012>

²²⁸ Diana M. Liverman, *Carbon offsets, the CDM, and sustainable development*, 131 available at <http://www.environment.arizona.edu/files/env/profiles/liverman/nobelcausebookchapter112.pdf> <accessed on February 21, 2012>

²²⁹ Cameron Hepburn, *Carbon Trading: A Review of the Kyoto Mechanisms* (The Annual Review of Environment and Resources, 2007, 32:375-393), 385

²³⁰ Diana M. Liverman, *Carbon offsets, the CDM, and sustainable development*, 136 available at <http://www.environment.arizona.edu/files/env/profiles/liverman/nobelcausebookchapter112.pdf> <accessed on February 21, 2012>

²³¹ A hydrogen-based gas also called fluoroform

inability to contribute to sustainable development, and their potential to divert investments from renewable energy and energy efficiency – the project areas with greater sustainable development benefits.²³²

4.2 The Case for Emissions Trading as an Economic Incentive for Emissions Reductions

The main advantages associated with economic incentives are flexibility, encouragement of technological innovation, improved relationships between the private and public sector, substantial cost savings, and better management of non-point emission sources. Economic incentives are premised on the notion that traditional command-and-control regulatory approaches to pollution control are not only expensive but do not provide an incentive to go beyond compliance.²³³ The common argument in favour of economic instruments is that they are “more flexible” while direct controls constrain firm behavior, for example, by mandating emission limits or specifying abatement technologies - market-based instruments give firms the freedom to take maximum advantage of innovations.²³⁴

Therefore, the logic behind the growing prominence for the emissions trading approach is that tradeable permits are a cost-effective initiative that relies on market forces to seek out the least cost reductions. Economic efficiency is therefore a major argument for international emissions

²³² Deborah Murphy, John Drexhage and Peter Wooders, *International Carbon Market Mechanisms in a Post-2012 Climate Change Agreement* (International Institute for Sustainable Development, May 2009) 7

²³³ Pollution Prevention Resource Exchange (PPRC), *Economic Incentives: Reasons for Economic Incentives* available at <http://www.pprc.org/hubs/subsection.cfm?hub=1003&subsec=11&nav=11&CFID=4769714&CFTOKEN=4818592> 4 <accessed on September 20, 2012>

²³⁴ Yoram Bauman, *Free- Market Incentives for Innovation: A closer look at the case of pollution control* (JEL Codes:Q20, 030 June 4, 2004) 5-6 available at www.smallparty.org/yoram/research/maxincent.pdf <accessed on September 29, 2012>

trading under the Kyoto Protocol.²³⁵ Proponents of the scheme have insisted on the cost-effectiveness of a transferable emission permit system explaining the polluters have an incentive to use the flexibility created by the system to achieve a given target at the lowest possible cost. For the proponents, emissions trading represented a novel approach to cleaning up the world by working with human nature instead of against it.²³⁶

4.3 Testing the Emissions Trading Framework

The Kyoto Protocol is credited for establishing a flexible broad-based international mechanism that provides a valuable starting point for shaping efficient climate policies in future.²³⁷ The dialogue about sustainable development however sets a criteria for assessing strategies for sustainable development as indicated earlier in the theoretical framework as - that the concept of sustainable development does not pit 'growth' against 'environment' but rather accepts that in some cases environmental protection and conservation can promote growth in the economy, and also, that the real issue is *not* 'growth or no growth', but *how* growth is to be attained. That in particular instances, this may mean trading off environmental quality for growth, but only after fully informed decision of the true environmental costs have been made; in other cases growth will be sacrificed in favour of environmental quality²³⁸ – in which case, where an irreplaceable asset would be used up by an activity, sustainable development requires that activity's

²³⁵ Mustafa Babiker, John Reilly and Laurent Viguier, *International Emissions Trading Always Beneficial?* (The Energy Journal, Vol. 25, No. 2, 2004, International Association of Energy Economics) 33

²³⁶ Richard Conniff, *The Political History of Cap and Trade: How an unlikely mix of environmentalists and free market conservatives hammered out the strategy known as cap-and-trade* (Smithsonian Magazine, August 2009) available at www.smithsonianmag.com/science-nature/Presence-of-Mind-Blue-Sky-Thinking.html?c=y&page=1 <accessed on September 29, 2012>

²³⁷ See the Abstract by Christoph Böhringer in *The Kyoto Protocol: A Review and Perspectives* (CPN Discussion Paper No. 04-01)

²³⁸ David Hughes & others, *Environmental Law* (Fourth Edition, Oxford University Press, 2005), 256

cessation.²³⁹In operationalizing sustainable development climate change mitigation, therefore, the key issue is climate protection through an efficient response policy to climate change.

A key means of determining effectiveness of a policy is by analyzing stakeholders' response to the policy. There are a number of challenges in finding the right path towards sustainable development as envisaged by the United Nations Framework Convention on Climate Change and, there are concerns about the desirability as well as efficacy of the Kyoto Protocol flexible instruments and mechanisms. We have seen the logic behind the growing prominence of the emissions trading approach. This section looks at the arguments discrediting emissions trading and the challenges and, other challenges and barriers in applying the Kyoto based market mechanisms to the risk in climate change. The discourse here will yield insights into the considerations that shall inform the conclusion and recommendations of this study.

4.3.1 The Exclusion of Developing Countries

The Kyoto Protocol in its framing has given some effect to the common but differentiated principle as captured under the UNFCCC. The protocol places real responsibility on the developed nations in terms of historical blame and the present rate and quantity of emissions.²⁴⁰ In this sense, the UNFCCC in itself seems to contemplate an absolute growth in the developing countries' emissions to allow for their economic development which is given explicit priority over reduction of anthropogenic greenhouse gases emissions and the Kyoto Protocol in itself is silent about how these countries would ever contribute to the common environmental responsibility. The omission of developing countries from the target raises serious questions

²³⁹ David Hughes & others, *Environmental Law* (Fourth Edition, Oxford University Press, 2005), 20

²⁴⁰ Article 3.1 of the Kyoto Protocol.

about the overall effectiveness of the agreement. Currently, many developing countries are making big strides in industrial development with a net effect of continued increase of greenhouse gas emissions. In this sense therefore the principle of common but differentiated responsibility is completely undermined. The perspective in this critique is that: if the Kyoto Protocol is to achieve its goal of reducing global emissions, it will have to be changed to include all countries of the world, each contributing accordingly.²⁴¹

4.3.2 The Imaginary Reduction Target/False paradigm

The average target of 5.2 percent mentioned earlier, is a random figure not reached at based on scientific calculations but based on a negotiated compromise.²⁴² Researchers have argued that offsets are an imaginary commodity created by deducting what you hope happens from what you guess would have happened.²⁴³ Further, critics argue that while carbon trading might sound like a neat theory, it is both ineffective and unjust: that redefining greenhouse gas emissions as a tradeable commodity – ‘carbon’ – whose value lies in what it can for or what price it can fetch, carbon trading significantly distorts the framework through which we view the problem of tackling climate change, encouraging the growth of an elaborate financial system in which a broad range of industrial and agricultural practices are rendered falsely equivalent, while obscuring the social, political, technological and historical questions of how rapidly shrinking caps are to be achieved.²⁴⁴

²⁴¹ Jaimet, Kate, *A primer on Kyoto* (The Ottawa Citizen, August 30, 2002: A4)

²⁴² W Nordhaus and J Boyer, *Requiem for Kyoto Protocol: An Economic Analysis* (Energy Journal Special Issue, 1999) 125

²⁴³ Dan Welch, *A Buyer's Guide to Offsets sets* (Ethical Consumer, no. 106, May/June 2007)

²⁴⁴ Tamra Gilbertson and Oscar Reyes, *Carbon Trading How it works and why it fails* (Dag Hammarskjöld Foundation, Critical Currents No. 7, November 2009), 17-18

4.3.3 The Development Critique

Development critics attack emissions trading on the hypothesis that developed countries create a system of dominance and dependence with developing nations, imposing Western structures and values upon nations that may not welcome or know how to manage them, exploiting the resources of developing nations.²⁴⁵ This echoes the false paradigm argument that Western policy programs based on economic theory and Excel spreadsheets, often do more to harm developing nations than to help them.²⁴⁶ It is contended that this trend in reality opens the door to a new form of colonialism which utilizes climate policies to bring about a variation on the traditional means by which the global South is dominated as majority of these projects are being imposed upon the South thereby raising serious concerns about the effectiveness and wisdom of relying on this scheme.²⁴⁷

4.3.4 Disrupting the Normative Community

It is argued that emissions trading increases the risk that countries and industries that have the capacity to develop new technologies will fail to do so. That this failure will make it more difficult, as a practical matter, for developing countries to agree to significant cuts in the future.²⁴⁸ With innovative technologies available, developing countries can agree to future emissions reductions without having to reduce already low levels of consumption. It is further argued that emissions trading may also make future emission reductions more expensive for countries that generate credits for joint implementation as these countries may exhaust cheap

²⁴⁵ Emily Richman, Emissions Trading and the Development Critique: *Exposing the threat to Developing Countries* (International Law and Politics, Vol. 36:133, 2003), 154

²⁴⁶ Emily Richman, Emissions Trading and the Development Critique: *Exposing the threat to Developing Countries* (International Law and Politics, Vol. 36:133, 2003), 154

²⁴⁷ Heidi Bachram, *Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases* (Capitalism Nature Socialism, Vol. 15, No. 4, The Centre for Political Ecology, 2004), 6-7

²⁴⁸ David M. Driesen, Free Lunch of Cheap Fix? *The Emissions Trading Idea and The Climate Change Convention* (Boston College Environmental Affairs Law Review, 1998, Pre-publication copy), 50

emission reduction opportunities in their efforts to sell joint implementation credits. This may raise the price of future emission reductions in the credit generating countries.²⁴⁹

4.3.5 Failure of the European Union Emissions Trading Scheme (EU ETS)²⁵⁰

The European Union Emissions Trading Scheme (EU ETS) which has already been discussed as the largest trading scheme, has not been a success as a pathway to low-carbon emissions. Because the tradeable instruments under the EU have been distributed for free, at least in the first phase, have acted as an incentive to firms and corporations to emit more now in order to receive a larger free allocation in the future. Furthermore, allocating the tradable instruments for free inevitably results in rent-seeking behavior by firms as they invest valuable resources in lobbying to obtain a higher allocation.²⁵¹

4.3.6 The Ethical Perspective

Emissions trading skeptics indict that it is unethical to buy your way out of your carbon guilt by purchasing low-cost offsets to compensate for high-consumption lifestyle. Offsets divert attention from the need to reduce consumption and to eliminate emissions from non-essential activities. That carbon trading has limited the overall potential of the Kyoto and other agreements because it reduced the need for domestic reductions.²⁵² It is also conceived that we

²⁴⁹ David M. Driesen, Free Lunch of Cheap Fix? *The Emissions Trading Idea and The Climate Change Convention* (Boston College Environmental Affairs Law Review, 1998, Pre-publication copy), 50

²⁵⁰ For comprehensive reading on failure of EU ETS see Tamra Gilbertson and Oscar Reyes, Carbon Trading *How it works and why it fails* (Dag Hammarskjöld Foundation, Critical Currents No. 7, November 2009), 31-51

²⁵¹ Dan Welch, *A Buyer's Guide to Offsets sets* (Ethical Consumer, no. 106, May/June 2007)

²⁵² Diana M. Liverman, *Carbon offsets, the CDM, and sustainable development*, 134 available at <http://www.environment.arizona.edu/files/env/profiles/liverman/nobelcausebookchapter112.pdf> <accessed on February 21, 2012>

cannot have a world in which some countries have to freeze their carbon dioxide emissions at one level as this would mean freezing global inequity.²⁵³

4.3.7 Quantification of Greenhouse Gases

The Kyoto market-based mechanisms are predicated on the fact that greenhouse gases mix uniformly in the atmosphere, which makes it possible to reduce carbon emissions at any point on the Earth and have the same effect.²⁵⁴ On the flipside however, the climate change problem is global in cause; greenhouse gases have broadly the same impact on climate wherever in the world they are emitted but effects will differ widely around the world²⁵⁵ and therefore quantifying greenhouse gases in one control cannot achieve a realistic environmental effect across the board.

4.3.8 Oversimplification of the Totality of Greenhouse Gases

The carbon trading mechanism has tended to oversimplify the totality of the greenhouse gases into carbon dioxide. The Kyoto Protocol and environmental reports place much emphasis on carbon dioxide. The tendency is then to regard CO₂ as the only gas of concern which has led to incorrect conclusions in economic assessments.²⁵⁶ However, the enhancement of the greenhouse effect involves multiple pollutants often interdependent and simultaneously released for example CO₂ and nitrous oxide (N₂O) from fossil fuel combustion. It is estimated that CO₂ is only

²⁵³ *Environmental Diplomacy* (Washington, D.C, Conference Report, American Institute for Contemporary German Studies, The Johns Hopkins University, November 18, 1998) 18 available at <http://www.aicgs.org/documents/environmentaldiplomacy.pdf> <accessed on April 24, 2011>

²⁵⁴ World Bank, Community Development Carbon Fund (Annual Report 2004) 5 available at http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/04/05/000011823_20050405152842/Rendered/PDF/316770CDCF0Ann10IO020346141public10.pdf

²⁵⁵ Nicholas Stern, *What is the Economics of Climate Change* (World Economics, Vol. 7, No. 2, April-June 2006) 2

²⁵⁶ A. C. Christiansen and J. Wettestad, The EU as a frontrunner on greenhouse gas emissions trading: *how did it happen and will the EU succeed?* (Climate Policy 3(1):3-18, 2003)

responsible for approximately half of human induced climate forcing and the other half has been attributed mainly to N₂O at 6%, methane (CH₄) at 15% and Chlorofluorocarbons (CFCs) at 17%.²⁵⁷

4.3.9 The Kyoto Protocol Design Fosters Vague Law

The Kyoto protocol imposes no penalties for failure to comply with its commitments. Despite negotiations on this point, the details for such penalties have not been established and negotiations have been very slow and difficult.²⁵⁸ Furthermore, any country can withdraw from the treaty after ratifying it by simply giving one year's notice. This part of the treaty, coupled with the lack of penalties for non-compliance, has come under harsh criticism from the scientific community: as it stands, the Kyoto Protocol seems to embody something that does not need to be taken seriously since there are no consequences for non-compliance.²⁵⁹ Furthermore, the intergovernmental negotiations are still concerned almost entirely with the structure and management of the vast international carbon trading regime citing reasons that the Kyoto Protocol has been hijacked by carbon traders.²⁶⁰

²⁵⁷ Professor Clive L. Splash, *The Brave New World of Carbon Trading* (New Political Economy, Vol. 15, No. 2, 2010), 8-9

²⁵⁸ Engelbeen, Ferdinand, *Kyoto's Shortcomings and Other Proposals* (INFOTERRA, 21 December 2001) available at www.cedar.at/mailarchives/infoterra/2001/msg01042.html <accessed on August 27, 2012>

²⁵⁹ Asher Minns, *An Introduction to the Kyoto Protocol* (changingclimate.org, 15 March 2002) available at www.changingclimate.org/content/articles/article/data/section_4/article_85/part_433/ <accessed on August 27, 2012>

²⁶⁰ *The Case Against Carbon Trading* (RisingTide UK March 2002) available at <http://risingtide.org.uk/resources/factsheets/carbontrading> <accessed on September 29, 2012 >

4.3.10 Overview of the Critiques Against the Emissions Trading Scheme

Combining an analysis of the sustainability agenda and the reasons for and against emissions trading that have been considered, this paper is able to propose that the choice of emissions trading appears to be problematic. There is widespread consensus that climate change represents a significant potential threat requiring the reduction of man-made greenhouse gas emissions from current and expected future Business-as-usual emissions.²⁶¹ The net effect of the shortcomings discussed here is that the climate change policy design embodied in the Kyoto Protocol may not be efficient to achieve the weight of expectation on a climate change policy. Indeed, opponents to the Kyoto Protocol have for these reasons stated that the Kyoto Protocol – as it stands – has not achieved a decisive breakthrough in international climate policy.²⁶² Analysts of market based policies have expressed that there is a fundamental distinction between the use of the market as a tool to help achieve society’s goals, and as a blueprint for society’s goals; that the market is a reasonable policy tool but not a reasonable blueprint. The market as a blueprint fails because there are significant public purposes that cannot be achieved by prices and markets alone and that getting the prices right in such markets is often a narrow and meaningless objective as the society may intentionally and appropriately choose to “get the prices wrong” in order to pursue more important goals.²⁶³

²⁶¹ Christoph Böhringer in *The Kyoto Protocol: A Review and Perspectives* (CPN Discussion Paper No. 04-01), 8

²⁶² See the Non-Technical Summary by Christoph Böhringer in *The Kyoto Protocol: A Review and Perspectives* (CPN Discussion Paper No. 04-01)

²⁶³ Frank Ackerman and Kevin Gallagher, *Getting the Prices Wrong: The Limits of Market-Based Environmental Policy* (Global Development and Environment Institute, Working Paper 00-05, October 2000) 1

4.4 Conclusion

By taking the general definition of sustainable development being - development that meets the needs of the present without compromising the ability of future generations to meet their own needs; sustainable development envisions sustainable designs that would comprise policy reforms across the spectrum of human imagination and broad participation in environmental management.

Economic incentives have been used as an argument favouring the trading of pollution permits. However, a comparative analysis of the perspectives on sustainable development and emissions trading reveals that there are substantial problems with the design and that the achievements so far, if any, are too modest when compared with the magnitude of the climate change challenge. It is recognized that in some circumstances, market-based mechanisms can be effective and efficient regulatory tool. However, there is concern that policymakers too often turn to market-based mechanisms without appreciating their weaknesses. This is particularly so in the environmental regulatory space. Although market-based mechanisms are usually the most efficient way to achieve a regulatory goal, they are not always the most effective to do so²⁶⁴. This ineffectiveness is prevalent especially where the policy goal requires an uncompromising approach or an urgent change in behavior, rather than a gradual price-driven change over time²⁶⁵.

²⁶⁴ Rosemary Lyster, *The Australian Carbon Pollution Reductions Scheme: What Role for Complementary Emissions Reductions Regulatory Measures?* (31 UNSWLJ 880, 2008)

²⁶⁵ Prest J, "A Dangerous Obsession with Least Cost" in Gumley W and Daya-Winterbottom T (eds), *Climate Change Law: Comparative, Contractual and Regulatory Considerations* (Lawbook Co, 2009) p 179; Weston D, "Carbon Trading: Much Ado About Nothing" (2009) 99 *Arena* 19; Kirk J, "Emissions Trading in California" (2008) 26(4) *VELJ* 547 at 557-564; Profeta T and Daniels B, *Design Principles of a Cap and Trade Scheme for Greenhouse Gases* (Duke University, 2005) p 2; Michael Power, 'Emissions Trading in Australia: Markets, Law and Justice under the CPRS' (2010) 27 *Environment and Planning Law Journal* 131,136

Further, capturing industrial gases generates much fewer benefits to local people and ecosystems than energy efficiency, renewable energy, and forest projects.²⁶⁶ This is an indicator that market-based incentives may be ineffective in promoting sustainable development and possibly detrimental to the process. The world needs an “ecologically effective” international mechanism that provides incentives to all nations to participate in a plan of action towards slowing the atmospheric buildup of greenhouse gases.

²⁶⁶ Diana M. Liverman, *Carbon offsets, the CDM, and sustainable development*, 136 available at <http://www.environment.arizona.edu/files/env/profiles/liverman/nobelcausebookchapter112.pdf> <accessed on February 21, 2012>

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Cooperation on climate change remains one of the greatest and most uncertain of the political challenges facing the world today. The essence of this challenge is to design an effective climate policy that encourages broad international participation, while limiting claims for international sovereignty. One shade of this challenge is the call for environmental management through sustainable development.

The question facing governments is whether they should adopt an emissions trading scheme as a major component of their strategies to combat global warming. Numerous questions frame this choice and debate: Is an emissions trading scheme an effective way to reduce emissions and combat global warming? Does it harness the market in the most effective way to bring about emissions reductions? Does a cap-and-trade system provide the greatest incentive for companies to innovate new technologies and approaches of reducing emissions? Is a cap-and-trade system the *most efficient* and flexible way to reduce emissions while preserving the integrity of the economy? Is a cap-and-trade system complicated, hard to understand, and costly to manage? Which approach is more feasible? What are the social and environmental justice issues in this debate?²⁶⁷

²⁶⁷ Debate: Carbon emissions trading *Should government adopt emissions trading to combat global warming? Pros and cons?* Available at <http://debatepedia.idebate.org/en/index.php/Debate: Carbon emissions trading> <accessed on September 23, 2012>

The theoretical review of sustainable development undertaken in this paper has emphasized effectiveness in any perceived solution to anthropogenic climate change. Applying the theoretical framework discussed in chapter 1, the sustainable agenda is that only credible, reliable and adequately informed strategies and controls should be adopted and promoted in the effort of protecting the environment and the pursuit of sustainable development: International responses to environmental challenges should therefore be crafted with an eye to their effectiveness.

Chapter 2 of this paper has highlighted that there is widespread consensus that climate change represents a significant potential threat requiring the reduction of man-made greenhouse gas emissions and that the major challenge that we have therefore is to achieve low carbon emissions. Chapter 3 on the other hand underscored the fundamental components of the international climate change legal framework and the analysis there is that the major post-Kyoto challenge remains how international cooperation on climate protection can be protected. Chapter 4 assessed the elements of emissions trading and concluded that the Kyoto Protocol does not hold the promise that was expected at its inception as no meaningful reductions have been achieved to date.

Against the critiques pointed out in chapter 4, the Kyoto Protocol fares poorly and it is far from clear whether emission trading schemes have contributed to emission reduction. An evaluation of these critiques supports the propositions that emissions trading can result in perverse incentives if participation in the scheme is driven by strong and diverse self-interests. Another fair

assessment is that the emissions trading scheme as implemented appears to be skewed towards economic objectives rather than promotion of sustainable development and therefore it not a sustainable practice.

Climate change is a problem which is global both in terms of causes and consequences: the uncertainties are large and likely to persist. Meanwhile, the political and economic stakes of both action and inaction are much higher than those in other transboundary concerns such as acid rain and ozone depletion.²⁶⁸ The change in climate of the world over the past hundred years or so is dramatically illustrated by the way mountain glaciers have retreated, increases in extreme weather events, rising sea level, disappearing polar ice, damaged coral and changes in wildlife distributions. Therefore, given the timescale and urgency of the problem, the United Nations have to organize their response appropriately because global warming is a global problem with critical thresholds.

Current human-induced climate change variability is linked to past economic patterns, which are responsible for the majority of greenhouse gas emissions. Therefore, if climate change is to be effectively addressed, solutions will necessarily affect the global economy.²⁶⁹ To the contrary however the main failing of the climate discussions is that they have not viewed climate as a development problem,²⁷⁰ which approach would activate factual integration of climate policy and sustainable development. The Kyoto Protocol, which is currently at the core of climate change

²⁶⁸ See Abstract in Shardul Agrawala, *Climate Change: Context & Early Origins of the Intergovernmental Panel on Climate Change* (Kluwer Academic Publishers, Netherlands, 1998)

²⁶⁹ Harro Van Asselt, Francesco Sindico and Michael A. Mehling, *Global Climate Change and the Fragmentation of International Law* (Law & Policy, Vol. 30, No. 4, October 2008, Baldy Center for Law and Social Policy) 433

²⁷⁰ Tariq Banuri and Hans Opschoor, *Climate Change and Sustainable Development* (DESA Working Paper No. 56, Economic & Social Affairs, ST/ESA/2007/DWP/56, October 2007) 17

mitigation, has strengths and weaknesses that can provide lessons for the design of future international climate policy architecture. However, this study finds that the economic emissions trading mechanisms are flawed because abating climate change requires deeper emission reduction. If we are to make significant progress in slowing global warming, we will have to do more and do it efficiently.

These findings lead to the conclusion that the emissions trading scheme is not an appropriate model to climate change abatement and that we need to deploy and focus on other efficient measures that can get us to the required emission reductions. This study therefore recommends that in order to meet the criteria of sustainable development, the United Nations need to sanction a globally efficient response to the climate change problem in the form of “the Green Leap” which includes measures such as efficient use of energy and energy conservation, developing renewable energy and advanced clean energy technology and other supply-side options, planting trees that can absorb carbon dioxide, preservation of forests, going solar and saving on electricity, recycling thereby saving the energy to manufacture new products and, large scale changes in agriculture and land-use patterns. As mentioned before, efficiency must be the fundamental principle in the design of climate policies. However, the most definitive option to reducing greenhouse gas emissions would be innovation breakthroughs that would solve our energy problems and which can only be achieved through basic research funding.

Turning to the recent climate change deliberations at RIO+20 which were highlighted in chapter 3 of this paper, we are seeing hopefully trends towards green development in the context of sustainable development, fuelled by demands by stakeholders for clear evidence for policy

effectiveness. Green economy in the context of sustainable development and poverty eradication was one of the principal themes of the United Nations Conference on Sustainable Development (UNCSD), based on the United Nations General Assembly decision that established the Conference. The final outcome of the discussions on this focus area was an affirmation that there are different approaches, visions, models and tools available to each country to achieve sustainable development and the green economy is considered one of the important tools: On implementation policies, there was recognition that each country can choose an appropriate approach, resource efficiency, equitable growth and job creation, and of the importance of evaluating a range of social, environmental and economic factors in decision making.²⁷¹ Going by this review, the fact therefore remains that alternative approaches have not had a serious hearing among natural scientists or among policy makers.

This study therefore proposes application of the long-term 'green' options that were discussed and recommended in the workshops held in Villach (28 September – 2 October 1987) and Bellagio (9-13 November 1987) under the auspices of Beijer Institute, Stockholm²⁷² on policies for climate change for achieving carbon dioxide reductions in a manner consistent with continued economic expansion. These are:

²⁷¹ Earth Negotiations Bulletin: Summary of the Cancun Climate Change Conference (Vol. 12 No. 498, International Institute for Sustainable Development (IISD, 2012) 9 - 10

²⁷² Jill Jaeger (Beijer Institute) *Developing Policies for Responding to Climate Change* (World Meteorological Organization and United Nations Environment Programme, WMO-TD-No. 225, April 1988), 23-24

- 1) Replacing fossil fuel combustion with alternative energy sources. Available options include solar energy, wind energy, hydro-electric power, nuclear power, tidal energy and ocean thermal conversion;²⁷³
- 2) A reduction of fossil fuel use through increases of end-use energy efficiency;
- 3) Reversing the current deforestation trend: Elimination of net forest loss would reduce the amount of fossil fuel reduction needed;²⁷⁴
- 4) Shifting the fossil fuel use mix from high to low carbon dioxide emitting fuels: The carbon dioxide emissions per unit energy differ according to fuel type; the lowest emissions per unit energy are from natural gas.²⁷⁵

The standards for green designs are worth pursuing as they promote focus on better outcomes rather than outputs and therefore would meet the dual objective of economic growth and environmental protection. However, the application of green mechanisms to be effective and to achieve any significant impact will require a collective process amongst the United Nations that would take into account the multiple actors and influencing factors that affect the climate. This is because the issue of climate change usually fits into various sectors, which means that the integration of climate change policies into other policy areas is frequently called for. Consequently, this has resulted in the high complexity of the issue, as the problem needs to be

²⁷³ Jill Jaeger (Beijer Institute) *Developing Policies for Responding to Climate Change* (World Meteorological Organization and United Nations Environment Programme, WMO-TD-No. 225, April 1988), 23

²⁷⁴ Jill Jaeger (Beijer Institute) *Developing Policies for Responding to Climate Change* (World Meteorological Organization and United Nations Environment Programme, WMO-TD-No. 225, April 1988), 24

²⁷⁵ Jill Jaeger (Beijer Institute) *Developing Policies for Responding to Climate Change* (World Meteorological Organization and United Nations Environment Programme, WMO-TD-No. 225, April 1988), 24

addressed as a global common, from multiple scales with diverse actors involved in the complex governance process.²⁷⁶

For these reasons, the principal output of this study is that in climate change mitigation, the perspective of sustainable development can only be achieved by linking policy strategies and the potential for achieving sustainable development. There is a pressing need to tackle climate change and this requires a broad acknowledgment that radical action in reducing emissions of greenhouse gases is the most economically sensible approach.

²⁷⁶ Barry G. Rabe, Beyond Kyoto: Climate Change Policy in Multilevel Governance Systems *Governance: An International Journal of Policy, Administration, and Institutions* (Volume 20, Issue 3, 423-444, July 2007)

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