"Environment" refers to the sum total of conditions which surround man at a given point in space and time. In fact, environment is an inseparable whole and is constituted by interacting systems of physical and biological elements which are interlinked individually as well as collectively in myriad ways.

Since environment is both physical and biological concept, it encompasses both the non-living (abiotic) and living (biotic) components of the planet earth. The biotic component of the environment consists of plants and animals including man as an important factor.

Thus, man is considered as an integral part of the nature and it is expected that there should be harmony and not hostility between man and environment but man has completely defied this expectation. As with the ever-growing population and a consequent need for over-exploitation of natural resources, this harmony has disturbed to a great extent. In the quest of rapid industrial development over the years, the environmental quality has come to be subordinated to material goods. This environmental crisis may safely be regarded as the inevitable result of a counter ecological pattern of productive growth. As for example, modern techniques have enabled the man to construct huge dams and reservoirs for the purpose of irrigation and generation of hydroelectricity which is immensely required by the industrial sector to augment the production process and by the domestic sector to increase the comfort of human beings. Such activities create several environmental problems of greater dimension. Large reservoirs submerge vast areas of natural forests and result in loss of habitat for both the human beings and animals. Similarly leakage of toxic gases from chemical plants not only pollutes the air but also causes death of human beings, plants and animals and causes impairment of human bodies for several years even for generations. Agricultural development also degrades the environment in a variety of ways, e.g. (i) through the application of
chemical fertilizers and pesticides and insecticides, (ii) through the increase in irrigational facilities and amount of irrigation, (iii) by making changes in biological communities etc. Marine oil spill which is due to release of oily refuse or oil mixed waste and flourishing shipping business, is also causing havoc not with the marine lives only but also human beings living in coastal areas. This causes kidney damage, altered liver function, digestive tract irritation and many more life threatening disease in marine lives. Likewise, the development of transport, nuclear technology, space technology, extensive mining of soil resources, unreasonable killing of animal species, unmindful use of drinking water and other nonrenewable resources, all are leading towards irreparable environmental damage in one or other way. All these show that the contemporary scientific and technological revolution has significantly transformed the relationship between man and nature. It has rightly been said that man is nature’s best promise and worst enemy.

We are now facing the serious ecological crises of acid rain, global warming, ozone layer depletion, extinction of marine lives, biodiversity loss, land desertification, degrading Antarctic environment and many more. All of them collectively leading to climate change which is being looked upon as a problem that is building up gradually showing signs such as weird and freaky weather, melting ice-caps, rising seas with many catastrophic consequences, increased risks of drought, frequency of certain diseases, warming and vector related death, decline in crop productivity, extinction of several plants and animal species etc. Experts estimate that by mid-century nearly 250 million people may come under pressure to move out because of intensifying monsoon, flooding, desertification and reduced food production. Maldives fears that it will almost entirely go underwater with a not impossible one meter rise in sea level.¹ So gloomy is the view that it recently announced a move to create a sovereign fund to resettle its population of around 30,000 abroad. It wants the world to treat the issue of climate change as a human rights issue.² Thus, this grave ecological issue may further lead to several socio-economic

and political problems too such as large scale migration of people from island nations may give rise to ethnic problems. Scientist and environmentalist are also predicting a terrible food and water crisis. It is worthwhile to mention that environmental damage may further give a boost to corruption and crime in society due to scarcity. All these are indicating towards an emergency situation which has rightly been described by the Ex-Secretary-General of United Nations Mr. Ban Ki Moon as "the defining challenge of our age".³

In such a scenario not only developing but developed nations too will find it difficult to generate resources for desirable level of progress. Added with the realization that climate change poses a threat to the fragile link between land and its people, it is now imperative to address concerns that are being projected real time by the scientist.

The problem of environmental degradation is global in nature. As, though blame for causing the crisis may be forced on one or more countries, no nation can claim immunity from the ill effects of this ecological crisis. As for example, ozone depleting substances (mainly halones) may be produced in any particular part of the world but the depletion of ozone layer is going to effect the entire world community. Therefore, as the adverse effects of environmental degradation knows no national boundaries, a collective effort on the part of nations shedding their narrow interests is a sin qua non to successfully deal with this chronic situation.

In this behalf, several global environmental regimes have developed over the period to deal with particular environmental issues. These regimes indicate the idea of "governance without government"- in which a combination of different organizations and institutions supply governance to address specific environmental problems through setting norms and patterns of behaviors and regulating the conduct of countries. At the initial stage, various environmental regimes were formed at regional level which in due course of time adopted a global outlook due to increasing awareness towards the problem of environmental degradation. Antarctic Treaty which came into force in 1901 was aimed

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at reserving the Antarctic areas south of 60°s latitude for peaceful purpose. An agreement signed by all the 39 parties in Madrid in 1991 imposed a ban on mineral exploitation in Antarctica for fifty years. Similarly Arctic Council was established in 1989 out of concern for cultural and environmental degradation associated with modern development. The council describes the Arctic region as an environment early warning system for our globe. Basel Convention which was meant to regulate trans-boundary movement of hazardous wastes and their disposal obliged the western countries to register and notify movement of waste to southern countries. Convention on Persistent Organic Pollutants was signed in 2001 with the aim of curbing the use of some of the world's most dangerous and toxic chemicals such as pesticides and dioxins which are blamed for causing death and disease around the world.

International Whaling Commission was set up by the terms of the International Convention for the Regulation of whaling which was signed in 1946 to provide for the proper conservation on whole stocks and thus make possible the orderly development of the whaling industry. However, the IWC has become dominated by governments who appear largely opposed to the practice of commercial v/haling. The result of this shift is most evident in the IWC's adoption of a moratorium on commercial whaling in 1986 which has yet not been lifted and in 1944, creation of the southern ocean whale sanctuary. In 1975, Convention on International Trade of Endangered Species was specifically designed to ensure worldwide protection of endangered flora and fauna. It regulates trade in living specimen as well as products derived from listed species. Convention to Combat Desertification, 1944 provides for an integrated approach towards the physical, biological and socio-economic aspects of desertification. Sofia protocol was negotiated to control the emissions of Nitrogen oxides or their trans-boundary fluxes. It now requires the application of an effects-based approach i.e. the reduction of emissions of compounds, including ammonia, and other

8. https://iwc.int/iwcmain
10. www2.unccd.int/
volatile organic compound, in view of their contribution to photochemical pollution, and acidification and their effects on human health, the environment and material by addressing all significant emission sources.\textsuperscript{11}

Unlike earlier efforts which were limited in both issues and participation, the U.N. Conference on the Human Environment held at Stockholm in 1972 may rightly be reckoned as the first major attempt to solve the global problems of conservation and regulation of human environment by international agreement on a Universal level.

The main contributions of the Stockholm Conference comprises of:

- The Declaration on Human Environment.
- The Action plan for Human Environment.
- The Resolution on Institutional Financial Agreements.
- Resolution on Designation for a World Environment Day.
- Resolution on Nuclear Weapons Test.

The international community has taken unprecedented steps to control and ultimately ban the production of chlorofluorocarbons (CFCs) and other ozone depleting substances (ODS) such as halons and carbon tetrachloride by the year 2000 under.\textsuperscript{12} The Vienna convention on the ozone layer and the subsequent Montreal Protocol on ODS adopted in 1987 set strict time tables for phasing out CFCs and other ODS by 2000 and established rules governing international trade in ODS. Kofi Annan, the Former Secretary General of UNO claimed it to be the most successful regime till date.\textsuperscript{13}

**Earth Summit** 1992 which was culmination of series of UN conferences beginning with the Stockholm conferences on human environment in 1972, was the largest international

\textsuperscript{11} https://www.unece.org/env/lrtap/nitr_h1.html.
\textsuperscript{13} http://www.theozonehole.com/montreal.htm
conference in the history of international relations. It was also held to be the most serious and global attempt made by international community to check the process of environmental degradation. 172 governments participated, some 2,400 representative of NGOs attended with 17,000 people at the parallel NGO "Global Forum", who had so called consultative status. The Earth Summit addressed a long range of issues such as systematic scrutiny of patterns of production, alternative sources of energy, new reliance on public transportation system, the growing scarcity of water etc. An important achievement was an agreement on the climate change convention which in turn led to the Kyoto Protocol.

The Earth Summit resulted in following documents -

• Rio Declaration on environment and development.
• Agenda 21.
• Convention on Biological Diversity.
• Forest principles.
• Framework convention on climate change.

Both conventions on biological diversity and Framework convention on climate change were set as legally binding agreements.

Except above treaties and conventions, several NGOs such as Audubon, Blue water Network, Earth Action Network, Earth Justice, Earth Rights International, Environmental Defense, Environmental Working Group, Friends of the Earth International (FoEI), Global Resource Action Centre for the Environment (GRACE), Greenpeace, National Environmental Trust, Natural Resources Defense Council, National Wildlife federation, Resources for the future, Sierra Club, World Resources Institute, World watch Institute, World Wide Fund for Nature (WWF), International Union for Conservation of Nature

and Natural Resources (IUCN) etc. along with various regional NGOs are also contributing significantly into the effectiveness of global environmental regimes. Inter-continental Panel on Climate Change (IPCC), a constituent body of United Nations which is the apex body working on global warming and its impact, is invaluably assisting various regimes in their functioning.

The Global Learning and Observation to Benefit the Environment (GLOBE), an international scheme and education program with stress on hands-on participatory approach along with Environmental Information System (ENVIS) network and others, is further contributing effectively into the cause of the environmental regimes through creating environmental awareness in people. ISO 14001, a certificate for adoption of Environmental Management System which helps to build a green image of an organization by addressing the immediate as well as long term impact of its products, services and processes on the environment is a very praiseworthy effort by the international body in way of integrating the hitherto contradictory interests of business and environment.

From the development of above and other global environmental regimes, it seems that the world community has very seriously taken the issue of environmental degradation, but it has not proved to be more than an illusion as these regimes except in few cases such as Montreal Protocol, agreement on the end of dumping in North Sea, Dumping of low level radioactive waste, management of Tuna Fisheries in the pacific (all these are counted among the effective regimes), Land based pollution control in the North Sea, the convention on Long-Range Trans-boundary Air Pollution etc. (mixed-performance regimes), are not successful in bringing any significant change. The contribution made by them is too meager to compensate the huge environmental loss.

This urgent issue which is threatening the very survival of the human beings have become politicized whereas the problem is becoming grave day by day. As a report from WWF in 2006 states that resources are depleting, the vertebrate species population have declined about one-third in 33 yrs. from 1970 to 2003. At the same time, the humanity ecological footprint-the demand people place upon the natural world- has increased to the
point where the earth is unable to keep up in the struggle to regenerate. These developments should prompt the whole world to take environmental degradation more seriously than it has taken so far. A sense of urgency is urgently needed.

**Objective of Research**

The proposed research-proposal throws light on the formation of various environmental regimes at global level and objective behind their formation. It further examines their roles in solving or at least managing the problem that led to its creation. While evaluating the performance of various regimes, it also suggests various new mechanism to make these regimes effective so as to make them truly capable to address this global concern which is about to cause havoc not only with the lives of human beings but the whole earth.

**Methodology**

Research of any type is a method to discover information. Critical analysis of articles, data and other important facts that pertain to the project is done to prove a hypothesis or support an idea. This is also true in this case. Here I have tried to prove the hypothesis through studying the historical development of various environmental regimes from time to time and the circumstances those led to their emergence. Further using legal methodology primary sources of environmental laws such as conventions, protocols, treaties along with relevant and authoritative texts have been critically analyzed while examining their effectiveness with a legal perspective. Keeping the legal perspective in mind scientific methodology has also been used to bring objectivity. Authoritative data and findings of various organizations such as NASA and IPCC etc. which are involved in scientific research and collection of relevant data on environmental degradation have also been incorporated and analyzed to support the central idea of the thesis. Thus research on the proposed topic is based on the content analysis of various conventions, treaties and protocols those have be negotiated from time to time on particular environmental issues along with the study of secondary sources such as books, research papers, journals etc. in historical and legal perspective. Interview of few NGOs such as Greenpeace, WWF, etc.
(India) etc. and eminent personalities active in field of environment such as Sundar Lal Bahuguna, Vandana Shiva, etc. have also be conducted to support the findings.

**Review of Literature**

Many prominent scholars from the field of environmental law and other related areas have done a lot of significant work on 'Global Environmental Regimes'. All have analyzed it from a different view point and perspective thereby significantly contributing to the growth of environmental regimes. One of the most prominent authorities on the topic is 'Analysing International Environmental Regimes' written by Helmut Breitmeier, Oran R. Young and Michael Zurn. The book introduces the International Regimes Database (IRD), an important methodological innovation that allows scholars to adopt a quantitative approach to the study of International Regimes. The book describes the database and discusses a number of methodological, technical and architectural issues. This reflects a shift from qualitative and case study to quantitative and database approach.

Another book 'The Effectiveness of International Environmental Regimes (causal connections and behavioral mechanism)' written by Oran R. Young examines how regimes influence the behavior of their member and those associated with them. It discusses the role of several mechanisms through in-depth case studies of three major environmental concerns viz. the international vessel-source oil pollution, shared fisheries and trans-boundary acid rain.

**Environmental Regime Effectiveness** written by D.G. Wester discusses why some international environmental regimes succeed while others fail. It considers what effectiveness in a regime would look like, what factors might contribute to effectiveness and how to measure the variables.

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16 Young, Oran R.: The Effectiveness of International Environmental Regimes (causal connections and behavioral mechanism, MIT Press, 1999
17 Wester, D.G., Environmental Regime Effectiveness, MIT Press, 2002
'Environmental Governance Reconsidered'\textsuperscript{18} by Robert F. Durant, Daniel J. Fiorino and Rosemary O’ Leary is another scholarly attempt to deal with the issue. It examines the "second generation" of environmental reforms, assesses its promise versus performance to date and points out future challenges and opportunities. It emphasizes over the need for a change in bureaucratic, adverbial, technology-based regulatory approach move from "rule-based" to "results-based" regulation.

Effectiveness of international environmental regimes: existing knowledge, cutting-edge themes, and research strategies \textsuperscript{19}, an article written by Oran R. Young and edited by William C. Clark, provides a critical review of the literature on this topic. It extracts and summarizes what is known about the effectiveness of environmental regimes in the form of a series of general and specific propositions. It identifies promising topics for considerations in the next phase of research in the field. Additionally, it comments on the research strategies available to pursue this line of analysis.

A book written by Howard Gumnitzky, entitled ‘The pitfalls of global environmental regimes emphasizes over the fact that international regimes are not without pitfalls. It say that international law is a body of legislation that individual countries may or may not decide to follow. In many cases, international agreements have proven entirely ineffective leading to failures.\textsuperscript{20}

In An Inconvenient Truth\textsuperscript{21}, Former U.S. Vice President Al Gore, lays out a case for the climate crisis and why it is imperative that we solve it. Our climate crisis may, at times, appear to be happening slowly, but in fact it is happening very quickly-and has become a true planetary emergency.

In Six Degrees: Our Future on a Hotter Planet\textsuperscript{22}, Mark Lynas, attempts to summarize results from scientific papers on climate change. Special coverage is given to the positive

\textsuperscript{18} F. Durant, Robert,.Fiorino, Daniel J and O’ Leary ,Rosemary : ‘Environmental Governance Reconsidered,’ MIT Press, 2004
\textsuperscript{19} Young, Oran R. ,Clark, C. William(ed) , Effectiveness of international environmental regimes: existing knowledge, cutting-edge themes, and research strategies, Harvard University Press, 2011.
\textsuperscript{20} Gumnitzky, Howard, Th.e pitfalls of global environmental, PANAS, Fall2009.
\textsuperscript{22} Lynas, Mark, Six Degrees: Our Future on a Hotter Planet, Fourth Estate,2007
feedback mechanisms that could dramatically accelerate climate change. The book explains how the release of methane hydrate and the release of methane from melting permafrost could unleash a major extinction event. Carbon cycle feedbacks, the demise of coral, the destruction of the Amazon rainforest, and extreme desertification are also described, with five or six degrees of warming potentially leading to the complete uninhabitability of the tropics and subtropics, as well as extreme water and food shortages, possibly leading to mass migration of billions of people.

Al Gore in another book Our Choice\(^{23}\) spells out what needs to be done. Based on 30 of Gore's 'Solutions Summits' as well as one-on-one discussions with leading experts across multiple disciplines, the book aims, in Gore's words, "to gather in one place all of the most effective solutions that are available now".

The book Protecting the Ozone Layer: Science and Strategy\(^{24}\) written by Edward A. Parson provides an account of the ozone-depletion issues from the first attempts to develop international action in the 1970s to the mature functioning of the present international regime. It examines the parallel developments of politics and negotiations, scientific understanding and controversy, technological progress, and industry strategy that shaped the issue's development and its effective management. In addition, the book offers important new insights into how the interactions among these domains influenced the formation and adaptation of the ozone regime.

Biodiversity Loss: Economic and Ecological Issues\(^{25}\) edited by Charles Perrings is a guide ecologists to consider the causes and consequences of biodiversity loss. It shows that while the immediate causes of biodiversity loss lie in habitat destruction and harvesting, the underlying causes are incentives that encourage resource users to ignore the effect of their actions these effects include both loss of genetic material, and the collapse of ecosystem resilience--our "insurance" against the fundamental uncertain

\(^{23}\) Gore, Al, Our Choice, Rodale Books, November 2009


\(^{25}\) Perrings, Charles et al. Biodiversity Loss: Economic and Ecological issues, 1997
effects of economic and population growth. The "solutions" are argued to lie in the reform of incentives.

Alan Grainger through his book ‘The Threatening desert: Controlling desertification’, wish to emphasize the fact that Lands lost to desert may effectively be lost forever, so desertification is humanity's most obvious despoliation of the planet. It is certainly one of the most serious environmental problems facing the world today.

Brilliantly attuned to the transience of nature and painfully aware of the precariousness of a polar environment facing global warming, Peter Matthiessen in his book *End of the Earth: Voyages to Antarctica* provides an exquisite account of his voyage through the islands surrounding Antarctica. In lyrical prose, he describes the wildlife he encounters and the region it inhabits, along with historical information regarding the greatest pioneers and adventurers who preceded him.


Matthijs isschemoller through his book 'Problem Solving through International Environmental Agreements: The issue of Regime Effectiveness', argues that for addressing different kinds of environmental problems, we need different kinds of environmental regimes. It then goes on to develop a typology of environmental regimes which can deal with different types of environmental problems.

The Business of Global Environmental Governance written by David L. Levy and

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Peter John Newell takes a political economy approach to understanding the role of business in global environmental politics. It views the evolution of international environmental governance as a dynamic interplay of economic structures, business strategies and political processes.

Gabriela Rutting through his book 'Globalisation and the Environment- Greening Global Economy' argues for on "eco- holistic" approach that merges social, political, economic and environmental analysis, so that a globalizing political economy may be understood in relation to environmental and social concerns.

Towards A Global Climate Regime by Pan Jiahua and Chen Ying discusses how much carbon developed and developing nations will be allowed to emit in the coming years along with one possible solution. The Carbon Budget Proposal (CBP) for the post-2012 era lies in centre of their discussion.

Fariborz Ali in his research paper 'Regime Conflicts in Global Environmental Governance' presents an analytical framework for a particular type of interplay namely for conflicts among international regimes, in particular between environmental and trade regimes. According to him there are two determinants, namely for the power structure and the knowledge structure in which the rivaling regimes are embedded.

Global Environmental Governance, a course organization established by Prof. Liliana Andonova discuss important issues concerned with environmental cooperation and governance including the negotiation of compliance with, and effectiveness of international environmental regimes, the emergence of private and hybrid systems of global environmental governance, and the interplay between international financial, trade and environmental intuitions.

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30 Rutting, Gabrielle' Globalisation and the Environment- Greening Global Economy' Suny Press, 2004
31 Jiahu Pan , and Ying, Chen, Towards A Global Climate Regime, Routledge, 2013
32 Ali, Fariborz ,Regime Conflicts in Global Environmental Governance ,Global Governance Project, 2008
There is a bulk of literature which though not directly based on the topic, relate with the issue of development of global environmental regimes in a variety of ways. Such as 'Cities and Climate Changes', Urban Sustainability and Global Environment written by Harriett Bullkeley\textsuperscript{33} which takes a political economy approach to understanding the role of business in global environmental politics, demonstrating the key roles of business, markets and private actors in shaping international environmental institution and constructing new forms of governance. Another book names 'Scaling Urban Environmental Challenges: from local to global and back'\textsuperscript{34} by Peter Macofullio& Gordon Me Granahon focuses on the spatial dimensions of urban environmental burdens and shows how important it is to take these into account when pursuing environmental justice. Urban Energy transition from fossil fuels to renewable power\textsuperscript{35} by Peter Droege is a cross-disciplinary handbook which covers a range of diverge yet relevant topics, including carbon emissions policy and practice, the role of energy etc.

**Brief Description of Chapters**

The proposed thesis is divided mainly into ten chapters which are as follows:

The first chapter is introductory in nature, which while underlining the significance of the topic described its objectives. It also throws light on the related significant literature and the methodology used for the research.

The second chapter describes the concept of global environmental regimes in detail. It examines the structure and functioning of the existing leading global environmental regimes in light of the changes brought by these regimes.

The third chapter is all-encompassing one that is climate change. It emphasizes that climate change is an issue that cannot be dealt with in isolation with other environmental issues as it on the one hand is the result of other environmental problems, on the other

\textsuperscript{33} Bullkeley, Harriett, 'Cities and Climate Changes', Urban Sustainability and Global Environment, Routledge, 2013

\textsuperscript{34} Macofullio, Peter, Granahon, Gordon Me, 'Scaling Urban Environmental Challenges: from local to global and back', Earthscan, 2007

\textsuperscript{35} Droege, Peter, Urban Energy transition from fossil fuels to renewable power, Elsevier, 2011
promotes them all. So an integrated approach is needed to contain climate change. The fourth chapter deals with the specific issue of ozone layer depletion. While throwing light on the issue, it analyses the existing regimes meant to protect the ozone layer and their effectiveness.

The topic of fifth chapter is loss of biodiversity. It focuses on its causes, effect on overall environment and the human beings. It further examines the related regimes and their strengths and weaknesses along with suggesting measures to further strengthen them.

The sixth chapter concerns with the dumping of toxic wastes and other material that is a major cause of concern for poor and developing countries. While throwing light on the issue it describes its emergence as a trans-boundary issue and measures taken to deal with it.

The seventh chapter deals with the issue of desertification. Describing the problem of desertification in detail, it examines the international conventions and other agreements meant to contain the problems and their effectiveness.

The focus of eighth chapter is Antarctic environment. It analyses various conventions and agreements entered into to protect and preserve the virginity of the zone while underlining the need to keep it intact.

The ninth chapter deals with the most discussed and threatening environmental issue that is global warming. It defines and describes the issue and the measure of carbon-trading suggested as an effective and lucrative means to attract countries to cut their emissions.

The tenth and the last chapter is the extract of all and conclude the thesis with various suggestions and means to make global environmental regimes truly effective and meaningful.