**INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD**
**Faculty of Shariah and Law**


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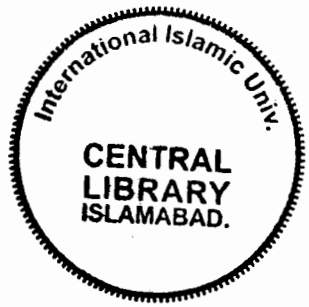
# GLOBAL WARMING: THE GREATEST THREAT TO THE WORLD

**Submitted by**
**MR. NIAZ MUHAMMAD**
**(LL.M International Law)**
**Reg. No. 02-FSL/LLMIL/F04**

**Supervised by**
**MR. MUHAMMAD MUNIR**
**Assistant professor,**
**Faculty of Shariah and Law**



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MS
363.7387
NIG

Accession No TH 5231

① Global warming - Govt. Policy

② Environment Policies & government

# FACULTY OF SHARIAH AND LAW
# INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD.

## CERTIFICATE

It is certified that we have read the dissertation submitted by Niaz Muhammad entitled Global warming: The greatest threat to the world as a partial fulfillment for the award of degree of L. L. M (International Law). We have evaluated the dissertation and found it up to the requirements in its scope and quality for the award of the degree.

**Supervisor:**

Muhammad Munir, Assistant Professor

**Examiners:** (Internal).

Afzal Ahmad, Deputy Dean

**External:**

Tariq Bilal, Advocate Supreme Court

**Dean:**

Professor Dr. Muhammad Tahir Mansuri
Dean, Faculty of Shariah and law

# ACKNOWLEDGEMENT

Thanks to Almighty Allah for his kindness and giving me the patience, vehemence and ability to accomplish the task of understanding this study. I feel immense pleasure in expressing my deepest and heartiest gratitude to Supervisor Mr. Muhammad Munir, Assistant professor, Faculty of Shariah and Law for his generous help, timely guidance, encouragement and positive criticism during the course of study.

I am also thankful to Mr. Sajid Ghafoor, Lecturer Law College, University of Peshawar for his moral and intellectual support in conducting this research work. Sincere thanks are extended to staff of Department of Environmental Sciences, University of Peshawar in general and in particular to the librarian who helped me a lot in searching the relevant books and material for the dissertation.

No words can express the deep debt of gratitude, which I owe to Mr. Said Muhammad, National Centre for Excellence in Geology, who has always been a constant source of generous help, invaluable guidance, moral support and cooperation behind this wholehearted endeavor.

At last to avoid the confusion of the readers, I would like to reveal that the words "Global warming" and "Climate change" have been used interchangeably in the whole dissertation.

Niaz Muhammad

# ABSTRACT

The single greatest problem facing mankind in 5,000 years of civilization is not terrorism, but global warming. It is one of the greatest issues of the present world. It is more dangerous than war or any natural disaster e.g. floods and earthquake, because these things can destroy only a small area or a few countries. But global warming is suffering the whole world at large. In fact, June 2005 was the second warmest June on record (since 1880) according to the National Climate Data Center (NCDC). Furthermore, nine of the top 10 warmest years globally occurred since 1995. Temperatures have risen dramatically in recent decades, and because of global warming pollution can stay in the atmosphere for a hundred or more years, temperatures will continue to increase.

There are more than 35 trace gases that could contribute to possible global warming. Some of these gases naturally exist in the nature while others are produced due to human activity. The major risk of global warming is thought to come from carbon dioxide emissions and other atmospheric gases including CFCs, methane and nitrogen oxides. The impact of carbon dioxide released through human activity since the industrial revolution accounts for about 64 percent of all factors that contribute to observed possible global warming world wide.

There are many causes contributing to global warming but scientists have concluded that human activities are responsible for most of the warming. Human activities contribute to global warming by enhancing green house gases in the atmosphere. The main human activities that contribute to global warming are burning of fossil fuels and the clearing of land. Most of the burning occurs in industries, automobiles and electric power plants that

produce greenhouse gases and consequently contributing to global warming. Other causes of global warming include deforestation, improper disposal of waste, nuclear tests and warfare acts etc.

Continuing global warming could have many damaging effects. It will harm plants and animals and will disturb biodiversity. It could melt enough polar ice to raise the sea level. Due to rising of sea some of the countries will totally disappear from the world. In certain parts of the world human diseases will spread and the crop yield will decline that will badly affect economy of those countries. Recent scientific developments also tell us that hurricanes will get more powerful with warmer oceans caused by global warming. There are many other effects of global warming, which can cause damage to the world at large.

Until 1992, international law did not address climate change directly. Although a number of treaties were already enforced, they did not specifically address the climate change. The first treaty which specifically addresses climate change is the 1992 United Nations Framework Convention on Climate Change (UNFCCC) now accompanied by the 1997 Kyoto Protocol. It remained open for signature until 19 June 1993, by which time 165 states plus the EU had signed. The Convention's ultimate objective is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The key principles incorporated in the treaty are the precautionary principle, the common but differentiated responsibility of states, and the importance of sustainable development.

The Kyoto Protocol is an agreement negotiated as an amendment to the Framework Convention on Climate Change, which was adopted at the Earth Summit in Rio de Janeiro in

1992. The treaty was negotiated in Kyoto, Japan in December 1997, opened for signature on March 16, 1998 and closed on March 15, 1999. The agreement came into force on February 16, 2005 following ratification by Russia on November 18, 2004. It is an agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990. The goal is to lower overall emissions of six greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, HFCs, and PFCs) calculated as an average over the five years period of 2008-12. National targets range from 8% reductions for the European Union and some others to 7% for the US, 6% for Japan, 0% for Russia, and permitted increases of 8% for Australia and 10% for Iceland. The Protocol is unique in the since that it establishes three innovative mechanisms known as joint implementation, emissions trading and clean development mechanism for the purpose of meeting its targets.

As the provisions of Kyoto Protocol are mainly concerned with developed states, so these states can play a very crucial role to make the treaty a success. The response of developed states to Kyoto Protocol is different from country to country based on their economic conditions and national interest. United States, the biggest polluter of the world, has denied ratifying the Protocol but fortunately Russia ratified it in 2004 and it came into force in February, 2005. Climate change (global warming) is a global challenge and requires a global solution. Greenhouse gas emissions have the same impact on the atmosphere whether they originate in Washington, London, Beijing or Islamabad. Consequently, action by one country to reduce emissions will do little to slow global warming unless other countries act as well. Polluter pays principle, precautionary principle, sustainable

development, transfer of soft technology, emissions trading and afforestation are the different techniques provided by international law to halt global warming.

Polluter pays principle means that where pollution occurs, the polluter should be responsible for the costs of dealing with the pollution and its impacts on others. Polluters should be responsible for paying the full costs associated with the health and environmental damage they create. The precautionary approach is widely accepted as a fundamental concept of national environmental laws and regulations in order to protect the environment. According to Article 3 (3) of the Climate Change Convention "The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effect". Technology transfer is another method to control global warming. Technology transfer within the Framework Convention on Climate Change provides both opportunities and incentives for international cooperation. Emission trading is a market mechanism that allows emitters to buy emissions from or sell emissions to other emitters. Emissions trading is expected to bring down the costs of meeting emission targets by allowing those who can achieve reductions less expensively to sell excess reductions to those for whom achieving reductions is more costly. There are hopes for the absorption of carbon dioxide by afforestation as a means of mitigating global warming. Forests absorb $CO_2$, and even after trees are cut they will store carbon for decades if used as building materials. Afforestation and subsequent uses of wood make it possible to slow the pace of global warming. Ultimately, an effective strategy will require commitments and action by all the major emitting countries in order to tackle this menace of the present century.

# TABLE OF CONTENTS

# CHAPTER 1

# INTRODUCTION TO GLOBAL WARMING

## 1.1 GLOBAL WARMING: The concept

The earth's atmosphere has been maintained at a temperature that is comfortable for human, animal and plant life because of the balanced properties of carbon dioxide and other greenhouse gases in the atmosphere. Since the advent of Industrial revolution in 1700s, humans have devised many inventions that born fossil fuels such as coal, oil and natural gas. Burning these fossil fuels as well as other activities such as clearing land for agriculture or urban settlements releases some of the gases that trap heat in the atmosphere. These gases include carbon dioxide, methane and nitrous oxide. All these gases trap heat and causing earth's climate to become warmer than it would naturally.

Scientists call this unnatural heating effect climate change. The term climate change refers to global changes in temperature and wind patterns. These changes are being driven by a gradual warming of the Earth's atmosphere commonly described as global warming. There are more than 35 trace gases that could contribute to possible global warming.[1] Some of these gases naturally exist in the atmosphere while others are produced due to human activities. The major risk of global warming is thought to come from carbon dioxide emissions and other atmospheric gases including CFCs, methane and nitrogen oxides. Carbon dioxide is the most significant of these in volume, although not necessarily in its effects. The impact of carbon dioxide released through human activity since the industrial revolution accounts for about 64 percent of all factors that contribute to observe possible

[1] Howard A. Bridgman, *Global Air Pollution: Problems for the 1990s*, Belhaven Press, London, 1990, p. 93.

global warming worldwide.[2] There are also other factors contributing to global warming including deforestation in developing countries, emissions of methane gas from agricultural sources and the presence of water vapor in the atmosphere. The effects of global warming would be felt worldwide, but not necessarily with the same impact everywhere. Some countries might benefit from a change others might disappear altogether.

Global warming will cause relatively greater damages in developing countries than in industrial countries. There are many factors responsible for it. The much larger share of agriculture in economy is one factor. Another is the incidence of sea level rise that is likely to be relatively high among developing countries. The case of Bangladesh is the best known. The list of the 50 countries expected to suffer the most severe damage from sea level rise contains 49 from the developing world and only one (New Zealand) from the developed.[3]

By the 1980s, concern about global warming has grown to such a level that world's governments decided to take at least some monitoring actions. In 1988, the Intergovernmental Panel on Climate Change (IPCC) was established by United Nations Environment Programme (UNEP) and World Meteorological Organization (WMO) to review the scientific evidence and make recommendations about global warming. Its first report came in June 1990, in which it declared that emissions resulting from human activities are substantially increasing the atmospheric concentrations of greenhouse gases, and if unchecked will result in an average additional warming of the earth's surface greater than

[2] http://www.encarta.msn.com/encylopedia761578504/greenhouse_Effect.html, Last visited, 07-02-2006.
[3] William R. Cline, *The Economics of Global Warming,* Institute for International Economics, Washington DC, 1992, pp. 332-333.

any experienced in the previous 10000 years.[4] Carbon dioxide was estimated to be responsible for half of this enhanced effect. In addition, the report predicted an average sea level rise of up to 65 centi metres by the year 2100.[5]

Many scientists think that this rapid increase of temperature will cause sea level to rise, floods and hurricanes to become worse, a widening of the economic disparities between developed and developing countries and food crises as a result of decreasing agriculture production. It will also cause the disappearance of many wild species of animals and plants and will have negative impacts on human health due to an increase in the incidence of infectious diseases.

Global warming is the greatest environmental challenge man faces in the 21st century and requires a global solution. Greenhouse gas emissions have the same impact on the atmosphere whether they originate in Washington, London, Beijing or Islamabad. Consequently, action by one country to reduce emissions will do little to slow global warming unless other countries act as well. Ultimately, an effective strategy will require commitments and actions by all the major emitting countries to tackle this challenge effectively.

The main objective of this study is three folded i.e., (i) burning issue of the present day (ii) how to deal with this problem and (iii) awareness of the people regarding this problem. The first objective of this study is to go into the detail of the subject with its causes and effects on the human, plants and animals. Once the problem has been discussed in detail

[4] Patricia W. Birnie and Alan E. Boyle, *International Law and the Environment*, Clarendon Press Oxford, 1994, p. 389.
[5] Ibid.

then the solutions to the problem shall be discussed at individual and collective level for the countries. The third objective is to create awareness as this is the greatest challenge facing mankind in the 21st century.

### 1.1.1 Burning issue of the present day:

Global warming is a burning issue of the present day all over the world. The scientific community has reached a strong consensus that the world is undoubtedly warming. This is a national as well as an international issue. An increase in the temperature would bring changes to the whole world and not only to a few countries. We should recognize global warming and its effects on people in both rich and poor countries as a threat to the entire world. This warming is largely occurring due to the emissions of carbon dioxide and other greenhouse gases from human activities. These include industrial and vehicle emissions, nuclear and warfare acts, and changes in the land use such as deforestation. If the emissions of greenhouse gases continued, it will increase global temperature from 2.5 F to 10.4 F by 2100.[6] This warming will have real consequences not only for a few countries but for the whole world. Sea level will rise due to global warming which will cause hurricanes and flooding. It will disturb biodiversity i.e., some animals and plants will totally disappear from the globe. It will also affect agriculture and human health to a great extent. All these affects make it an international issue which needs worldwide responses. A state or a few countries would not be able to tackle this problem. All nations of the world would have to

[6] http://www.pewclimate.org/global-warming-basics/, Last visited, 03-02-2006.

take a strong action to reduce greenhouses gases and consequently reduce global climate change.

### 1.1.2 How to deal with this problem?

Global warming is the most serious problem human being facing in the 21st century. Future generations are depending on us to do whatever we can to tackle this problem. This is a problem that can be slowed and stopped with practical actions only. To find a solution to this problem is not easy but we will have to work individually and collectively if we are to escape from the dangers of this problem.

To protect ourselves, our land and our economy from the effects of global warming we must reduce carbon dioxide and other greenhouses gases.[7] The first step we should take is to stabilize the emissions of greenhouses gases, especially carbon dioxide and methane.[8] These gases are released during use of fossil fuel. The emissions of these gases, now-a-days, have been increased due to industrialization, transportation and deforestation. We can reduce and control these emissions by controlling the use of fossil fuels and deforestation. The growing emission of carbon dioxide from industries and transport can be reduced by the use of lower emission fuel. We can contribute individually through different methods to the solution of this problem. Electric power generation is the largest source of greenhouse gases. An average home contributes more to global warming than an average car.[9] Much of the energy we use in our homes comes from power plants. These power plants burn fossil fuel to

[7] http://www.pewclimate.org/global_warming_basics/, Last visited, 03-02-2006.
[8] Jeremy Leggett, *Global Warming: The Green Peace Report,* 1990, Oxford University Press, p. 129.
[9] http://www.eartheasy.com/article_global_warming.htm, Last visited, 23-02-2006.

power our electric products. To reduce the use of electricity and consequently global warming, we should switch over to energy efficient appliances. We should decrease the use of heater and air conditioner by using it only when it is needed. We should turn off our electric appliances completely when we do not need it, for example turning off the television completely rather than leaving it on stand by. Transport is another area where we can decrease the emission of greenhouse gases. The growing emission of carbon dioxide could be reduced by use of lower emission fuel, for example conversion of diesel engine car into compressed natural gas (CNG) car.

Although it may be difficult to adopt some of these suggestions however any amount of energy saved is significant. As we become more aware of the problem of global warming, we find ways of saving energy where possible in order to reduce global warming. We must use more efficient appliances and equipment in our homes and offices to reduce our electricity needs. We can also phase out the decades-old, coal-burning power plants that generate most of our electricity and replace them with cleaner plants. We can increase our use of renewable energy sources such as wind and sun as, some states are moving in this direction. California has required its largest utilities to get 20 percent of their electricity from renewable sources by 2017, and New York has pledged to compel power companies to provide 25 percent of the state's electricity from renewable sources by 2013.[10] Despite the importance of individuals, efforts, global warming cannot be addressed without the

[10] http://www.nrdc.org/globalWarming/f101.asp#11, Last visited, 28-03-2006.

involvement of international community. Solutions for international community to curb the problem of global warming have been discussed thoroughly in chapter 5.

Climate change is an international issue which needs worldwide study and responses. It is an issue which needs short and long term projects and world wide efforts for its solution. All countries must improve their governance in key sectors such as energy, infrastructure and transport if they wish to curb the problem. In other words we must act in accordance with the recognition that climate change and its effects on people in both rich and poor countries remains a threat to global security.

### 1.1.3 Awareness of the people:

In order to tackle the problem of global warming, awareness of the people is inevitable. Most of the people, especially those from poor and developing countries, are ignorant of this problem. The message must reach every one in the global village in order to bring necessary changes in their behavior regarding environment and global warming. The people should be made aware through electronic and print media regarding the problem and its consequences. The subject of environment should be inserted in the curriculum of schools, colleges and universities at least as an optional subject. There is also a desperate need for simplified guides easily accessible to the public and students on the key climate problems and solutions. Theses booklets, which should focus on both problems and solutions should be supplemented by audiovisuals and computer aids. Theses books and materials should be distributed to schools, training centers and the media.

The problem of global warming is weak at the present and people think it only a change in the climate. It is not only related to change in the climate but it also relates to social, economic and political changes. A serious work is needed to explain these social, political and economic problems to the people because people are more concerned with these problems instead of global warming.

## 1.2 ECONOMY VS GLOBAL WARMING:

Economy and environment are interrelated to each other and cannot be separated. However, there are different opinions of the people regarding the relationship of environment and economy. Some are of the view that there is no relationship between economy and the environment. According to second group there is a relation between the two but policies to improve the environment would slow down economic growth and job creation. The third group is of the view that improving the environment creates more jobs and strengthens economy. For example in a resource rich state clean air, clean streams and healthy forests help to provide the quality of life to people. This makes a state attractive not only for tourists but also to corporate executives looking for a location where their families and employees will want to live.[11] So, if we save economy environment will suffer and economy will grow for the time being only. But on the other hand, if we save environment economy will stand later on and there will be sustainable development. It means that for growth of economy there has to be a friendly environment.

[11] http://www.legis.state.wi.us/assembly/asm77/news/columns/economy_vs_environment.htm, Last visited, 17-04-2006.

To cut the greenhouse gas emissions, especially carbon dioxide is inevitable for the growth and improvement of economy. Some people argue that no policy on global warming is needed because not enough is known about the problem. On the other hand people who contend that atmospheric concentrations of greenhouse gases must be stabilized and reduced whatever the cost. If the temperature increases are at the lower scale there would be little cause for concern but if warming amounts to several degrees the consequences would be catastrophic. In economic terms one estimate is that doubling the carbon dioxide concentrations in the atmosphere would result in damage of 1.4 percent of the world's gross domestic product (GDP).[12]

A number of people suggest that some might gain and others might lose in the event of a global warming of the atmosphere. Although some nations or countries will gain from global warming but in case of significant warming the world as whole would be loser. Also the gain would be only for the time being and not everlasting. Some studies has predicted an eight fold rise in carbon concentrations to the year 2275, which means that the warming is significant and there would be no winners in the future. If strong actions are taken against these concentrations it might result in benefits of up to 20 percent of world's GDP.[13] It has also been estimated that with a 2.5 centigrade rise in temperature the loss to agriculture alone would be $ 40 billion rising to $ 212 billion over the longer term with greater concentrations

[12] http://www.magma.ca/jalrober/chapter10c.htm, Last visited, 10-03-2006.
[13] Sten Nilsson and David Pitt, *Protecting the atmosphere: The Climate Change Convention and its context*, Earthscan publications Ltd. London, 1994, p. 38.

of carbon.[14] These figures clearly show that there would be great loss to the whole world due to increase in temperature and the benefit would be only nominal or nothing.

Global warming is an economic issue because any policy we pursue will involve money. If we take measures to reduce our greenhouse gas emissions, we will have to pay for these efforts. A balanced policy is to be applied to reduce both greenhouse gas concentrations and the damage they caused. The cost of a policy can be estimated by calculating the change that it produces in human well-being. Economist generally agreed that the per ton cost of making the first reductions in greenhouse gas emissions would be small. However, once the cheapest solutions for reducing emissions have been exhausted, the per ton cost would start rising as further reductions are made through more expensive solutions. Most economists believe that total cost of reducing emissions by a significant amount would be high more than 1 percent of GDP.[15] The benefits of global warming policy can be estimated by calculating how much the policy reduces environmental damage. Another question is that how much the economy would be seriously affected by climate change. For some industrial countries it seems that the answer is not more than 1 to 3 percent of GDP.[16] However for other countries including islands nations and countries with very large agricultural sectors the percentage could be much higher.

Making a significant reduction in atmospheric concentrations of greenhouse gases will require international coordination and agreement. When one country reduces its

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[14] Sten Nilsson and David Pitt, *Protecting the atmosphere: The Climate Change Convention and its context*, Earthscan publications Ltd. London, 1994, pp. 38-39.
[15] http://www.planetark.com/dailynewsstory.cfm/newsid/36219/, Last visited, 23-04-2006.
[16] http://www.washingtonpost.com/wp-dyn/content/article/2006/05/02/AR2006050201677.html, Last visited, 23-04-2006.

emissions all countries benefit. But the country reducing emissions will incur a substantial cost and will receive only a fraction of the total benefits achieved by its actions. So the economic incentives for any nation to reduce emissions unilaterally are very small. At the same time all countries would benefit from a greater reduction in global emissions. Some of the benefits of global warming policy can be derived from national income statistics of different countries. The economic sector that is most vulnerable to global warming is agriculture and forestry. This sector accounts for only 2 percent of United States GDP but for more than 60 percent of GDP in Somalia, Uganda and Nepal.[17] It means that the poorer countries will experience greatest relative losses due to global warming. Another sector affected by global warming is rise of sea level that will cause damage to a number of countries. The direct benefits of reducing sea level rise would be very high for some countries but negligible for others. The Intergovernmental Panel on Climate Change (IPCC) has predicted that there will be a 30 to 110 centimeter rise in sea level by 2100.[18] One US study suggests that a one metre rise in sea level would cost the US 0.2 percent of current GDP.[19] The damages would be greater for islands nations and for low lying countries such as Egypt and Bangladesh. Another study estimates that the cost for protecting the Maldives from sea level rise would be about 35 percent of the country's GDP.[20]

[17] http://www.innovations-report.com/html/reports/environment_sciences/report-, Last visited, 27-07-2006.
[18] http://www.eurekalert.org/pub_releases/2006-05/ncfa-sit050106.php, Last visited, 23-04-2006.
[19] http://www.herald.ns.ca/News/501093.html, Last visited, 24-04-2006.
[20] http://www.mercurynews.com/mld/mercurynews/news/local/states/california/northern_california.htm, Last visited, 23-04-2006.

It is clear that costly global warming policies would reduce our wealth today but if they are successful in reducing the global warming damage, they would increase our wealth in the future.

# CHAPTER 2

# CAUSES OF GLOBAL WARMING

There are many causes contributing to global warming but scientists have concluded that human activities are responsible for most of the warming. Human activities contribute to global warming by enhancing green house gases in the atmosphere. Gases that trap heat in the atmosphere are known as greenhouse gases. Some greenhouse gases occurred naturally in the atmosphere while, other result from human activities. Carbon dioxide, methane, nitrous oxide and ozone are naturally occurring greenhouse gases. However human activities add to the levels of most of these gases. Greenhouse gases that are not naturally occurring include hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulfur hexafluoride (SF6). These gases are generated in a variety of industrial processes.

The main human activities that contribute to global warming are burning of fossil fuels and the clearing of land. Most of the burning occurs in industries, automobiles and electric power plants that produce greenhouse gases and consequently contributing to global warming. Other causes of global warming include improper disposal of waste, nuclear tests and warfare acts etc. Following are the main causes of global warming.

## 2.1 INDUSTRIAL EMISSIONS:

Once, all climate changes occurred naturally. However, during the Industrial Revolution, we began altering our climate and environment through changing industrial practices. Before the Industrial Revolution, human activity released very few gases into the atmosphere, but now through fossil fuel burning we are affecting the mixture of gases in the

atmosphere. Carbon dioxide is released to the atmosphere when solid waste, oil, natural gas, coal, wood and wood products are burned. Methane is emitted during the production and transport of coal, natural gas, and oil. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. Very powerful greenhouse gases that are not naturally occurring include hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulfur hexafluoride (SF6). These are generated in a variety of industrial processes. All these gases are called greenhouse gases and are responsible for global warming.

Since the industrial revolution in the mid 1800s, there has been an expanding amount of carbon dioxide emitted into the atmosphere. The burning of fossil fuels provides about 82% of energy needs on a global scale. Of these oil provides 41%, coal 24% and gas 17% of energy needs.[1] During industrial revolution the economically developed countries increased the combustion of fossil fuels, which are mostly carbon. Today fossil fuel combustion is the major source of atmospheric carbon releases which produces extra heat. Our natural system may not be able to cope with the extra heat and overall temperature of the earth will increase. Currently, the industrialized countries in North America, Europe and Japan are most responsible for the emission of GHGs. However, in the future big countries like China, India, Indonesia, Nigeria and Brazil will become major carbon dioxide contributors because of the increasing industrialization and also because of their dependence on coal.[2]

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[1] Howard A. Bridgman, *Global Air Pollution: Problems for the 1990s*, 1990, Belhaven Press, London, p. 93.
[2] Peter Hayes and Kirk Smith, *The global greenhouse regime: Who pays?*, United Nations University Press, 1994, Pp. 3-5.

To reduce industrial emissions of greenhouses gases all the countries must join an effective technique of limiting these gases. The effective technique for limiting $CO_2$ emissions would be to replace fossil fuels with energy sources that do not emit $CO_2$. Alternative energy sources that do not emit $CO_2$ include the wind, sunlight, nuclear energy, and underground steam. Devices known as wind turbines can convert wind energy to electric energy. Solar cells can convert sunlight to electric energy, and various devices can convert solar energy to useful heat. Geothermal power plants convert energy in underground steam to electric energy.[3] Alternative sources of energy are more expensive to use than fossil fuels. However, increased research into their use would almost certainly reduce their cost.

## 2.2 VEHICLE EMISSIONS:

Motor vehicles are responsible for more air pollution than any other single human activity. Greenhouse gases emitted by motor vehicles include Chlorofluorocarbons (CFCs), carbon dioxide ($CO_2$), nitrous oxide ($N_2O$), methane ($CH_4$) and carbon monoxide (CO). These gases are responsible for global warming in the world to a dangerous situation. These gases are emitted from motor vehicles is one of the great causes of global warming. CFCs are the most powerful green house gases contributing to about 24% of the total global warming effect. The other major greenhouse gas is carbon dioxide. When a single tank of gasoline burned, it produces between 300 and 400 ponds of carbon dioxide,[4] which is a

[3] http:/www.nasa.gov/worldbook/global_warming_worldbook.html, Last visited, 21-05-2006.
[4] Jeremy Leggett, *Global Warming: The Greenpeace Report,* 1990, Oxford University Press, p. 261.

major contributor to global warming. Vehicles are also a direct source of methane emissions, although it is not possible to quantify the fully overall proportion from vehicles.

In a number of cases the impact of vehicle emissions also contribute to global warming indirectly, as with carbon monoxide. Carbon monoxide does not trap heat directly and is not considered as an important greenhouse gas. However, it tends to react with other compounds and reduces their presence in the air, as hydroxyl radicals (OH). Hydroxyl radicals normally react with and remove other greenhouse gases such as methane. As hydroxyl radicals are reduced by carbon monoxide, more methane is allowed to survive and rise to the upper atmosphere where it can increase the global warming.[5] So motor vehicle emissions of greenhouse gases can be seen as a major source of climate modification.

By reducing greenhouse gas emissions from vehicles, we can begin to reduce overall emissions of harmful pollutants that cause global warming and threaten our world. For the motor car, California's emission laws are the best and toughest in the world. These rules will take effect from January 2, 2008 and require automakers to annually reduce emissions of greenhouse gases from their total new vehicle fleet. Each manufacturer must reduce average emissions of these gases including carbon dioxide, methane, nitrous oxide and hydro fluorocarbons 22 percent by 2012 and 30 percent by 2016.[6] Studies by many groups have concluded that adoption of California's greenhouse gas standards for new vehicles is the single best option available to reduce emissions from the transportation system.

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[5] M. K. Burke, R. A. Houghton and G. M. Woodwell, *Progress Towards Predicting the Potential forIncreased Emissions of CH4 from Wetlands as a consequence of Global Warming,* 1990, Earthscan Publications Ltd., London, p. 451.

[6] http:www.dec.state.ny.us/website/press/pressrel/2005/2005131.htm, Last visited, 02-06-2006.

## 2.3 EMISSIONS FROM POWER PLANTS:

Atmospheric concentrations of some of the gases that produce the greenhouse effect are increasing due to human activity and most of the world's climate scientists believe this causes global warming. Over one-third of human-induced greenhouse gases come from the burning of fossil fuel to generate electricity. Two of the world's greatest energy users are electricity generation and transport. Both are responsible for huge quantities of greenhouse gas emissions, as most power plants and vehicles still rely on fossil fuels.

America's 500 coal-fired electric generating plants are its largest industrial source of harmful air pollution.[7] From lung damage to asthma attacks to acid rain, haze, and global warming, no economic sector has a greater impact on our environment. Yet there has been a remarkable transformation in the way power plant pollution has been viewed over the past eight years. Nuclear power plants do not emit these gases. Coal-fired generation gives rise to twice as much carbon dioxide as natural gas per unit of power at the point of use, but hydro, nuclear power and most renewables do not directly contribute any. If the entire world's nuclear power were replaced by coal-fired power, electricity's carbon dioxide emissions would rise by a third. Conversely, there is scope for reducing coal's carbon dioxide contribution by substituting natural gas or nuclear, and by improving the efficiency of coal-fired generation itself. Even lawmakers from the largest coal-producing states are calling for reductions in power plant emissions. Thermal power plants also use small quantities of diesel oil and furnace oil as supplementary fuels to boost the combustion and heat content. $CO_2$

[7] http://www.innovations-report.com/html/reports/environment_sciences/report, Last visited, 06-06-2006.

emissions are estimated based on the carbon content in the coal and the excess air used at the power plants.

Emissions of climate changing greenhouse gases from the European Union have increased in 2003, after having fallen in 2002. Emissions in the 15 old member states increased by 1.3% between 2002 and 2003.[8] The overall increase in EU emissions between 2002 and 2003 reflected higher greenhouse gas emissions from energy industries, mainly due to a 5% growth of thermal power production and a 5% increase of coal consumption in thermal power stations. The increase in thermal power production was driven by higher electricity consumption. The largest emissions increase from electricity and heat production was in the UK, Finland and Germany. Substantial increases of coal consumption were the main reason. The increase of emission in Finland was driven by 27% of $CO_2$ from electricity and heat production. This was mainly due to a 45% increase of coal and peat combustion in thermal power plants. Declining electricity imports and hydropower production combined with a sharp increase of electricity exports were driving the thermal power production in Finland. In total Finland's emission increased by 10.8% from 2002 to 2003.[9] Between 2002 and 2003, Denmark and Austria also saw large relative increases in their emissions, 7.3% and 5.9% respectively.[10] The main reason for the large emission increase in Denmark was an increase in electricity exports associated with a sharp increase of coal consumption in thermal power production.

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[8] Gregory H. Aplet and Nels Johnson, *Defining Sustainable Forestry,* Island Press, Washington D.C, 1993, p. 59.
[9] http://www.nasa.gov/worldbook/global_warming_worldbook.html, Last visited, 07-07-2006.
[10] http://www.planetark.org/dailynewsstory.cfm/newsid/36208/story.htm, Last visited, 11-07-2006.

The emissions increase in 2003 was mainly caused by an increase in power production using coal. The colder weather in the first quarter in several EU countries, also contributed to an increased use of fossil fuels to heat homes and offices. The emissions from power plants are mainly consist of carbon dioxide and sulpher dioxide contributing to global warming and climate change.

## 2.4 DEFORESTATION:

It is recognized that $CO_2$ plays a major role in the enhancement of the greenhouse effect and it is also recognized that carbon emissions caused by human is the main cause of global warming. But the role of deforestation in global warming has become a great issue now-a-days because it is the second principal cause of atmospheric carbon dioxide.

Forests are destroyed for several reasons. There is an increasing demand for both farm and grazing land which results in the burning and clearing of forests for agriculture production. The second cause of deforestation is the continued urbanization of the world and the need for construction of roads and industrialization. The need for fuel and timber is another major factor of deforestation. A few hundred years ago, rainforests covered about 14% of the land surface; today they cover a mere 7%. Much of this has been lost over the Last 200 years, mostly following the Second World War.[11] Carbon dioxide accounts for at least one half of the greenhouse effect and deforestation is responsible for 25% of all carbon

[11] Kevin T. Pickering and Lewis A. Owen, *An Introduction to Global Environmental Issues,* 1997, Routledge Publications, p. 352.

emissions entering the atmosphere by burning and cutting millions acres of trees each year. [12] Trees are half carbon and by burning them we release all of that carbon into the atmosphere. One of the most important global aspects of deforestation is the transferred of carbon stored in the forest biomass to the atmosphere. Depending on the extent of the cleared area, deforestation can affect the climate directly at local and regional level with global consequences.[13]

The major threat to the world's forests is human activity. A rapidly increasing world population and its need for more cropland, grazing land and fuel wood are responsible for deforestation. These activities are in an increasing rate in developing countries. To protect the forests from more destruction, there is an urgent need for a comprehensive global forest agreement. Such a convention should be worked on and put in place as soon as possible in order to protect the world's forests.

## 2.5 IMPROPER DISPOSAL OF WASTE:

The disposal of waste represents a major economic and environmental issue throughout the world. Historical trend and waste generation show an increase in the quantity of waste generated for most countries and it is clear that the trend will continue. The treatment and disposal of waste involve a range of processes including landfill, incineration,

[12] http:/www.ecobridge.org/content/g_cse.htm, Last visited, 13-07-2006.
[13] J. Jager and H. L. Ferguson, *Climate Change: Science, Impacts and Policy,* 1991, Cambridge University Press, New York, pp. 392-393.

composting and gasification etc., all of these results in emissions to the environment.[14] Even recycling of waste may involve an increase in emission of gases.

Landfill represents the largest route for the disposal of waste throughout Europe and North America. The modern landfill sites are advanced treatment but the older landfill sites are not well designed and are emitting pollution to the environment. In land fill sites the bio degradation occurs under oxygenated condition. This process depends on the availability of oxygen. The macro organism oxidized the available waste into simpler hydro carbons, carbon dioxide, water and heat. Gases arising from land fill biodegradation mainly consist of hydrogen, carbon dioxide and methane. Gases generated in the land fill will move throughout the mass of waste and diffused to the environment. Incineration is the most common practice for municipal solid waste throughout the world. This is the most air polluting method as compare to other methods of waste disposal. In this process the waste is burnt and various gases like carbon dioxide, nitrogen oxides sulpher dioxide and water vapour are produced. All these gases act as greenhouse gases contributing to global warming.

Open dumping is common practice for disposal of waste in developing countries. In this method waste is transported away from populated area where composting process occur. In this process the micro organisms decomposed the organic matter and convert it into carbon dioxide and other gases. These gases go to the environment causing greenhouse effect. Gasification process of waste disposal has a number of advantages over conventional methods of waste disposal. Depending on technology the waste can be processed to produce

[14] http://english.pravda.ru/news/world/03-05-2006/79799-Global-warming, Last visited, 15-07-2006.

not only energy but also gas or oil products for commercial purposes. When this gas or oil product is used they produce carbon dioxide, carbon monoxide and water vapour, contributing to greenhouse effect.

## 2.6 NUCLEAR TESTS AND WARFARE ACTS:

Nuclear tests and warfare acts are also changing the climate and contributing to global warming. The 16th July 1945 saw the first explosion of a nuclear bomb,[15] and this heralded the period of nuclear bomb tests. All nuclear explosions above the ground and the sea gave rise to tendency for increasing the global temperature of earth's surface. The Last nuclear test in open atmosphere was on 16th October, 1980. All subsequent nuclear tests were under the ground or the sea which does not generates the shock wave reaching the stratosphere. But the tendency of global warming recommenced earlier, approximately in 1977.

On 6th August, 1945 the America dropped a single bomb on Hiroshima and the resulting explosion seared the earth like a fallen sun and a city vanished. Those who survived have forever remembered a blinding white flash, incinerating heat, concessive shock wave and a towering cloud that cast day into darkness. Homes of paper and wood ignited, steel twisted and stone glowed. On 9th August, a second atomic bomb destroyed Nagasaki. In 1954, the United States of America detonated a nuclear bomb on a small ring of pacific islands known as Bikini Atoll which was a thousand time more powerful than the one that

[15] Vladimir Shaidurov, *A report on Atmospheric hypothesis of earth's Global Warming*, Institute of Computational Modeling, Siberia, 2005, p. 3.

incinerated Hiroshima.[16] All such nuclear tests and explosions are creating a lot of heat and hence causing global warming.

In May, 1998 India and Pakistan carried out eleven atomic explosions during the single month. It increased in the severity of droughts and heat in both the countries. These atomic explosions have initiated severe climate changes. As a result of these explosions in the first year it did not rain in Chaghi and Pokhran. Scientists also linked the earthquake of January 2001 in Indian province of Gujrat with underground atomic explosions of May, 1998.[17] The energy released in form of heat light and sudden impart was absorbed by the underneath layers of earth, transforming the physical shapes of rocks and creating huge tectonic movement.

Almost nine different countries including Pakistan are the declared nuclear states and a number of other states have the resources to join this race. If the nuclear experiments were increased, it will endanger the global climate. The need of the time is to study the products of nuclear tests and atomic reactors, with a point of view of their warming potential as greenhouse gases.

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[16] Stephen H. Schneider, *Global Warming: Are We Entering the Greenhouse Century?,* Lutterworth Press Cambridge, 1990, p. 250.

[17] Parvaiz Habibullah, *Global Warming: Subverting disaster of New Millennium*, Allama Iqbal Open University, Islamabad, 2002, p. 78.

# CHAPTER 3

# EFFECTS OF GLOBAL WARMING

Continuing global warming could have many damaging effects. It will harm plants and animals and will disturb biodiversity. Even some of them will totally disappear from the world. It could melt enough polar ice to raise the sea level. Due to rising of sea level, some of the countries will also disappear from the world. In certain parts of the world human diseases like skin cancer, malaria and cataract etc. will spread. The crop yield will also decline in most of the countries that will affect badly economy of those countries. Recent scientific developments also tell us that hurricanes will get more powerful with warmer oceans caused by global warming.[1] There are many other effects of global warming, which can cause damage to the world at large. Some of the main effects of global warming are discussed here.

## 3.1 SEA LEVEL RISE:

Sea level rise is one of the dangerous effects of global warming. Sea level may rise for a number of reasons. Melting of small glaciers, melting of the Greenland and polar ice sheets, thermal expansion of sea water and changes in evaporation in a warmer atmosphere are of particular importance related to global warming. According to Intergovernmental Panel on Climate Change (IPCC) scientists, sea level will rise by between 10 to 30 cm by the year 2030 and by 30 to 100 cm by the end of the next century in the absence of efforts to cut

[1] http://www.euractiv.com/en/sustainability/crashing-carbon-prices-puts-eu-climate-policy-test/article, Last visited, 09-08-2006.

greenhouse gas emissions.[2] However, on March 24, 2006 researchers said in a report in the Journal Science that accelerating meltdown of Antarctic and Arctic ice, along with melting Greenland glaciers will mean a possible 20 foot increase in sea level by the end of the 21st century.[3] A 30 to 50 cm rise in sea-level poses serious problems for the low lying nations and costal zones. A rise of 1 metre would displace populations; destroy low lying urban infrastructure; inundate urban lands; contaminate fresh water supplies and alter coastlines. For example, a 1 metre rise could inundate up to 15% of Egypt's arable land and 14% of Bangladesh's net cropped area.[4] In Bangladesh 144 million people are living in a region the size of Wisconsin, much of it close to sea level and already severely affected by storm surges. The Maldives, a country of about 300,000 people live on a multitude of islands, 80% of which are situated less than 1 meter above mean sea level. About half of those islands that are inhabited are already seeing various degrees of erosion.

There are several possible impacts of rising sea level. Costal land with an alleviation of 1 metre or less would be under threat of inundation. Those parts of the coast presently reclaimed from the ocean would be in increasing danger from flooding. Higher sea- levels would create greater coastal erosion problems, remove sand from present beaches and create changes to the structure and shape of the coastline. Supplies of fresh groundwater presently used for agricultural and human needs may become saline.[5]

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[2] Jeremy Leggett, *Global Warming: The Greenpeace Report,* 1990, Oxford University Press, p. 159.
[3] http://www.ecobridge.org/content/gtht.htm, Last visited, 09-08-2006.
[4] ibid
[5] Howard A. Bridgman, *Global Air Pollution: Problems for the 1990s*, 1990, Belhaven Press, pp. 105-108.

Sea level rise is most serious problem for developing countries and a number of international meetings have addressed this problem. In July 1989, the South Pacific Forum expressed concern over the sea-level rise and the Heads of Government of the Commonwealth declared their support for the efforts of costal and island states to protect themselves against sea-level rise in their 1989 Langkawi Declaration on Environment. The 1989 Mal Small States Conference on Sea Level Rise stressed the serious consequences of sea level rise for low-lying costal and island states and the special responsibility of industrialized states. The United Nations General Assembly's 1989 resolution welcomed the growing international attention the problem was receiving. It urged all states to help the countries concerned and recommended the issue for consideration to IPCC and the United Nations Conference on Environment and Development (UNCED).

## 3.2 FLOODS AND HURRICANES:

Global warming would raise sea level which resultantly would cause floods and hurricanes. Billions of people would be at risk from storms, floods and hurricanes in the coming years as a result of global warming. The big problem is that most countries are not ready to deal adequately with these severe natural disasters. The most serious implications of floods are for the densely populated parts of Nile Delta in Egypt and the Ganges Delta in Bangladesh. In the case of Egypt, around 16% of the populations live in a region which would flood if the sea level rose by 50 cm. In Bangladesh, floods caused the deaths of

300,000 people in the 1970s.[6] Flooding in Mumbai, India in July, 2005 left over 700 dead. Some areas went under 15 feet of water. One of Canada's most devastating floods happened in southern Alberta, Canada in June, 2005. After 3 weeks of flooding, 72 people died.[7] From 1971 to 1995, floods affected more than 1.5 billion people, or 100 million a year; of those, 318,000 people were killed and more than 81 million left homeless. In addition, the number of major flood disasters has risen relentlessly. There were six in the 1950s; seven in the 1960s; eight in 1970s; 18 in the 1980s; and 26 in the 1990s.[8]

Global warming will result in more intense hurricanes because of increasing sea surface temperature. The most destructive hurricane in US history was Hurricane Katrina which ravaged New Orleans, Louisiana and Mississippi in August, 2005. This storm was a week hurricane when crossing Florida, and only gained force later over the warm waters of the Gulf of Mexico. Similarly European heat wave of 2003 was the most severe natural disaster in European history, which caused 30,000 casualties.[9] This evidence strongly suggests that hurricanes will become more destructive as oceans temperatures rise and unchecked rise in greenhouse gases will increase ocean temperatures further.

### 3.3 DISTURBING BIODIVERSITY:

Global warming may have a devastating effect on biological diversity. All species will be affected in one way or another, but some groups of species will be especially vulnerable. There are estimates among scientists that one million species are threatened with

[6] Jeremy Leggett, *Global Warming: The Greenpeace Report,* 1990, Oxford University Press, p. 128.
[7] http://www.en.wikipedia.org/wiki/flood, Last visited, 11-08-2006.
[8] http://www.abc.net.au/science/news/stories/s796319.htm, Last visited, 11-08-2006.
[9] http://www.realclimate.org/index.php, Last visited, 13-08-2006.

extinction by global warming. In the journal Nature researchers say in their study, "Extinction Risk from Climate Change" concluded that from 15 to 37 percent of all the species in the regions studied could be driven to extinction by the climate changes between now and 2050. So because of climate change, one-fourth of all plants and animal species could face extinction by 2100.[10]

Temperatures in the Antarctic and Artic have increased significantly to the point that sea ice has diminished in both the regions. In the Arctic this has meant a decreased habitat for the polar bear. Similarly melting polar ice is threatening the main food source for blue whales and could lead to their extinction. According to World Wildlife Fund (WWF) studies had shown that as the temperature has increased in recent decades, sea ice had diminished rapidly and food supplies for blue whales were getting scarce.[11] If this decline continuous it will seriously affect the entire ecosystem and could lead to the extinction of the Antarctic blue whales. Caribou, alligators, turtles, seals, gray wolf and woodland buffalo may also be threatened by global warming.

Besides these animals a large number of birds are also threatened by global warming. According to International Union for Conservation of Nature (IUCN) report, about 11 percent of all birds are threatened with extinction while two-thirds of the planet's bird species are in a state of decline.[12] The Sooty Shearwater, a U.S west coast bird that at one time numbered 5 million, now numbers about 450,000. Warmer water has reduced upwelling in the Pacific Ocean, which bring the Shearwaters' main source of food, squid and plankton

[10] http://www.ecobridge.org/content/g_tht.htm, Last visited, 20-08-2006.
[11] http://www.ecobridge.org/content/g_ces.htm, Last visited, 20-08-2006.
[12] http://www.centredaily.com/mld/aberdeennews/news, Last visited, 27-08-2006.

to the surface. Over the past two decades, reduced upwelling apparently has caused a 70 percent decrease in zooplankton, a key food source for shearwaters and the small fish that the shearwaters eat.[13] Plant growth and development on all levels may also be influenced by global warming. Some plant species will benefit while others will totally extinct due to global warming. So, there is no doubt that climate change will have a major negative impact on biological diversity.

### 3.4 AGRICULTURE:

Global warming will affect agriculture in two ways, first by the carbon dioxide fertilization effect and second, the climate changes which will also effect growth and yield. The increase of $CO_2$ has an effect on both photosynthesis and temperature. In laboratory experiments it has been shown that increased concentrations of the gas enhance growth in most plants. A doubling of $CO_2$ has increased yields of maize and sugar cane by 10 percent in controlled experiments.[14] But the overall effect of global warming will be destructive for agriculture. It will raise sea level which will cause floods and consequently the problems of soil erosion and drought will occur. An increase in sea level may result in salinization of ground water which will have effects on agriculture and the water supply. Decreases in crop yields will occur due to heat stress and decreased soil moisture. The effect of global warming on agriculture in the tropical regions is likely to be greater than in the temperate regions.

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[13] http://www.livescience.com/environment/060503waring_birds.html, Last visited, 28-08-2006.
[14] David D. Kemp, *Global Environmental Issues: A climatological approach*, 1990 Routledge Publishers, p. 155.

There will be winners and losers in international arena. The European Union may experience increased agricultural yields due to the increase in temperature and precipitation. In contrast the United States may experience decreased yields. The summer of 1988 reduced the North American grain crop by about 30 percent and effected the price of grain globally.[15] Similarly less rainfall in Australia could mean a 15 percent drop in grazing grasses. Although Europe and Russia will likely benefit agriculturally from global warming, places like Africa and Asia will likely experience negative effects such as increased dryness, heat, water shortages and reduced agricultural production. In Africa and Latin America many rainfed crops are near their maximum temperature tolerance, so that yields are likely to fall sharply for even small climate changes.

In agriculture, crops suitable for cultivation will change, and agricultural land may be lost. Since the world's population is continuing to increase, the food supply problem will continue to be one of the greatest problems for humankind. Due to the impact of global warming on agriculture, the world's food situation may reach a crisis point. The rapid progress of warming will damage the vegetation that exists today, since it is difficult for vegetation to adapt to rapid environmental change. For this reason, the forestry industry is threatened as well.

All these influences may combine negatively or positively. The effects are also different depending on the latitude. In temperate countries, effects are found less negative or even rather beneficial, while in tropical and desertic countries they tend to be adverse. Effects also depend on altitude, for example, places at higher altitudes tend to benefit from a

[15] Jeremy Leggett, *Global Warming: The Greenpeace Report,* 1990 Oxford University Press, pp. 125-126.

warmer temperature. Developing countries are likely to have considerably more difficulty adapting to climate change due to many factors, such as less developed technology and less available capital.

### 3.5 HUMAN HEALTH:

Many aspects of human health may be affected by global warming and associated changes in humidity. The developed nations may see an increase in mortality rate and communicable diseases. It is predicted that due to global warming, there is likely to be a considerable rise in the number of summer deaths and Mosquito borne diseases could well increase. The impact of climate change on communicable diseases is not likely to be limited to developed nations. The developing and third world countries will also suffer a lot. Global warming may raise sea level and may increase flooding in Bangladesh, Egypt, Pakistan, Indonesia and Thailand.[16] All these countries have large and relatively poor populations and increased flooding will cause death directly and indirectly through diseases. A study by scientists at the World Health Organization (WHO) determined that 160,000 people die every year from the effects of global warming in which children from developing nations seemingly the most vulnerable. These numbers could almost double by 2020.[17]

Global warming may have an impact on several diseases including cardiovascular, cerebrovascular and respiratory diseases. The effects are likely to be particularly felt by the very elderly, the chronically ill and the very young. The distribution of a range of diseases

[16] Frances Drake, *Global Warming: The Science of Climate Change,* 2000, Oxford University Press, p. 205.
[17] http://www.ecobridge.org/content/g_cse.htm, Last visited, 07-07-2006.

including malaria, trypanosomiasis, leishmaniasis, amoebiasis, filariasis, onchocerciasis and various worm infestations is correlated with temperature and could be effected by global warming. There are also a number of other non-parasitic communicable diseases whose distribution is related to temperature including yellow fever, dengue and other arbovirus diseases, plague, and dysentery and other diarrhoeal conditions. [18] Global warming may also result in increased cataract formation leading to increased numbers of blind people, especially in the third world countries. In addition the incidence of skin cancer is likely to increase as a result of increasing exposure to ultraviolet radiation. Asthma and hay fever may also tend to increase in summer months, due to temperature rise.[19] So, global warming is responsible for many types of diseases not only in third world countries but in developing and developed countries also. It is a problem of not one country or region but of the whole world and all the states should combine to tackle this problem.

[18] L. D. Gillett, *Increased Atmospheric Carbon Dioxide and the Spread of Parasitic Diseases*, 1981, Oxford University Press, p. 458.
[19] Jeremy Leggett, *Global Warming: The Greenpeace Report*, 1990 Oxford University Press, pp. 149-152.

# CHAPTER 4

# INTERNATIONAL LAW AND GLOBAL WARMING

International law concerning climate change consists of customary international law and treaty law. Customary international law provides some general guidance on the legal implications of climate change. An unwritten international norm becomes part of customary law if it is consistently followed over a long period of time by a significant number of states which accept it as a legal obligation. For example, if a particular commitment to act is repeatedly expressed at important international conferences, and if all the participating states act in accordance with it, then the commitment may become an obligation under customary law.

Existing customary law affirms the sovereign right of states to manage their own natural resources, although this right is by no means absolute. Customary law also prohibits a state from allowing activities on its territory to inflict serious damage on the environment of other states or on parts of the environment that do not belong to any state. Although states are not prohibited from causing any environmental damage at all, they must make reasonable use of common resources such as the atmosphere. The problem is what is reasonable? Exactly how much carbon dioxide is a state permitted to release into the atmosphere? How much forest may it turn into agricultural or industrial land? Customary law has no definite answers. These questions should be answered by treaty law.

Until 1992, international law did not address climate change directly. Because climate change is a phenomenon of unprecedented scale and character, traditional legal

concepts and mechanisms provided by treaties and customary law do not help much.[1] A number of treaties already in force, notably the Geneva Convention on Long-Range Transboundary Air Pollution and the Montreal Protocol on Substances That Deplete the Ozone Layer, do deal with atmospheric pollution. The amended 1987 Montreal Protocol on Substances That Deplete the Ozone Layer legally obliges its parties to phase out chlorofluorocarbons (CFCs) by the year 1996. Similarly, the 1979 Geneva Convention on Long-Range Transboundary Air Pollution and its protocols regulate the emission of noxious gases, some of which are precursors of greenhouse gases. However, they do not specifically address the climate change as such. The first treaty which specifically addresses climate change is the 1992 United Nations Framework Convention on Climate Change (UNFCCC) now accompanied by the 1997 Kyoto Protocol. Climate Change Convention recognizes the common but differentiated responsibilities and respective capabilities of states in implementing the obligation to protect and preserve the climate system for the benefit of present and future generations.[2]

## 4.1 CLIMATE CHANGE CONVENTION:

The United Nations Framework Convention on Climate Change is the first binding international legal instrument that deals directly with climate change. The Convention was negotiated and drafted by the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC), a body established by the UN General

[1] Patricia W. Birnie and Alan E. Boyle, *International Law and the Environment*, 1994, Calrendon Press, Oxford, p. 414.
[2] United Nations Framework Convention on Climate Change, 1992, Article 3 (1).

Assembly. Participation in the INC/FCCC was open to all member states of the UN and its specialized agencies, and efforts were made to involve as many states as possible. The INC/FCCC took just 15 months to draft the Convention. The Convention was officially opened for signature at the UN Conference on Environment and Development (UNCED). During the Conference, also known as the Rio Earth Summit, the Convention was signed by 154 heads of states, as well as by European Union. It remained open for signature until 19 June 1993, by which time 165 states plus the EEC (now EU) had signed. The Climate Change Convention entered into force on 21 March 1994, 90 days after the 50th ratification. It is the first binding international legal instrument to address the issue of global warming specifically.

### 4.1.1 Main Articles:

Article 1 of the Convention defines "climate change" as a change of climate that alters the composition of the global atmosphere, attributed directly or indirectly to human activities.[3] "Emissions" is the release of greenhouse gases into the atmosphere over a specific area and period of time."[4] "Greenhouse gases" has been defined as those gases that absorb and re-emit infrared radiation."[5]

The Convention's ultimate objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic

[3] United Nations Framework Convention on Climate Change, 1992, Article 1(2).
[4] Ibid, Article 1(4).
[5] Ibid, Article 1(5).

interference with the climate system."[6] To achieve this objective, the Convention sets out a series of commitments. It sets out principles and general commitments, leaving more specific obligations to future legal instruments. The key principles incorporated in the treaty are the precautionary principle, the common but differentiated responsibility of states, and the importance of sustainable development.[7] The general commitments, which apply to both developed and developing countries, are to adopt national programmes for mitigating climate change; to develop adaptation strategies, to promote the sustainable management and conservation of greenhouse gas "sinks", to take climate change into account when setting relevant social, economic, and environmental policies, to cooperate in technical, scientific, and educational matters and to promote scientific research and the exchange of information.[8]

The Convention also establishes more specific obligations for particular categories of states. It distinguishes between members of the OECD (listed in Annex II to the Convention), countries in transition to a market economy (Eastern European countries which, together with the OECD countries, are listed in Annex I), and developing countries. The Convention requires OECD countries to take the strongest measures, while the states in transition to a market economy are allowed certain flexibility. The Convention recognizes that compliance by developing countries will depend on financial and technical assistance from developed countries.[9] This approach is consistent with the widely recognized principle of the common but differentiated responsibility of states at different levels of development.

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[6] United Nations Framework Convention on Climate Change, 1992, Article 2.
[7] Ibid, Article 3.
[8] Ibid, Article 4 (1).
[9] Ibid, Article 4 (2-7).

Developed countries and states in transition to a market economy must take the lead in adopting measures to combat climate change. They should take measures designed to limit emissions of carbon dioxide and other greenhouse gases, with the aim of returning to 1990 emissions levels by the year 2000. However, the differing economic circumstances of these countries are to be taken into account, and several states may together adopt a common, joint target.[10]

The Convention establishes institutions to support efforts to carry out commitments and to monitor compliance. The Conference of the Parties (COP) is the Convention's supreme body in which all Parties states that have ratified are represented. According to the Convention, It will meet for the first time in March 1995 and on a yearly basis thereafter. It will promote and review the implementation of the Convention under Article 7 and, if appropriate, adopt amendments, annexes, and protocols under Article 15. The Convention's Secretariat will provide administrative support and ensure the flow of information among Parties.[11] The INC/FCCC Secretariat is providing these services on an interim basis under Article 21. The COP will be assisted by two subsidiary bodies, one for scientific and technological advice (SBSTA) and the other for implementation (SBI).[12] The COP can also set up additional bodies if it so decides.

Under Article 12, the Convention creates its own institutions for monitoring compliance. Parties to the Convention must regularly provide information on their performance to the Conference of the Parties (COP). These documents are made available to

[10] United Nations Framework Convention on Climate Change, Article 4 (2).
[11] Ibid, Article 8.
[12] Ibid, Articles 9-10.

all other parties and discussed by the COP. Two subsidiary bodies are created by the Convention to provide expert advice for assessing the reports and the effectiveness of the measures that parties take. In this way, all parties will know if a state is not meeting its commitments. This can provide an incentive for a state to comply with its obligations so as to avoid a negative international reputation.

Any party can raise questions about whether another party has complied with its commitments under the Convention.[13] If possible this should be done through negotiation or other peaceful means. Alternatively, the parties may use more traditional methods of dispute settlement, including conciliation, arbitration, and adjudication. The parties concerned could agree to bring the dispute before the International Court of Justice or to another agreed forum.[14] Legally, the resulting decision would have to be respected. The decision of the court or arbitrator may oblige a state to honour its commitments in the future, restore the damaged parts of the environment, or pay compensation. One possible drawback of this approach is that all states involved in the dispute must have previously accepted the jurisdiction of the arbitrator or court.

The Climate Change Convention is a major step forward in the international response to climate change. Much work remains to be done, however. Many states still need to ratify the Convention and formulate national laws and policies that will enable them to meet their commitments. Until the first session of the COP, the INC/FCCC will continue to meet and

[13] http://www.livescience.com/environment/060503waring_birds.html, Last visited, 07-08-2006.

[14] United Nations Framework Convention on Climate Change, 1992, Article 14.

work on outstanding issues. The COP itself will have an enormous amount of work to do to ensure that the Convention is a success in the years and decades to come.

## 4.2 KYOTO PROTOCOL:

The Kyoto Protocol is an agreement made under the United Nations Framework Convention on Climate Change (UNFCCC). It is an agreement negotiated as an amendment to the Framework Convention on Climate Change, which was adopted at the Earth Summit in Rio de Janeiro in 1992. The treaty was negotiated in Kyoto, Japan in December 1997, opened for signature on March 16, 1998 and closed on March 15, 1999. The agreement came into force on February 16, 2005 following ratification by Russia on November 18, 2004. As of April 2006, a total of 163 countries have ratified the agreement representing over 61.6% of emissions from Annex I countries.[15]

All parties to the UNFCCC can sign or ratify the Kyoto Protocol, while non-parties to the UNFCCC cannot. Countries that ratify this protocol commit to reduce their emissions of carbon dioxide and five other greenhouse gases, or engage in emissions trading if they maintain or increase emissions of these gases. Most provisions of the Kyoto Protocol apply to developed countries, listed in Annex I to the UNFCCC.

[15] http://www.planetark.org/dailynewsstory.cfm/newsid/36208/story.htm, Last visited, 14-09-2006.

### 4.2.1 Main Articles:

The definitions contained in Article 1 of the Climate Change Convention shall also apply to the Kyoto Protocol.[16] Article 2 of the Protocol obliges Annex 1 states to take action on a range of matters additional to those already covered by the convention. These include energy efficiency, promotion of renewable energy, reduction or phasing out of tax and subsidies that contravene the objective of the convention and control of emissions from ships and aircrafts.

The Kyoto Protocol is an agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990.[17] The goal is to lower overall emissions of six greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, HFCs, and PFCs ) calculated as an average over the five-year period of 2008-12. National targets range from 8% reductions for the European Union and some others to 7% for the US, 6% for Japan, 0% for Russia, and permitted increases of 8% for Australia and 10% for Iceland. The Protocol is unique in the since that it establishes three innovative mechanisms known as joint implementation, emissions trading and clean development mechanism for the purpose of meeting its targets.

According to the idea of joint implementation, two or more states listed in Annex 1 of the Convention may agree to fulfill their protocol commitments by aggregating their combined emissions, provided these are with in the total assigned limits for those states as a

[16] Kyoto Protocol, 1997, Article 1.
[17] Ibid, Article 3.

group.[18] It does not matter that some of these states exceed their individual emissions limit. This provision is mainly intended to help the European Union by enabling its less developed countries to increase emissions at the expense of other members. Annex 1 states may agree on another form of joint implementation whereby one party receives credit against its emissions limit for supporting projects that reduce the emissions of another Annex 1 party.[19] Technology transfer, energy efficiency and forest conservation schemes are examples of such projects. Any such project must result in emissions reduction or removal by sinks.

Article 17 of the Protocol allows Annex 1 parties to trade emissions permits internationally. Permits would be allocated to each party in accordance with its carbon emissions limit. It would then be free to transfer permits or to acquire more, but the number in circulation would never exceed the total permitted volume of carbon emissions. Under an international emissions trading system, the total GHG emissions of each industrialized country would be limited according to the emission targets agreed upon in the Kyoto Protocol. Countries subject to these targets would be allocated Assigned Amount Units, the total of which cannot exceed the limits for GHG emissions in the Protocol. Countries could then allocate emission permits to entities representing emission sources within their country, which would enable individual sectors or firms to participate in the international system. If a participant does not need all of its allocated emission permits, it can then sell or trade them to another participant who needs them to cover its emission needs. Emission trading therefore provides a financial incentive for reduction of GHGs below required levels. Through

[18] Kyoto Protocol, 1997, Article 4.
[19] Ibid, Article 6.

emissions trading, a market price emerges which reflects the cost of pollution reduction. Each participant can then decide whether it is cheaper to reduce emissions or to purchase permits or credits.

The Protocol also provides for the idea of clean development mechanism (CDM).[20] It enables Annex 1 developed states to fulfill their emissions limits by funding projects which assist non-Annex 1 parties to achieve sustainable development and which results in long term benefits related to the mitigation of climate change.

According to Article 5, Each Party included in Annex I shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases. Each Party included in Annex I shall also incorporate in its annual inventory the necessary supplementary information for the purposes of ensuring compliance with the commitments of the Protocol.[21] Such information shall be submitted annually. Such information shall be reviewed by expert review teams pursuant to the relevant decisions of the Conference of the Parties.[22] Expert review teams shall be coordinated by the secretariat and shall be composed of experts selected from those nominated by Parties to the Convention. The expert review teams shall prepare a report to the Conference of the Parties serving as the meeting of the Parties to this Protocol, assessing the implementation of the commitments of the Party and identifying any potential problems in, and factors influencing, the fulfillment of commitments. Such reports shall be circulated by the secretariat to all

[20] Kyoto Protocol, 1997, Article 12.
[21] Ibid, Article 7.
[22] Ibid, Article 8.

Parties to the Convention. The Meeting of the Parties shall, with the assistance of the Subsidiary Body for Implementation and the Subsidiary Body for Scientific and Technological Advice, consider the information submitted by parties and shall take decisions on any matter required for the implementation of the Protocol.[23] One of the innovative features of the Protocol is that before national reports are considered by the subsidiary body and the COP/MOP an in-depth review is conducted by a team of experts.

Parties to the Convention that are not Parties to the Protocol will be able to participate in Protocol-related meetings as observers. It is required to meet regularly and to keep the adequacy, implementation and effectiveness of both instruments under review.[24] For this purpose it receives advice from supplementary bodies for science and technology, and implementation.[25] The former assesses the state of scientific knowledge relating to climate change and the effects of implementation measures. The latter assists the COP/MOP in the assessment and review of the effective implementation of the Convention and the Protocol and considers reports from parties under Article 7 of the Protocol concerning implementation and projected emissions. It is this body which has also been responsible for developing details guidelines on issues such as transfer of technology and consultation with NGOs and business. Both supplementary bodies are composed of experts acting as governmental representatives.

According to terms of the protocol, it enters into force "on the ninetieth day after the date on which not less than 55 Parties to the Convention, incorporating Parties included in

[23] Kyoto Protocol, 1997, Article,
[24] Ibid, Article 13.
[25] Ibid, Article 15.

Annex I which accounted in total for at least 55 per cent of the total carbon dioxide emissions for 1990 of the Parties included in Annex I, have deposited their instruments of ratification, acceptance, approval or accession."[26] Of the two conditions, the 55 parties' clause was reached on May 23, 2002 when Iceland ratified. The ratification by Russia on 18 November 2004 satisfied the 55 percent clause and brought the treaty into force, effective February 16, 2005.

### 4.3 ROLE OF DEVELOPED STATES:

As the provisions of Kyoto Protocol are mainly concerned with developed states, these states can play a very crucial role to make the treaty a success. The response of developed states to Kyoto Protocol is different from country to country based on their economic conditions and national interests. United States, the biggest polluter of the world, has denied ratifying the Protocol but fortunately Russia ratified it in 2004 and it came into force in February, 2005. The position of different developed countries regarding the Protocol is discussed below.

#### 4.3.1 Position of the United States:

The United States of America (USA), although a signatory to the protocol, has neither ratified nor withdrawn from the protocol. The signature alone is mostly symbolic, as the protocol is non-binding over the United States unless ratified. On July 25, 1997, before the Kyoto Protocol was to be negotiated, the U.S. Senate unanimously passed by a 95–0 vote

[26] Kyoto Protocol, 1997, Article 25.

the Resolution, which stated that the United States should not be a signatory to any protocol that did not include binding targets and timetables for developing as well as industrialized nations or "would result in serious harm to the economy of the United States".[27]

The President, George W. Bush, has indicated that he does not intend to submit the treaty for ratification, because of the strain he believes the treaty would put on the economy.[28] He is not happy with the details of the treaty. For example, he does not support the split between Annex I countries and others. The world's second-largest emitter of greenhouse gases is China. [29] Yet, China was entirely exempted from the requirements of the Kyoto Protocol. India and Germany are among the top emitters. Yet, India was also exempted from Kyoto.

In June 2002, the American Environmental Protection Agency (EPA) released the "Climate Action Report 2002". Some observers have interpreted this report as being supportive of the protocol, although the report itself does not explicitly endorse the protocol. Later that year, Congressional researchers who examined the legal status of the Protocol advised that signature of the UNFCCC imposes an obligation to refrain from undermining the Protocol's object and purpose, and that while the President probably cannot implement the Protocol alone; Congress can create compatible laws on its own initiative.

The position Bush has taken on climate change has shifted with a gradual increasing acceptance that global warming is a problem, and that it is partly caused by human activity. The United States has signed the Asia Pacific Partnership on Clean Development and

[27] Susan R. Fletcher, *Global Climate Change Treaty: The Kyoto Protocol*, CRS Report for Congress, 2000.
[28] http://www.cs.ntu.edu.au/homepages/jmitroy/sid101/uncc/fs201.html, Last visited, 22-07-2006.
[29] http://www.washingtonpost.com/wpdyn/content/article/2006/05/02/AR2006050201484. html, Last visited, 12-07-2006.

Climate,[30] a pact that allows those countries to set their goals for reducing greenhouse gas emissions individually, but with no enforcement mechanism. Supporters of the pact see it as complementing the Kyoto Protocol whilst being more flexible whilst critics have said the pact will be ineffective without any enforcement measures. Nine north-eastern states and in California, Republican Governor Arnold Schwarzenegger, along with 187 mayors from US towns and cities, have pledged to adopt Kyoto style legal limits on greenhouse gas emissions.

### 4.3.2 Position of Russia:

The Russian President, Vladimir Putin, approved the treaty on November 4, 2004 and Russia officially notified the United Nations of its ratification on November 18, 2004. With that, the Russian ratification is complete. The issue of Russian ratification was particularly closely watched in the international community, as the accord was brought into force 90 days after Russian ratification (February 16, 2005). President Putin had earlier decided in favour of the protocol in September 2004, along with the Russian cabinet. As anticipated after this, ratification by the lower and upper house of parliament did not encounter any obstacles.

Kyoto Protocol limits emissions to a percentage increase or decrease from their 1990 levels. Since 1990, the economies of most countries in the former Soviet Union have collapsed, as have their greenhouse gas emissions. Because of this, Russia should have no problem meeting its commitments under Kyoto, as its current emission levels are

[30] http://en.wikipedia.org/wiki/Kyoto_Protocol, Last visited, 09-05-2006.

substantially below its targets. Even Russia will benefit from selling emissions credits to other countries in the Kyoto Protocol.

### 4.3.3 Position of the European Union:

On May 31, 2002, all fifteen then-members of the European Union deposited the relevant ratification paperwork at the UN. The EU produces around 22% of global greenhouse gas emissions, and has agreed to a cut, on average, by 8% from 1990 emission levels. The EU has consistently been one of the major supporters of the Kyoto Protocol. In December, 2002, the EU created a system of emissions trading in an effort to meet these tough targets. Quotas were introduced in six key industries: energy, steel, cement, glass, brick making, and paper/cardboard.[31] There are also fines for member nations that fail to meet their obligations. Current EU projections suggest that by 2008 the EU will be at 4.7% below 1990 levels.[32]

The position of the EU is not without controversy in Protocol negotiations, however. One criticism is that, rather than reducing 8 percent, the EU should cut 15 percent as they said they would during the negotiation. Also, emission levels of former Warsaw Pact countries who now are members of the EU have already been reduced as a result of their economic restructuring. This may mean that the region's 1990 baseline level is inflated compared to that of other developed countries, thus giving European economies a potential competitive advantage over the U.S.

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[31] http://www.cs.ntu.edu.au/homepages/jmitroy/sid101/uncc/fs201.html, Last visited, 23-05-2006.
[32] http://english.pravda.ru/news/world/03-05-2006/79799-Global-warming, Last visited, 11- 05-2006.

### 4.3.4 Position of Canada:

On December 17, 2002, Canada ratified the treaty. While numerous polls have shown support for the Kyoto protocol, there is still some opposition, particularly by some business groups, non-governmental climate scientists and energy concerns, using arguments similar to those being used in the US. There is also a fear that since US companies will not be affected by the Kyoto Protocol that Canadian companies will be at a disadvantage in terms of trade.

In 2005, the result was limited to an ongoing "war of words", primarily between the government of Alberta (Canada's primary oil and gas producer) and the federal government. There are even fears that Kyoto could threaten national unity, especially in Alberta. On April 25, 2006, Rona Ambrose, the environment minister announced that Canada would have no chance of meeting its targets under Kyoto, and would instead look to participate in U.S. sponsored Asia Pacific Partnership on Clean Development and Climate.[33] On May 2, 2006, it was reported that environmental funding designed to meet the Kyoto standards has been cut, while the Harper administration develops a new plan to take its place.

### 4.3.5 Position of Australia:

Despite the fact that Australia was at the time of the negotiation already one of the biggest emitters on per capita basis, the country was granted an easy target of 8 percent increase. This is because Australia used its relatively smallness as a negotiation tool while other big players were negotiating. And the result of the negotiation was reported in its media as success. However, Australia has refused to sign the Agreement. The Australian

[33] http://www.canada.com/ottawacitizen/news/story.html?id=4aaaf378, Last visited, 10-06-2006.

Prime Minister, John Howard, has argued that the protocol would cost Australians jobs, and that Australia is already doing enough to cut emissions.[34] The Federal Opposition, the Australian Labor Party, is in full support of the protocol and it is currently a heavily debated issue within the political establishment. The opposition claims signing the protocol is a "risk free" prospect as they claim Australia would already be meeting the obligations the protocol would impose. As of 2005, Australia was the world's largest emitter per capita of greenhouse gases.

The Australian government, along with the United States, agreed to sign the Asia Pacific Partnership on Clean Development and Climate at the ASEAN regional forum on 28 July 2005.

## 4.4 CASE OF DEVELOPING STATES:

A crucial question for international cooperation on global warming is that whether the developing countries should participate in emissions reduction. Some argue that because the industrial countries have been the main emitters in the past, and because developing countries are too poor to undertake the additional burden of carbon restraints, the developing nations must be exempted from any such restrictions. Other argue that although developing countries are emitting only 30 percent of carbon dioxide today,[35] projections show that they are likely to play a massive role in expansions in future. It is unambiguous that some limitations on developing countries are required if global warming is to be abated. By the

[34] http://www.innovations-report.com/html/reports/environment_sciences/report, Last visited, 10-06-2006.
[35] William R. Cline, *The Economics of Global Warming*, Institute for International Economics, Washington DC, 1992, p. 336.

year 2100 carbon emissions in these countries alone would be almost twice the entire global level today.[36]

The United States of America had denied to be a signatory to any protocol that did not include binding targets and timetables for developing countries. The United States had taken a firm position that participation of developing countries in commitments made in the protocol is critical to achieve the goals of the treaty. The US government also argued that success in dealing with the issue of global warming would require such participation. The developing countries bloc argued that the terms of reference of Kyoto negotiations clearly exclude them from new commitments. The United States indicated that it will not ratify the protocol until meaningful commitments are made by developing countries.

The present government of President Bush has also rejected the Kyoto Protocol. Bush's rejection of Kyoto was strongly based on a belief that it did not adequately address the international community. US has refused to sign up also because it believes the treaty's binding targets are too costly for the US economy. It is also unfair because fast growing developing countries are not part of the targeted emissions cuts. The United States has been upset that India and China were included as developing countries and was thus not held to the same emissions reduction standards as developed countries. China, India and other emerging countries that requires large amount of energy to fuel their rapid growth must also be fully involved in any effective remedy to combat global warming.[37] Because of its large

[36] Ibid, pp. 337-338.
[37] News, October 31, 2005.

population and heavy reliance on its massive reserves of coal, China accounts for 11 percent of global carbon emissions.[38]

But if one goes through the provisions of Kyoto it will become clear that the protocol does call on both developing and developed countries to take a number of steps to formulate national and regional programmes to improve local emission factors, activity data models and national inventories of greenhouse gas emissions and sinks that remove these gases from the atmosphere. All parties are also committed to formulate, publish and update climate change mitigation and adaptation measures, and to cooperate in promotion and transfer of environmentally sound technologies and in scientific and technical research. With the Clean Development Mechanisms (CDM), developed countries will be able to use certified emissions reductions from project activities in developing countries. On the other hand developing countries will be able to receive the kind of technology that can allow them to sustainable development. These provisions clearly show that it is not only developed states that are obliged by the Protocol but the developing countries have also some responsibilities to make the treaty a success.

In developing countries emissions are far lower in volume when estimated on a per capita basis. On the other hand they are higher in the affluent world. Up to now, with only 15 percent of the world's population, rich countries have been responsible for more than 75 percent of global carbon dioxide emissions.[39] However it is developing countries that are

[38] William R. Cline, *The Economics of Global Warming*, Institute for International Economics, Washington DC, 1992, p. 340.
[39] News Friday, March 4, 2005.

most vulnerable. It is unrealistic to ask poor countries to bear the costs associated with the much needed technological change.

In fact, there is little that developing countries can do. It is the United States of America, the biggest polluter of the world, which must realize its responsibility by ratifying the Kyoto Protocol and cutting down on dangerous emissions to arrest global warming.

## 4.5 SUPPORTS FOR KYOTO:

Advocates of the Kyoto Protocol claim that reducing these emissions is crucially important. They believe that carbon dioxide is causing the earth's atmosphere to heat up. The governments of all the countries whose parliaments have ratified the Protocol are supporting it. Most prominent among advocates of Kyoto have been the European Union and many environmentalist organizations. The United Nations and some individual nations' scientific advisory bodies have also issued reports favoring the Kyoto Protocol.

A group of major Canadian corporations also called for urgent action regarding climate change, and have suggested that Kyoto is only a first step. On 3 January 2006, after the Montreal accords a group of people assembled a petition with the goal to reach 50 million signatures supporting Kyoto Protocol.[40] This petition was set out to give civil support and ratification to the international fight against Global Warming on a base of world wide active cooperation. Many US and Australian citizens are signing the petition and thus criticise their leaders' choices on this matter. In the US, there is at least one student group Kyoto Now! which aims to use student interest to support pressure towards reducing

[40] http://www.innovations-report.com/html/reports/environment_sciences/report, Last visited, 23- 05-2006.

emissions as targeted by the Kyoto Protocol compliance. People of the World are ratifying Kyoto Protocol, although the positions of their governments may be different on the issue.

## 4.6 OPPOSITION TO KYOTO:

The two major countries currently opposed to the treaty are the United States and Australia. Some public policy experts who are skeptical of global warming see Kyoto as a scheme to either retard the growth of the world's industrial democracies or to transfer wealth to the third world in what they claim is a global socialism initiative.[41] Others argue the protocol does not go far enough to curb greenhouse emissions.

Many environmental economists have been critical of the Kyoto Protocol. Many see the costs of the Kyoto Protocol as outweighing the benefits, some believing the standards which Kyoto sets to be too optimistic, others seeing a highly inequitable and inefficient agreement which would do little to curb greenhouse gas emissions. The critics also argue that the Protocol will cost trillions of dollars and have scant impact unless countries like China get involved.[42] It should be noted, however, that this opposition is not unanimous, and that the inclusion of emissions trading has led some environmental economists to embrace the treaty.

Defenders of the Kyoto Protocol argue that while the initial greenhouse gas cuts may have little effect, they set the political precedent for bigger cuts in the future. They also advocate commitment to the precautionary principle. The Kyoto Protocol may not be perfect

[41] http://en.wikipedia.org/wiki/Kyoto_Protocol, Last visited, 09-05-2006.
[42] Dawn Saturday, October 23, 2004.

but it is the only effective tool that is available to the international community. It may be insufficient and will have many faults. But at least it is a basis for moving forward. It sets some modest targets and broadly states the rules for meeting them.

## 4.7 ENVIRONMENTAL POLICY AND LAW IN PAKISTAN:

Pakistan has signed the Kyoto Protocol to the Convention on Climate Change and ratified it on 11 January, 2005. Pakistan has taken several steps for the protection of environment. The Pakistan Environmental Protection Ordinance, 1983 was replaced by Pakistan Environmental Protection Act, 1997 in order to tackle the problems of environment. The National Environmental Policy, 2005 also gives valuable guidelines for the protection of environment.

### 4.7.1 Pakistan Environmental Protection Act, 1997:

The Environment and Urban Affairs Division under the ministry of Local government was established in Pakistan in 1975 as follow up a Stockholm declaration of 1972. The Ministry promulgated the Environmental Protection Ordinance of Pakistan in 1983. The main objective of the Ordinance was to establish institutions i.e. to establish Federal and Provincial Environmental Protection Agencies and Pakistan Environmental Protection Council (PEPC). In 1992 Pakistan attended the Earth Summit in state of Brazil (Rio-De Janeiro) and thereafter became party to various international conventions and protocols. In 1993 Environmental Quality Standards (NEQS) were promulgated and time frame 1996 was given for their compliance.

The Pakistan Environmental Protection Act was enacted on 6th December 1997, repealing the Pakistan Environmental Protection Ordinance, 1983. The PEPA 1997 provides the framework for implementation of the NEQS, establishment of Provincial Sustainable development Funds, Protection and conservation of species, conservation of renewable resources, establishment of Environmental Tribunals and appointment of Environmental Magistrates, Initial Environmental Examination (IEE), and Environmental Impact Assessment (EIA).

The Pakistan Environmental Protection Council was constituted in 1984 with President of Pakistan as its Chairman.[43] The Council was reconstituted after enactment of the Pakistan Environmental Protection Act, 1997. It is headed by the Prime Minister (Chief Executive) of Pakistan. The council is represented by trade and industry, leading NGOs, educational intuitions, expert's journalists, lawyers and concerned ministries. In 1993, the Pakistan Environmental Protection Agency (Pak-EPA) was established under Section 6 (d) of the Pakistan Environmental Protection Ordinance, 1983. A number of action were taken by the Agency, which included notification of the NEQS in 1993 for municipal and liquid industrial effluents and industrial gaseous emissions, motor vehicle exhaust, and noise. After enactment of the PEPA 1997 the functions and responsibilities of the Agency enhanced and it was strengthened technically and logistically to met the environmental challenges.[44] Pak-EPA also provides technical support to the Ministry of Environment.

[43] Pakistan Environmental Protection Ordinance, 1983, Section 3.
[44] Pakistan Environmental Protection Act, 1997, Section 5.

The Federal Agency may undertake inquiries of investigation into environmental issues, either of its own accord or upon complaint of any person or organization.[45] It may summon and enforce the attendance of any person and require him to supply any information or document need for the conduct of any enquiry or investigation into any environmental issue.[46] It may also enter and inspect and under the authority of a search warrant issued by the environmental magistrate, search at any reasonable time, any land, building, premises, vehicle, vessel, or other place where or in which, there are reasonable ground to believe that an offence under this act has been or being committed.[47] In all four provinces, Environmental Protection Departments were created under the provision of Pakistan Environmental Protection Act, 1997. Federal Government has delegated its powers to the provincial governments and they have further delegated powers to the provincial Environmental Protection Departments.

Section 12 of the Act mandates that no proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination or, where the projects is likely to cause an adverse environmental effect, an Environmental Impact assessment, and has obtained from Federal Agency Approval. The IEE/EIA Regulations, 2000 have been notified under this section and IEE and EIA process has begun in the country in an organized manner. The Act, 1997 requires that no person may import hazardous substances of which chemical activity is toxic, explosive, flammable, corrosive, radioactive, cause directly or in combination with other

[45] Pakistan Environmental Protection Act, 1997, Section 6(2).
[46] Pakistan Environmental Protection Act, 1997, Section 7.
[47] Pakistan Environmental Protection Act, 1997, Section 7.

matters, an adverse environmental effect.[48] Operation of a motor vehicle from which gaseous emission or noise exceeds the NEQS or other standards established by Pak-EPA, have been prohibited under Section 15. To ensure compliance with the NEQS, the Pak-EPA has been empowered to direct that pollution control devices be installed in motor vehicles or fuels specified by Pak-EPA be used in them or specified maintenance or testing be carried out on them.

The Government is empowered to constitute Environmental Tribunals to hear cases relating to Pakistan Environmental Protection Act, 1997.[49] The Federal Government has established four Environmental Tribunals one in each province. The Federal and Provincial governments have designated senior civil judges as Environmental Magistrates to take all contraventions punishable in respect of handling of hazardous substances and pollution caused by motor vehicles.[50] The Environmental Magistrates have been authorized to award compensation for losses or damage under Section 17(5). They have the Authority to endorse a copy of the order of conviction to the concerned trade or industrial association and award sentence of imprisonment for a term which may extend up to two years. They can order the closure of the factory and confiscation of the factory machinery and equipment, vehicle, material or substance, record or document, or other object used or involved in contravention of the provisions of the Act.

[48] Pakistan Environmental Protection Act, 1997, Section 13.
[49] Pakistan Environmental Protection Act, 1997, Section 20.
[50] Pakistan Environmental Protection Act, 1997, Section 24.

### 4.7.2 National Environmental Policy 2005:

The policy of 2005 provides a framework for addressing the environmental issues, particularly water pollution, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It provides directions for addressing the underlying causes of environmental degradation and meeting international obligations.

The goal of the policy is to protect, conserve and restore Pakistan's environment in order to improve the quality of life through sustainable development. The objectives of the policy include conservation, restoration and efficient arrangement of environmental issues; awareness of the masses and meeting international obligations effectively.[51]

One of the core issues of the policy is climate change and ozone depletion. To deal with this issue the government may devise and implement the National Climate Change Policy and Action Plan. The policy obliges the government to establish Clean Development Mechanism (CDM) Authority and to develop and implement policy and operational framework for effective management of CDM process.[52] The policy further describes that the government may promote the use of ozone friendly technology and phase out the use of ozone depleting substances in line with provisions of the Montreal Protocol. The other areas covered by National Environmental Policy are water supply and management, air quality and noise, waste management forestry, biodiversity and protected areas, energy efficiency, agriculture and livestock and multilateral environmental agreements.

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[51] National Environmental Policy, 2005, Ministry of Environment, government of Pakistan.
[52] Ibid

For effective implementation of the policy a National Environmental Policy Implementation Committee would be established at the federal level. The Committee shall be chaired by Secretary, Ministry of Environment. Other members of the committee shall consist of Secretary, Ministry of Industries; Secretary, Planning and Development Division; Secretary, Ministry of Finance; Secretary, Ministry of Food, Agriculture and Livestock; Secretary, Ministry of Health; Secretaries of Provincials and National environmental departments including Azad Jammu and Kashmir; three representative from the corporate sector/ chambers of commerce and industries; three representatives from the civil society organizations and Director General environment. This committee would meet biannually and would report the status of implementation of the policy to Pakistan Environmental Protection Council on regular basis.

### 4.7.3 Environmental activities in Pakistan:

Pakistan has a very small industrial base that too is shrinking day by day due to various reasons. All the industries are not posing danger to the environment. The National Conservation Strategy (NCS) points out approximately 21 sub-sectors of industries which come under the head of polluting industries. Out of these 21 only six have been marked as most dangerous.[53] Among the highly polluting industries we have the leather, paper, textile, cement, sugar, chemicals and fertilizer. If we are successful in converting these highly

[53] A. Samiuzzaman, Chairman, Steering Committee o Environmental Technology Programme for Industry of Federation of Pakistan Chambers of Commerce and Industry, *Environmental Activities in Pakistan.*

polluting industries to non-polluting industries then there will be no immediate threat to our environment from the industries. But for the new industries we should have strict control that new industries should only be allowed when they prove to be environment friendly.

All the major units of leather industry are clustered in Karachi at two places in Korangi and SITE. The Pakistan Tanners Association has prepared a comprehensive plan for Korangi Industrial Area and is also extending it to other parts of Pakistan like Kasur & Sialkot. It is hoped that after few years the damages to the environment will be reduced to minimum by the leather industry in Pakistan. As for as the paper sector of Pakistan is concerned, we have few units but their contribution to over all pollution is large. Luckily paper sector is also interested in pollution abatement and have shown greater interest in Environmental Technology Program for Industry (ETPI) which was initiated by FPCCI. The program aimed at installing Demonstration Project in each sub-sector to bring down the pollution to minimum. Similarly the sugar industry and the fertilizer industries are also in the process of setting demonstration projects in their sectors. The cement industry claim to have achieved the perfection and control pollution in their sub-sector. The textile sector has taken a late start but they also seem to be determined to control pollution in their sub-sector. In Pakistan the government and the Industrialists are serious about the environment and they are taking different steps to tackle this problem collectively.

In recent years, the Government of Pakistan has taken various concrete steps to attain control over industrial pollution in the country. One of the important products of its efforts is the "Self-Monitoring and Reporting System for Industry", which will be implemented by the EPA's in collaboration with the industry and other stakeholders. This system is called

SMART which stands for Self-Monitoring and Reporting Tool. The Self-Monitoring and Reporting System will make the country's industry owners and operators responsible for systematic monitoring and reporting of their environmental performance. By implementing this system, the government will, in fact, transfer the responsibility for examining and evaluating industry's environmental performance to individual industrial facilities. Apart from saving EPA's considerable expense, time and effort, this measure will enable industry to make long-term provisions for eco-friendly production. The reported data will also enable government agencies to assist industrial units in controlling their pollution levels.

### 4.7.4 Impacts of global warming on Pakistan:

Due to the ever-increasing global warming, the South Asian region is experiencing an average 1 to 2 degrees centigrade rise in temperature with much reduced rainfall.[54] So it is suggested that industry should come forward to fund need-based research in the field of environment instead of expecting the same from the government. Pakistan had already started experiencing repercussions of the global warming. If the climate change pattern continues at the same pace as it is changing at the moment, Pakistan essentially will be losing a significant portion of its glacier resource within the next 48 years.[55] At present Pakistan is experiencing hot summers with temperature up to 53 degrees centigrade, the annual average rainfall is 278mm with the monsoon share of 48 per cent. Dry weather will result in droughts, dust storms, high level meteorological activity including high wind

[54] Daily DAWN, 5th June, 2007
[55] Daily DAWN, 5th June, 2007.

velocities and thunderstorms. There will be less snowfall, snow deposits, reduced river flows, reduction in storage of water in dams, less rainfall in arid areas and prolonged droughts. The ICCI and the Environment Protection Agency (EPA) had taken measures for installing pollution control devices in the steel industries.

Global warming is radically changing the face of Mount Everest and it has reduced to a great extent in the last 50 years. Scientists predict that all glaciers in the Himalayas, which range from half a mile to more than three miles long, could end up as small patches of ice within 50 years if global warming is not checked. Some 250,000 people were left homeless by a cyclone that lashed the coast of Balochistan and killed 22 people in the province in June 2007.[56]

Torrential rains accompanying Cyclone Yemyeni also inundated dozens of villages and towns in Balochistan and disrupted rail services, communication links and utilities. Twelve people drowned in flood waters in Kalatuk in Turbat district, four in Gwadar, three in Bolan, two in Dalbandin and one in Noshki. Hundreds of people were also injured in their homes in roof collapses. UN disaster prevention official Salvano Briceno said in Geneva that the recent extreme weather in Pakistan and elsewhere was only a taste of what could happen in future through global warming.

To tackle the problem of global warming we should look to a policy of adaptation. In Pakistan, we should begin the required research to see how we can produce seeds and plants, which will be heat resistant, and yield levels, will not drop.[57] Also, due to the possibility of

[56] Daily TIMES, 28th June, 2007.
[57] Sifwat Ali, *Global Warming: Danger to Pakistan's Agriculture*, 1999.

floods, and rise of the ocean levels additional problems are expected. We already know that Karachi is below the sea level, and any significant rise in the ocean level will be a disaster. In addition, the Indus River Delta needs to be carefully studied to see what other possibilities exist. There might be some good news as well, in that several new small ports might become feasible. Also, the Indus River Delta may provide fertile ground for the food chain and the ecosystem in general. As far as floods are concerned, our rivers need to be further controlled. This is especially important, since the weather phenomenon will be even less predictable in this turbulent and abundant greenhouse gases era.

# CHAPTER 5

# SOLUTIONS TO THE PROBLEM

Climate change is a common concern of humankind. The legal problem is that climate change is not imposed by one state upon another state. As a result, the traditional legal principles governing transboundary pollution do not apply. The atmosphere is a common concern of humankind and all states have an interest and duty to protect it from serious harm. A state on one side of the globe is affected by a state on the other side of globe that is emitting greenhouse gases into the atmosphere. This principle is affirmed also in the preamble to the Climate Change Convention.

The principle of common but differentiated responsibilities proposes that, while all states should act to prevent damage to the atmosphere, developed countries should take the lead.[1] Traditionally, activities were often not restricted or prohibited by legal rules until they had been proven to cause environmental damage. However, this approach may not work in the case of activities contributing to climate change. Scientists are still unsure about the exact timing and nature of climate change impacts, but if efforts to limit net greenhouse gas emissions are not initiated before scientific certainty is achieved, it may be too late to undo the damage.

We all recognize that climate change is a real threat to humankind. Global efforts to combat climate change should be guided by the principle of common but differentiated

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[1] William P. Cunningham, Mary Ann Cunningham and Barbara Saigo, *Environmental Science: A Global Concern,* Belhaven Press London, 2001, p. 58.

responsibilities.[2] Global environmental challenges will only be effectively addressed through international cooperation. Developing countries therefore look to the international community for technological cooperation and financial assistance that will make their future more secure.

In the Kyoto Protocol it has been agreed that industrialized countries should take the first significant cuts, according to the "common but differentiated responsibilities" principle. These efforts are then followed, after a period of 10 years, by similar steps on the part of developing countries. Some of those countries, such as China and India, have tremendous levels of poverty. They have much lower per capita emissions than industrialized countries, and there is a huge ecological debt from industrialized countries in terms of past and present emissions. It is therefore important to acknowledge the legitimacy of the claims of the developing countries, that they cannot be expected to sacrifice economic growth to achieve the same level of cuts in greenhouse gas emissions as industrialized countries. This position is supported by international environmental principles, such as the 'polluter pays' and 'common but differentiated responsibilities'.

Polluter pays principle, precautionary principle, transfer of soft technology, sustainable development, emissions trading and afforestation are different techniques provided by international law to curb global warming.

[2] Kyoto Protocol, 1997, Article 10.

## 5.1 POLLUTER PAYS PRINCIPLE:

Pollution could be considerably reduced with the introduction of the Polluter Pays Principle (PPP) into national and international environmental laws. The polluter pays principle recognizes that we all have an impact on our environment and that the way to minimize that impact is to make people pay proportionally to the amount of pollution they create. This principle simply means that where pollution occurs, the polluter should be responsible for the costs of dealing with the pollution and its impacts on others. The principle was introduced by member countries of the Organization for Economic Cooperation and development (OECD) in 1972. This principle has been successfully applied in United States of America and Western countries to discourage pollution by heavy industries.[3] Global warming can be reduced but cannot be eliminated even if the polluter pays principle is strictly implemented.[4] Application of the principle at world level could control global warming but many countries are too slow to apply this principle. Its main reason is that it can be very difficult to make an absolute assessment of the environmental degradation produced by a specific polluter incident. For example atmospheric pollution may have global as well as regional effects.

An alternative approach to paying for cleaning up the environment and preventing pollution through a direct PPP is for government to levy some form of pollution tax. It is to be assessed by an independent panel of experts and lawyers. Any pollution tax should be set at levels at least equal to the environmental damage done, but it is no easy matter. The

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[3] http://www.chicagotribune.com/news/columnists/ch, Last visited, 02-05-2006.

[4] Muhammad Munir, *The polluter Pays Principle in International Environmental Policy and Law: Economic and Legal analysis*, Islamabad Institute of Legal studies, Islamabad, 2004, p. 117.

revenue that is raised from such a scheme could then be devoted solely to environmental pollution control and clean up. Any pollution tax would have to be effective but not proving so punitive that many industries could not survive.

Developing countries, which have contributed very little to global climate change, are going to be faced with increasing costs in coping with its impacts. Therefore, the polluter pays principle should be applied by developing countries to combat global warming. Without the appropriate apportionment of responsibility for global climate change the developing countries will be faced with increasing costs to mitigate against actions over which they have no control. Those countries that have driven global climate change should be bound by the notion of polluter pays. They must contribute to the costs of adaptation and mitigation that will be borne otherwise by developing countries.[5] Hence, it is clear that for the protection of the environment and for controlling global warming the application of the polluter pays principle is necessary.[6] Unless, the developed countries are willing to make it convenient for the developing countries to join internationally binding agreements for concrete pollution reduction, global implementation of the polluter pays principle would not take place, and global climate change would continue.[7]

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[5] http://www.euractiv.com/en/transport/meps-want-polluter-pays-principle-applied-air-traffic/article-155694, Last visited, 01-02-2007.

[6] Muhammad Munir, *The polluter Pays Principle in International Environmental Policy and Law: Economic and Legal analysis*, Islamabad Institute of Legal studies, Islamabad, 2004, p. 120.

[7] Ibid, p. 75.

## 5.2 PRECAUTIONARY PRINCIPLE:

The precautionary principle is widely accepted as a fundamental concept of national and international environmental laws and regulations in order to protect the environment. It is included in the United Nations Framework Convention on Climate Change, in the Water Law and Planning Law of Israel, in the Environmental Protection Act of the Czech Republic[8] and in the Pakistan Environmental Protection Act (PEPA) 1997.

According to provisions the Climate Change Convention "The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effect. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefit at the lowest possible cost"[9]. The definitions make clear that where there is scientific uncertainty the precautionary principle establishes an impetus to make a decision that seeks to avoid serious damage if things go wrong.

Although the precautionary principle was originally framed in the context of preventing environmental harm, it is now widely accepted as applying broadly where there is threat of harm to human, animal or plant health, as well as in situations where there is a threat of environmental damage. This principle should be applied when, on the basis of the best scientific advice available in the time frame for decision making there is good reason to believe that harmful effects may occur to human, animal or plant health, or to the

[8] http://www.ecobridge.org/content/g_cse.htm, Last visited, 04-05-2006.
[9] United Nations Framework Convention on Climate Change, 1992, Article 3 (3).

environment.[10] So, the precautionary principle could be applied to control global warming, as there is good reason to believe that global warming will harm human, animals and plants health. In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

The precautionary principle is one of the bases for community policy on the environment of the European Union. Each EU member state accepts precaution as a general principle of environmental policy. Several other countries including USA, Hungary and Brazil have adopted precaution as a guiding principle.[11] Networks of environmental and consumer NGOs are refining their understanding and positions on the precautionary principle and developing structures for its implementation. Many academic researchers are orienting their research towards practical implementation of the principle. Some political leaders are also clearly articulating the fundamental importance of precaution in protecting the environment for future generations. These developments justify a sense of optimism that the precautionary principle will in the future serve as an overarching principle to guide efforts towards sustainability and to combat climate change.

[10] http://www.livescience.com/environment/060503_warming_birds.html, Last visited, 02-05-2006.
[11] http://www.msnbc.msn.com/id/17435875/site/newsweek/, Last visited, 11-04-2007.

## 5.3 TECHNOLOGY TRANSFER:

Transfer of technology by developed countries to developing countries is another method that could reduce and control global warming. The success of the implementation of the Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol requires that developed countries take a leading role in reducing domestic greenhouse gas emissions and in providing financial assistance and facilitating technology transfer to developing countries.[12] They should fulfill their responsibilities to the best of their abilities. New technologies will play a critical role in achieving the objective of the UN Convention on Climate Change. Without radical changes in lifestyles, only a massive deployment of low or no carbon energy technologies can power the world economy and satisfy growing energy needs, especially in the developing world, while stabilising atmospheric $CO_2$ concentrations in the long run. The Clean Development Mechanism of the Kyoto Protocol is expected to help with technology transfer to developing countries.[13]

For the past three sessions of the Conference of the Parties to the UNFCCC, developing countries have constantly requested and reiterated their urgent needs for financial assistance and the transfer of technology. They have had to express their deep regret from time to time that their requests received less attention from the world leaders. At present, technology transfer has still occurred under normal commercial terms, which demand large returns for intellectual property rights. Therefore, it goes against the spirit of the Convention. The governments of the rich countries argue that the private sector companies own the

[12] http://www.centredaily.com/mld/aberdeennews/news, Last visited, 07-05-2006.
[13] http://www.edie.net/news/news_story.asp?id=11394&channel, Last visited, 01-05-2006.

technologies and the better way to get them is to associate yourself with any flexibility mechanisms; namely, joint implementation, emissions trading and the Clean Development Mechanism. For some poorest countries, if these mechanisms can help their people to have enough food and access to technologies, particularly electricity, the governments may be forced to join.

Technology transfer remains one of the important issues in the implementation of the Convention to control global warming. The warming which is today considered to be tolerable may be dangerous in the future.[14] The developed countries should try to reach an agreement on the establishment of an effective mechanism for the development and transfer of technology under the Convention. Perhaps this can be considered as the way in which developed countries can take the lead in combating climate change and its adverse effects.[15]

The developing countries are of the strong opinion that little progress has been made in the development and transfer of technology, despite the commitments of developed country parties in the Convention. The developing countries believe that it is the most practical step that developed countries must provide since it will lead to the successful implementation of Convention commitments by both the North and South. It is also expected that access to environmentally sound technology will be provided on a grant or concession term. It is therefore recommended that developed countries should agree to set up an international mechanism on the development and transfer of technology in order to provide guidance on ways and means to promote the international cooperation on a concession term.

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[14] Muhammad Munir, *The polluter Pays Principle in International Environmental Policy and Law: Economic and Legal analysis*, Islamabad Institute of Legal studies, Islamabad, 2004, p. 35.
[15] United Nations Framework Convention of Climate Change, 1992, Article 3 (1).

The unsustainable practices adopted by the industrialized countries are causing climate change.[16] They must bear the responsibility for combating the problem and for introducing alternate technologies in due proportion.

If technology has been responsible for causing the problem, it is technology that can also correct the problem. To control global warming we have to develop alternative technologies like solar energy and wind energy and change the nature of things consumed so that there is no negative affect on the environment.[17]

## 5.4 SUSTAINABLE DEVELOPMENT:

Sustainable Development is a term used to describe methods of creating economic growth which protect the environment, relieve poverty, and do not destroy natural capital in the short term at the expense of long term development. It is a good technique for combating global warming. While many definitions of the term have been introduced over the years, the most commonly cited definition comes from the report "Our Common Future", which states that sustainable development is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs".[18]

The United Nations Convention on Climate Change (UNFCCC) is the key instrument for addressing climate change. The entry into force of the Kyoto Protocol provided renewed optimism for the effectiveness of a multilateral approach to tackle climate change. Article 3

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[16] E. Willard Miller & Ruby M. Miller, *Contemporary World Issues: Environmental Hazards, Air Pollution,* Clio Press Ltd. Oxford, England, 1989, p. 56.
[17] Muhammad Munir, *The polluter Pays Principle in International Environmental Policy and Law: Economic and Legal analysis*, Islamabad Institute of Legal studies, Islamabad, 2004, p. 118.
[18] Report from the UN World Commission on Environment and Development (WCED), published in 1987.

of the FCCC says that 'policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost,' and that 'The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. It is clear that the stress has been laid down on sustainable development in order to address the problems of global warming.

Responsible energy use is fundamental to sustainable development and a sustainable future. Efficient methods, devices, and appliances should be employed at the sustainable development to conserve energy.[19] The international community must transform its global energy systems from traditional to renewable forms. Natural lighting should be used wherever possible and where artificial light is needed, regular and compact fluorescent lighting should be used. Efficiency of refrigeration mostly depends on insulation but also on the temperature of the condenser. High insulation levels and efficient compressors are available in only a few refrigerators and freezers. They will reduce energy consumption significantly, using only 20% of conventional units.[20] Energy-efficient conversion kits are available for standard electric washing machines, which reduce energy consumption by two-thirds by replacing the motor with an energy efficient model. Clothes should be air-dried whenever possible. All these strategies shall not only bring sustainable development but also help in controlling global warming to a great extent.

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[19] http://www.nps.gov/dsc/d_publications/d_1_gpsd_7_ch7.htm, Last visited, 11-04-2007.
[20] http://www.catholic.org/international/international_story.php?id=19830, Last visited, 29-03-2007

The Millennium Development Goals (MDG) recognizes the fundamental connection between energy, environment and sustainable development.[21] UNDP has adopted a strategic approach to sustainable development proposed by the UN Secretary General that emphasizes action in five key thematic areas: water, energy, health, agriculture and biodiversity[22] (collectively called WEHAB). Climate change is recognized as a cross-cutting issue that impacts all of the five WEHAB areas, one that is integral to a coherent approach to sustainable development. Thus, addressing climate change should be integrated into national strategies for poverty eradication. In theory, CDM can assist in accomplishing this objective through partnerships with diverse stakeholders and innovative policy formulation and implementation. This will require increased human, institutional and system-wide capacity at the national level and enabling policies, laws and regulations in the host countries.

## 5.5 EMISSIONS TRADING:

Emission trading is a technique that could reduce and control global warming. It is a market mechanism that allows emitters to buy emissions from or sell emissions to other emitters. Emissions trading is expected to bring down the costs of meeting emission targets by allowing those who can achieve reductions less expensively to sell excess reductions to those for whom achieving reductions is more costly. It is a market based approach to achieving environmental objectives that allows those reducing greenhouse gas emissions below what is required to use or trade the excess reductions to offset emissions at another

[21] The report of the National Commission on the Environment, *Choosing a Sustainable Future*, Island Press, Washington D.C, 1993, p. 21.
[22] John L. Allen, *Environment,* Dushkin Publishing Group, Brown and Benchmark Publishers Sluice Dock, Guilford, Connecticut, 1996, pp.19-23.

source, inside or outside the country. In general, trading can occur at the domestic, regional (EU), international and intra-company levels. A precedent is the US acid rain program which trades permits for sulfur dioxide.[23]

According to Kyoto Protocol, Annex I countries are assumed to trade permits among themselves to reduce compliance costs.[24] Article 17 of the Protocol allows Annex 1 parties to trade emissions permits internationally. Permits would be allocated to each party in accordance with its carbon emissions limit. It would then be free to transfer permits or to acquire more, but the number in circulation would never exceed the total permitted volume of carbon emissions. Under an international emissions trading system, the total GHG emissions of each industrialized country would be limited according to the emission targets agreed upon in the Kyoto Protocol. If a participant does not need all of its allocated emission permits, it can then sell or trade them to another participant who needs them to cover its emission needs. Emission trading therefore provides a financial incentive for reduction of GHGs below required levels. Through emissions trading, a market price emerges which reflects the cost of pollution reduction. Each participant can then decide whether it is cheaper to reduce emissions or to purchase permits or credits.

In this case, the global emissions mitigation limitation remains the same as in the other cases. What changes is the extent to which parties other than those with explicit emissions limitations can participate in the process.[25] Emissions trading is a good technique to mitigate GHGs, as independent mitigation could be quite costly. For example, if no

[23] Kevin T. Pickering & Lewis A. Owen, *An Introduction to Global Environmental Issues,* Routledge, London & New York, 1997, p. 433.
[24] Kyoto Protocol, 1997, Article 17.
[25] http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2006/05, Last visited, 25-05-2006.

trading is allowed, returning carbon emissions in the Annex I countries to 1990 levels has been projected to cost about $58 billion per year by 2010, rising to $112 billion by 2020.[26] Trading emissions permits among nations offers substantial gains from trade and can control global warming. Costs of controlling carbon emissions would be significantly lower if trade in carbon emissions allowances were permitted than if each nation had to meet its emissions reduction responsibilities alone.

**5.6 AFORESTATION:**

There are hopes for the absorption of carbon dioxide by afforestation as a means of mitigating global warming. Forests absorb $CO_2$, and even after trees are cut they will store carbon for decades if used as building materials.[27] Using wood as biomass energy allows a reduction in the use of oil and other fossil fuels. Afforestation and subsequent uses of wood make it possible to slow the pace of global warming.

Because afforestation costs less than energy conservation and other methods, it generates expectations as one way of coping with global warming. It is believed that planting trees in developing countries will cost less and provide larger areas for afforestation than in developed countries. Accordingly, having developed countries fund afforestation in developing countries is regarded as a part of efforts to reduce $CO_2$ emissions

Meanwhile, a number of forest conservation and afforestation projects are underway in order to control environmental damage. At the fourth FCCC Conference of the Parties

[26] John L. Allen, *Environment,* Dushkin Publishing Group, Brown and Benchmark Publishers Sluice Dock, Guilford, Connecticut, 1996, p. 19.
[27] http://www.nasa.gov/worldbook/global_warming_worldbook.htm, Last visited, 09-12-2005.

held in Buenos Aires, there were reports on 95 projects as activities implemented jointly (AIJ), 12 of which were forest conservation and afforestation projects.[28] Forests recovery and afforestation projects account for 12.6% of the total number of projects, while in terms of GHG reduction and absorption they account for 52.2%.[29] The national park project implemented jointly by the U.S. and Costa Rica makes a very large contribution, with this project alone accounting for 35.5% of total reduction and absorption.[30] These figures show that afforestation can play a leading role in combating global warming.

Mitigation of global warming requires that we control the amounts of $CO_2$ emissions and absorption for the globe as a whole. It is also necessary to minimize the costs of reducing and abating emissions while keeping equity in mind. With afforestation as well one must provide information on the absorption amount and cost, and compare this with the same information for energy conservation and other means of reducing $CO_2$ emissions. More accurate determination of the latent effectiveness of afforestation requires more detailed studies of the social and economic circumstances of areas where afforestation is thought to be possible to determine afforestation costs and the sizes of the areas that can be planted. If one ignores social and economic circumstances, one may overestimate the effectiveness of $CO_2$ absorption by afforestation, or underestimate costs.

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[28] John L. Allen, *Environment,* Dushkin Publishing Group, Brown and Benchmark Publishers Sluice Dock, Guilford, Connecticut, 1996, pp. 232-234.

[29] Gregory H. Aplet and Nels Johnson, *Defining Sustainable Forestry,* Island Press, Washington D.C, 1993, p. 129.

[30] J. Jager and H. L. Ferguson, *Climate Change: Science, Impacts and Policy,* Cambridge University Press, Cambridge, 1991, p. 461.

FCCC conferences of the parties are henceforth to discuss the matter of how to add the $CO_2$ reduction achieved in developing countries through CDMs and other means to the emission reduction credits of developed countries that provide the funding. Additionally, some decisions have yet to be made about the treatment of forests and other carbon sinks in the developed countries.

It is observed that $CO_2$ emission cuts in the energy sector by conservation and other means have the double dividend of reducing other pollutants such as sulfur oxides.[31] Similarly, afforestation can provide double or triple dividends by absorbing $CO_2$, improving the livelihoods of local people, and, over larger geographic areas, forestland conservation and flood control. It is necessary to proceed carefully with afforestation, for the purpose to address the problems of global warming, after having ascertained the social and economic circumstances in the area to be planted.

[31] Gregory H. Aplet and Nels Johnson, *Defining Sustainable Forestry*, Island Press, Washington D.C, 1993, p. 137.

# CONCLUSION

Unlike other environmental issues, global warming threatens the well being of both developed and developing countries. There are many activities responsible for global warming, but human activities are responsible for most of the warming. Burning of fossil fuels, deforestation, improper disposal of waste and nuclear and warfare acts are contributing to it by enhancing the greenhouse gases in the atmosphere. It could have many damaging effects like loss of biodiversity, decline in crop yield, rising of sea level, spread of human diseases and increase in the intensity of hurricanes.

Global warming is a problem that can be slowed and stopped with practical actions only. Due to increase in population and industrial development, the demand for energy has increased enormously. To provide access to people for clean and affordable energy services without execrating the problem of global warming is the main challenge to world community. This can be accomplished only by dramatically reducing the world reliance on fossil fuels and increasing the clean renewable sources of energy and new technologies to make energy use more efficient.

As developing countries are rapidly increasing their energy usage. This is the time to help them build new system that is clean, efficient, affordable and sustainable. The U.S and other industrialized countries are blaming developing countries for their own inaction on global warming. Only after the industrialized countries take the lead in addressing global warming, the developing countries could be expected to follow. Industrialized countries must provide leadership by adopting policies to reduce greenhouse gases emissions, develop needed technologies and provide new and additional resources to help developing countries

to achieve sustainable development while managing their own emissions. For the protection of the globe a comprehensive international solution is needed, in which both the developing and developed countries would closely cooperate, because global climate change will affect rich and poor alike. The only solution on which both the developed and developing countries can agree is to reduce the emissions of GHGs on the national level.

The Kyoto Protocol provides a comprehensive and flexible framework that can meet the needs of all countries. Leadership by industrialized countries by the first commitment period will assure the full engagement of developing countries in the future. No country can be allowed to go its own way and refusal to participate constructively with in the Kyoto Protocol. The Kyoto Protocol framework should be met with stern sanctions by international community, as this is the only practical way to control global warming.

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3. The Times, Islamabad
4. Frontier Post, Peshawar
5. The Times
6. Newsweek

## Annexure A

# ABBREVATIONS

| | |
|---|---|
| **AIJ** | **Activities Implemented Jointly** |
| **CDM** | **Clean Development Mechanism** |
| **CFCs** | **Chlorofluro Carbons** |
| **$CH_4$** | **Methane** |
| **CNG** | **Compressed Natural Gas** |
| **CO** | **Carbon Monoxide** |
| **$CO_2$** | **Carbon Dioxide** |
| **COP** | **Conference of the Parties** |
| **EEC** | **European Economic Community** |
| **EIA** | **Environmental Impact Assessment** |
| **ETPI** | **Environmental technology Programme for Industry** |
| **EU** | **European Union** |
| **FCCC** | **Framework Convention on Climate Change** |
| **GDP** | **Gross Domestic Product** |
| **GHGs** | **Greenhouse Gases** |
| **HFCs** | **Hydrofloro Carbons** |
| **IIE** | **Initial Environmental Examination** |
| **INC** | **Intergovernmental Negotiating Committee** |
| **IPCC** | **Intergovernmental Panel on Climate Change** |
| **IUCN** | **International Union for Conservation of Nature** |
| **MGDs** | **Millennium Development Goals** |
| **MOP** | **Meeting of the Parties** |
| **$N_2O$** | **Nitrous Oxide** |
| **NCS** | **National Conservation Strategy** |
| **NEQS** | **National Environmental Quality Standards** |

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| **NGOs** | **Non-Governmental Organization** |
| **OECD** | **Organization for Economic cooperation and** |
| **Pak-EPA** | **Pakistan Environmental Protection Agency** |
| **PEPA** | **Pakistan Environmental Protection Act** |
| **PEPC** | **Pakistan Environmental Protection Council** |
| **PEPO** | **Pakistan Environmental Protection Ordinance** |
| **PFCs** | **Perfluro Carbon** |
| **PPP** | **Polluter Pays Principle** |
| **SBI** | **Subsidiary Body for Implementation** |
| **SBSTA** | **Subsidiary Body for Scientific and Technological Advice** |
| **$SF_6$** | **Sulpher Hexafluoride** |
| **UK** | **United Kingdom** |
| **UNCED** | **United Nations Conference on Environment and Development** |
| **UNEP** | **United Nations Environment Programme** |
| **UNFCCC** | **United Nations Framework Convention on Climate Change** |
| **UNO** | **United Nations Organization** |
| **USA** | **United States of America** |
| **WEHAB** | **Water Energy Health Agriculture and Biodiversity** |
| **WHO** | **World Health Organization** |
| **WMO** | **World Meteorological Organization** |
| **WWF** | **World Wild Fund** |

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