CHAPTER-I

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The word security has been defined by scholars in different ways in different periods of history. As the global scenario keeps on transforming, the discourse in international politics on the definition of security also changes its track. In its generic and literal meaning, security conveys the state or feeling of being free from fear, care, worry threat, danger etc., ensuring a sense of safety.\(^1\) However, the concept of security has changed its connotations over time. During Nineteenth century, it was primarily defined in terms of state security and the government was solely responsible for upholding the security of the state. This concept of security underwent further change in the aftermath of the First World War, which threatened the security of nations and this compelled the global community to look for a multilateral organisation which will make security a collective concern. This led to the establishment of the *League of Nations* in 1919 and it was anticipated that it would work in averting another war. The League soon proved ineffective and the world witnessed yet another World War. The experiments with collective security were however not abandoned and by 1945, the United Nations Organisation (UNO) was established as a multilateral body to ensure international security and peace. Nevertheless, the concern with national security or security of the state defined primarily in military security terms was central to the concept of security and it was not until the close of the twentieth century that the concept broadened its scope to include non-militarist dimensions of security within its conceptual domain.

The years following the Second World War led to a more complicated and insecure world because of the initiation of Cold War. During this period the term security was primarily defined on the basis of military and nuclear strength. Cold war understandings of security emphasised military, ideological and technological definitions of social problems. Security was connected with state secrecy, nuclear power and military

strength. The state was the primary actor and the dominant interpretation was that if the state security was assured, individual security was of little consequence. But the deterioration of environment and occurrence of natural calamities during 1960s made the scholars of International Relations (IR) to review the definition of security. No substantial progress was made on this front other than creation of United Nations Environment Programme (UNEP) following the 1972 Stockholm Conference. It worked as catalyst in generating awareness over environmental issues, which gradually led to shift in the paradigm of security.

In the post cold-war there was unanimity among the IR scholars that there is a need for a theory that included the areas that were earlier excluded from the ambit of the realist paradigm like the problems of AIDS, ecological deterioration, global warming, economic underdevelopment and the globalisation of trade and markets. One of the issues that became significant was environmental security and led the scholars to state that 'welfare not warfare' will shape the rules and global threats like ozone holes and pollution will dictate the agenda. It is said so because extensive deforestation, desertification, salination, denudation, water scarcity etc., are no longer seen as local, state or even regional problems, but have broader international ramifications; for they undermine the economic base and social fabric of weak and poor states by generating or exacerbating intra/inter state tensions and conflicts.

The importance of environmental security in IR has led to, growing participation and importance of non-state actors in global environmental politics. International intergovernmental organisations, Non governmental organisations, advocacy groups have all become vital players in the process of international environmental regime formation. The complexity of environment problem has provided increasing role to these advocacy

4 Abul Kalam, n.1, p. 124.
groups. It is now almost universally accepted that global environmental threats can be successfully addressed only through the active cooperation of these key actors. Using military force to enforce an environmental agreement would be an impractical option even if it were politically acceptable. Moreover, the issues of deteriorating environment at the global level and its transboundary impact have led to redefining the concept of intervention. Traditionally, intervention was understood in terms of military force, but it has been gradually recognized that countries could also be invaded by foreign pollutants or even by the depletion of crucial resource. The developing countries that were kept aloof from the decision making have received attention with the issue of international environmental politics. It is also believed that the capacity for some southern nations to exercise power is likely to increase as the global reach of environmental problems is further recognized.

One more very significant aspect that has come out into sharper focus with the redefinition of security is the importance of the role played by women groups in various movements aimed at conservation of the environment. Earlier feminists were of the view that discourses on security have neglected women, making them feel insecure in society. It was so because military and national security of the state, have always been viewed from a masculine perspective. Now when the security is getting re-defined in multi-dimensional terms, they have joined the global movements with renewed zeal and enthusiasm.

Theoretical Aspect

The diminishing role of state in the global order coincided with the shift in emphasis from realist to neo-liberal institutionalist perspective at the conceptual level. realists emphasised on fashioning national interest in terms of power, war or threat

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8 ibid
perception, (in contrast) the neo-realist propose a problem-solving approach, seeking to help develop, the concept of system’s structure which at once bounds the domain.9

The realists believe that international anarchy fosters competition and conflicts among states which, inhibits their willingness to cooperate even when they share common interests. They, while focussing on states as units of analysis, do not take into account the environmental issues and tend to downplay internal factors as well as indirect transboundary effects of environmental degradation.10 The realists also favour unilateral action if an environmental problem is recognised as a potential threat in order to optimise the state’s access to scarce resources of water, oil and soil. Moreover, realists advocate action by the state and its agencies to maintain and or acquire control of resources. Faced with threats to the continued enjoyment of such resources, realists endorse military actions to maintain the state’s advantage.11

On the other hand, the neo-realist enables the policymakers to see how the structure of the system and variations in it, effect the interacting units and the outcomes they produce. Thus, neo-realist theory, helps us to focus on the conflicting aspects of the negotiations, and elucidates some of the reasons why co-operation has been difficult to achieve.12 Moreover, according to neo-realist international structure emerges from the interaction of states and then constrains them from certain actions while propelling them toward others. The neo-realists also assert that power is no longer considered an end in itself; nor does it derive from human nature; instead states always pursue power as a means of survival.13 As a result it leads the policymaker to think in terms of a collective action problem, through the conceptualisation of anarchy. However, the neorealist also has drawbacks and its primary weaknesses are its neglect of international institutions and domestic politics, and its effective structural determinism, which leaves us unable to account for the process and for agenda setting. According to John Volger, the proponents

9 Abul Kalam, n.1, pp.118-119.
10 Narottam Gaan, n.2, pp.300-01.
of neo realism are less convinced of the efficacy of institutions per se and place great emphasis on the underlying power structure, and in particular the requirement for hegemonic leadership.

The neo-liberal institutionalists have appropriately elucidated the role of international institutions in solving the global problem. They argue that the realists have overemphasised conflicts and underestimated the capacities of international institutions to promote cooperation. Neo-liberal institutionalists believe that states cooperate to cope with environmental problems by creating new international regimes and organisations. They also believe that these institutions reinforce their legal sovereignty and often enhance their problem-solving capacity.\(^\text{14}\) The proponents of neo-liberal institutionalism believe that even in the prevailing state of anarchy in global order, states can work together and can do so especially with the assistance of international institutions because international organisations provide stability in negotiations and thereby make cooperation and mutual learning more likely. They advocate that the big problems on the global agenda are ones that simultaneously affect many states. They cannot be meaningfully managed unilaterally, they are transnational and cannot be met effectively with a national response.\(^\text{15}\) In such scenario it is cooperation that becomes a more endemic feature of international relations.

Central to neoliberalism is the view that, rather than brute force, a set of rules and institutions in the international system mitigate against conflicts, affects relations among state and pushes the international system toward pluralism and diversity. Further neoliberalism holds that transnational contacts and coalitions have transformed national attitudes and the very definition of national interests.

For the neo-liberal security is essential, and institutions help to make security possible. Institutions provide guaranteed framework of interaction; they suggest that there will be an expectation of future interactions. These interactions will occur not just on

\(^{14}\) Karen T.Litfin, n.7, p.10.

\(^{15}\) Charles W. Kegley, Jr. and Eugene R. Wittkopf, no. 13, p.544.
security issues but on a whole suit of international issues, including human rights, the
environment, immigration and economics.\textsuperscript{16} The liberal institutionalist also advocate that
states cooperate to cope with environmental problems by creating new international
regimes and organizations. These new institutions may decrease state’s autonomy of
action, but they always reinforce their legal sovereignty and very often enhance their
problem solving capacity as well.\textsuperscript{17} The liberal institutionalist theory is resolutely
problem solving rather than critical in its approach.

However, there are divergences among countries regarding their approaches to
security. Some are influenced by the realist and some by the neo liberal institutionalist
perspective. For example, the US position on environmental security is guided more by
the realist theoretical approach and argues that it would be irrelevant for it to take
substantial action on environmental issues, if developing countries would not also
undertake similar commitments. It is exemplified by the act of US walking out from the
Kyoto Protocol in March 2001. It proves that US has no faith in the framework prepared
by the international organisation. On the other hand, the developed and developing
countries have shown faith in international organisation to solve the menace emanating
from environmental degradation. These countries have taken number of mitigation and
adaptation measures suggested by the international organisation. It also underlines that
the US policies are more influenced by realist theory than liberal institutionalist.

Environmental Security

The first theoretical perspective to focus specifically on environmental issues and
sovereign authority, and the one that set the stage for much subsequent thinking about the
relationship, was the \textit{Harmon Doctrine}\textsuperscript{18}. The doctrine was based on the view that, the
fundamental principle of international law is the absolute sovereignty of every nation, as

\textsuperscript{17} Karen Litfin, n.7, p. 10.
\textsuperscript{18} It was first to focus specifically on environmental issues and sovereign authority, and the one that set the
stage for much subsequent thinking about the relationship. The doctrine was articulated in 1895 by US
Attorney General Judson Harmon when he dismissed Mexican complaints that US use of the Rio Grande
adversely affected Mexico. According to him the US had the legal right to use waters within territory as it
saw fit, independent of external effects.
against all others, within its territory. Environmental security as a concept encompassing non-military aspects was officially mentioned for the first time in the *International Conference on the Relationship between Disarmament and Development*, convened by the United Nations General Assembly (UNGA) in New York from 24th August to 11th September, 1987. In the conference, there was unanimity among the member states that recently non-military threats to security have moved to the forefront of global concern. Before it in, 1982 the notion of common security was also advocated by the Palme Commission, suggested that there are global dangers which threaten the community of nations and which cannot be solved by mere boundary protection. By emphasising common dangers, it bases its appeal for co-operative behaviour, not on altruism, but on a larger sense of collective self-interest. It also suggested that the real challenge is to find sufficiently impelling points of reference in present circumstances to raise support for a longer-term perspective. In the similar vein the report entitled, *Our Common Future*, released during World Commission on Environment and Development, pointed out that, environmental stress is both a cause and effect of political tension and military conflict. It also maintained that traditional notion of security is no longer applicable.

Acknowledging the threat emanating from environmental degradation and to make the global community secure, the UNGA on 20th December 1987, passed the Resolution 44/228. The resolution recognised that the members of the international community must act together to address global environmental challenges and to prevent the occurrence and escalation of international environmental conflicts. It also decided to convene the United Nations Conference on Environment and Development in 1992.

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20 Abul Kalam, n.l, p. 127.
Since then, scores of conferences have taken place but very little headway has been made due to differences between developed and developing countries. Developed states are of the view that it is a common technological and economic problem. It could be tackled by providing aid and encouragement of new technologies in developing states. On the other hand, Southern states are of view that it is a western problem. It is caused by consumption patterns. It cannot be dealt with without looking into the problems inherent in the development paradigm and at distribution issues.

Apart from this issue, developing countries have apprehensions that in the name of eco-friendly objectives, developed countries would try to impose various restrictions on the developing countries that would implicitly impede their development process. Most notable amongst these are trade, access to natural resources, restriction on forest resources on which many depend for their livelihood. It would indirectly promote interference in internal policies of developing countries. These are some fundamental issues needed to be solved and require immediate attention, but the multilateral organisations have failed miserably to bring rapprochement between both parties, i.e. developed and developing countries.

Apart from international organisations there is a need for a role to be played by non-state actors. The success of Vienna Convention was possible due to convergence of scientific and political opinion for regulatory action. It was in 1970s that the scientists discovered depletion of the ozone layer was being caused by human made chemicals called cholo-flouro-carbons(CFCs).22 The scientific evidence led to serious action, which ultimately led to the phasing out of the ozone depleting substances. In a similar manner during United Nations Conference on Environment and Development the Chairman eloquently pointed out that “the need for international cooperation is inescapable and growing almost exponentially.... the United Nations and its system of agencies, organisations and programmes....provide the indispensable structure and fora on which international co-operation depends....They represent not the precursors of world

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22 Porter, n. 6, p. 87.
government but the basic framework for a world system of governance which is imperative to the effective functioning of global society.”

Apart from the role of the aforementioned groups, the role of the government is of immense importance. It is found that the countries of Eastern Europe and the former Soviet Union are unable or unwilling to enforce the hundreds of regulations and state promulgations aimed at environmental protection primarily because the elites in these countries are insensitive towards these issues. Many Asian countries have written environmental protection policies into their constitutions and even made environmental laws legally enforceable. However, in reality, there is a clear enforcement-lag in this field due to state commitments to high rates of economic growth and other more pressing problems like poverty, unemployment etc. It was rightly stated by the then Prime Minister of India, Smt. Indira Gandhi, during Stockholm Conference of 1972 that poverty is the biggest pollution. There is need for integrating environmental issues with social issues, which ultimately influence the policies of developing countries on environment. Developed countries can contribute meaningfully in this domain by providing financial assistance and transferring green technology to the developing countries and most vulnerable countries, i.e., the coastal countries whose existence is at stake due to rise in sea levels and frequent occurrence of natural hazards.

The inclusion of environmental threat in the ambit of security has significantly expanded the scope of the security. It has also cast a shadow on the existing national priorities and challenged the prevailing notions of security. There has been a slow but steady realisation that environmental threats may have serious socio-economic and human costs; hence, they cause insecurity and that they cannot be solved by the unilateral decisions of states. In simple words, one could say that intervention, which was understood in terms of military force earlier, has been gradually changed and countries have recognized that it could also be invaded by foreign pollutants or even by the depletion of crucial resources. Moreover, it is found that ecology and economy are

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becoming even more interwoven—locally, regionally, nationally and globally—into a seamless net of causes and effects.

Environmental security, today, unlike the cold war period has raised question of who takes initiatives, coordinates cooperation and shoulders costs. During cold war period developed countries were seen at the fore-front in shouldering the global problems and military power was the solution for everything. With the growing importance of environmental security and international environmental politics, the capacity for some southern nations to exert pressure is likely to increase gradually as the global ramification of environmental problems is further recognized.

Climate Change

According to Matthew Patterson climate change hit the international politics agenda in 1988. He has cited four reasons for this. First, the finding of the Intergovernmental Panel on Climate Change (IPCC). The report confirmed the reality of global warming. Second, climate change arrived on the back of a series of other environmental issues which rose onto the political agenda in the West during the 1980s, such as acid rain, ozone depletion and tropical deforestation. Third, it arrived when economic objections to action on environmental issues were not at the forefront of public consciousness. And fourth, series of freak weather conditions, of which the most important politically were the US drought in 1988 and the empirical observations that the 1980s provided the six hottest years on record.

Climate refers to the average weather in terms of the mean and its variability over a certain time-span and a certain area. Climate varies also in time; from season to season, year-to-year, decade to decade or on much longer time-scales, such as the ice ages.

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Statistically significant variations of the mean state of the climate or of its variability, typically persisting for decades or longer, are referred to as *Climate Change*.\(^{26}\)

The Earth’s climatic system\(^{27}\) is driven by solar energy. About 2/3rd of the short wave solar radiation is absorbed by the atmosphere, ocean, land, ice and biota and 1/3rd is radiated back. In this way climate of the Earth is controlled by the difference between the incoming solar radiation from the sun and the outgoing infrared radiation emitted by the Earth-atmosphere system the radiation balance.\(^{28}\) However, the long-wave terrestrial radiation emitted by the earth’s surface is partially absorbed and then re-emitted by a number of trace gases in the atmosphere collectively known as green house gases (GHGs). The main GHGs include water vapour, carbon dioxide, methane, nitrous oxide CFC and ozone in the atmosphere and stratosphere. This phenomenon keeps the global temperature warmer by about 33°C and is vitally important for life on Earth.\(^{29}\) Since, the industrial revolution, anthropogenic activities, especially fossil fuel combustion and deforestation, are increasing the concentrations of atmospheric GHGs beyond their natural state, resulting in the enhanced greenhouse effect. This causes an increase in global temperatures, which is known as global warming.\(^{30}\) The sum of all these potential changes is referred to as climate change.

The CFC’s and ozone are under control by Montreal Protocol. Among the remaining gases water vapour is the most important but the supply of water vapour

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\(^{27}\) Each square metre of the Earth’s spherical surface outside the atmosphere receives an average throughout the year of 342 Watts of solar radiation, 31% of which is immediately reflected back into space by clouds, by the atmosphere, and by the Earth’s surface. The remaining 235 Wm\(^2\) is partly absorbed by the atmosphere but most (168 Wm\(^2\)) warms the Earth’s surface: the land and the ocean. The Earth’s surface returns that heat to the atmosphere, partly as infrared radiation, partly as sensible heat and as water vapour which releases its heat when it condenses higher up in the atmosphere. This exchange of energy between surface and atmosphere maintains under present conditions a global mean temperature near the surface of 14°C, decreasing rapidly with height and reaching a mean temperature of −58°C at the top of the troposphere.


\(^{30}\) Ibid, p. 363.
depends on the temperature and the presence of other GHGs notably carbon dioxide. Methane emission could be reduced with the improvement in paddy cultivation and improvement in rudimentation of cattle. Moreover, the lifetime of methane in the atmosphere is variable depending on the interactions with other gases. But in general the lifetime (8-12 years) is considerably less than that of carbon dioxide (100 years), so the time between emission change and concentration response is comparatively short. Nitrous oxide emission has not risen as quickly as other gases. The sources of nitrous oxide and their fluxes to the atmosphere are very uncertain, but according to some research it is found that the use of nitrate and ammonium fertilizers is likely source, but estimates of the fluxes vary widely. This is elaborated in the table given below.

<table>
<thead>
<tr>
<th>GHGs and their Main Anthropogenic Sources</th>
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</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>Methane</td>
</tr>
<tr>
<td>Chloro fluorocarbons</td>
</tr>
<tr>
<td>Nitrous oxide</td>
</tr>
<tr>
<td>Precursor gases</td>
</tr>
<tr>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>Nonmethanehydrocarbons</td>
</tr>
<tr>
<td>Carbon monoxide</td>
</tr>
</tbody>
</table>


According, to the above illustrations it becomes clear that emission of carbon dioxide reduction is an imperative to stop the climate from changing. Carbon dioxide accounts for about 360 particles per million (ppm) of the atmosphere today. The atmospheric concentration of carbon dioxide has been increased by 31 per cent since 1750. The current rate of increase is unprecedented during the past 20,000 years. The first three GHGs are estimated to account for 50, 18 and 6 per cent, respectively, of the overall global warming effect arising from human activities. The hydro floro carbons and

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per floro carbons used as replacements for ozone-depleting substances such as CFCs are being phased out under the Montreal Protocol.

The concentration of other natural radiatively active atmospheric components, such as methane and nitrous oxide, is increasing as well, due to agricultural, industrial and other activities. The concentration of the nitrogen oxides (NO and NO₂) and of carbon monoxide (CO) is also increasing. Although these gases are not greenhouse gases, they play a role in the atmospheric chemistry and have led to an increase in tropospheric ozone, a greenhouse gas, by 40% since pre-industrial times.³²

Observational evidence indicates that climate changes in the 20th century already have effected a diverse set of physical and biological systems. Examples of observed changes with linkages to climate include shrinkage of glaciers; thawing of permafrost; shifts in ice freeze and break-up dates on rivers and lakes; increases in rainfall and rainfall intensity in most mid and high latitudes of the northern hemisphere; lengthening of growing seasons; and earlier flowering of trees, emergence of insects, and egg-laying in birds.³³

The signs of climate change can be noticed everywhere. Mount Kilimanjaro has lost 75 per cent of its ice cap since 1912. The ice on Africa's tallest peak could vanish entirely within 15 years. Coral reefs are dying off as the seas get too warm for comfort. Coral reefs suffer from the loss of algae that colour and nourish them. The process, called bleaching, is caused by Warmer Ocean. Pacific salmon populations fell sharply beginning from 1997 when local ocean temperatures rose by 3°C. Drought is the norm in parts of Asia and Africa. El Nino effects, which trigger devastating weather in the eastern Pacific, are more frequent. The Arctic permafrost is starting to melt. Lakes and rivers in colder climates are freezing later and thawing earlier each year.³⁴

³² E. Ablonsou, Y. Ding, D. Schimel, n.25, p.92.
The Intergovernmental Panel on Climate Change (IPCC), has concluded in its Fourth Assessment Reports (FAR) released in February and April of this year that the total temperature increase from 1850 – 1899 to 2001 – 2005 is 0.76 [0.57 to 0.95]°C and the linear warming trend over the last 50 years (0.13 [0.10 to 0.16]°C per decade) is nearly twice that for the last 100 years.\textsuperscript{35} Earlier the Third Assessment Report had pointed that most of the warming has occurred in the 20th century, during two periods, 1910 to 1945 and 1976 to 2000. On average, between 1950 and 1993, night-time daily minimum air temperatures over land increased by about 0.2°C per decade. This is about twice the rate of increase in daytime daily maximum air temperatures (0.1°C per decade). This has lengthened the freeze-free season in many mid- and high latitude regions. The increase in sea surface temperature over this period is about half that of the mean land surface air temperature.\textsuperscript{36} The report also shows that precipitation has increased by 0.5 to 1 per cent per decade in the 20th century over most mid-and high latitudes of the Northern Hemisphere continents, and it is likely that rainfall has increased by 0.2 to 0.3 per cent per decade over the tropical (10°N to 10°S) land areas.\textsuperscript{37}

The satellite data shows that there is very likelihood that snow cover will decrease of about 10 per cent in the extent of snow cover since the late 1960s. Ground-based observations show that there is very likely to have been a reduction of about two weeks in the annual duration of lake and river ice cover in the mid- and high latitudes of the northern hemisphere, over the 20th century. There has been a widespread retreat of mountain glaciers in non-polar regions during the 20th century. Northern Hemisphere spring and summer sea-ice extent has decreased by about 10 to 15 per cent since the 1950s. It is likely that there has been about a 40 per cent decline in Arctic sea-ice thickness during late summer to early autumn in recent decades and a considerably slower decline in winter sea-ice thickness.\textsuperscript{38}

\textsuperscript{36} E. Ahllonsou, Y Ding, D. Schimel, n.26, p. 2.
\textsuperscript{37} ibid, p. 4.
\textsuperscript{38} ibid, p. 44
Furthermore, climate change may have adverse impact on food security as it would be capable of causing drastic changes and redefining agricultural belts globally. If and when that happens, today's breadbaskets (important food producing areas of the world) could be turned into agricultural deserts as a result of several factors, which include the inability of crops to cope with climate change-induced temperature regimes.\textsuperscript{39}

Evidence of human interference with the climate first emerged in 1979 at the First World Climate Conference. As public concern over environmental issues continued to increase during the 1980s, governments grew progressively more aware of climate issues. In 1988 the United Nations General Assembly adopted resolution 43/53, proposed by the Government of Malta, urging the 'Protection of global climate for present and future generations of mankind'.\textsuperscript{40} In 1990 the IPCC issued its First Assessment Report, which confirmed that the threat of climate change was real. The Second World Climate Conference held in Geneva later that year called for the creation of a global treaty. The General Assembly responded by passing resolution 45/212, formally launching negotiations on a convention on climate change, to be conducted by an Intergovernmental Negotiating Committee (INC).

The IPCC confirmed in its Third Assessment Report that there was "new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities." Although uncertainties regarding proportion of greenhouse gas emissions in the process of projecting future trends create wide margins for error in the estimates, the IPCC predicted a rise of 1.4 to 5.8°C in global mean surface temperatures over the next 100 years. The impact of warming, even at the lower end of this range is likely to be dramatic. The impact on humans will be unavoidable and – in places – extreme. Some countries will get hotter and benefit from a longer growing season; some will suffer a reduction in crop yield, shortage of water and an increase in disease; others

\textsuperscript{39} John Onu Odihi, "Climate Change and Water Resources", Borneo Bulletin, (Darussalam), February 1, 2003.
\textsuperscript{40} Caring For Climate A Guide to the Climate Change Convention and the Kyoto Protocol, (Bonn: Climate Change Secretariat, UNFCCC, August, 2003), p.3.
may even get colder because of the local impact of the changes to world weather patterns. Some countries—especially small island states and Bangladesh—will be quickly and adversely affected by the rise in sea levels.\textsuperscript{41} Similarly the FAR has reported that the eleven of the last twelve years (1995–2006) rank among the twelve warmest in the instrumental record of global surface temperature (since 1850).\textsuperscript{42} The reports have also tried to do away with the illusion that changes are taking place due to natural cycle and in a very stern word have made a remark that the probability of the link between human activity and global warming is more than 90 percent, which according to the Third Assessment Report (TAR) was 60 per cent.

The climate change effect is likely to be experienced by the water sector and it is predicted that there will be an acute shortage of water. Acute water shortages combined with thermal stress should adversely affect wheat and, more severely, rice productivity in India even under the positive effects of elevated carbon dioxide in the future.\textsuperscript{43} The table given below provides potential land loss and population exposed in India and Bangladesh for selected magnitudes of sea-level rise, assuming no adaptation.

<table>
<thead>
<tr>
<th>Country</th>
<th>Sea level Cm</th>
<th>Potential land loss Km(^2)</th>
<th>%</th>
<th>Population exposed Millions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>45</td>
<td>15,668</td>
<td>10.9</td>
<td>5.5</td>
<td>5.0</td>
</tr>
<tr>
<td>India</td>
<td>100</td>
<td>5,763</td>
<td>0.4</td>
<td>7.1</td>
<td>0.8</td>
</tr>
</tbody>
</table>


The change in the climate will adversely affect the cycle of cyclone and storm surges and it is believed by the scientific community that their frequency would increase. Tropical cyclones and storm surges continue to take a heavy toll on life and property in India and Bangladesh. An increase in the intensity of cyclones combined with sea-level

\textsuperscript{41} R.A. Warrick, A.H. Buiya and M.Q. Mirza, n.28, p. 253.
\textsuperscript{42} IPCC FAR, ibid, no. 35, p. 5.
\textsuperscript{43} Teddy, n. 29, p. 47.
rise would result in more loss of life and property in low-lying coastal areas in cyclone-prone countries of Asia. The expected increase in the frequency and intensity of climatic extremes will have significant potential effects on crop growth and agricultural production, as well as major economic and environmental implications (e.g., tourism, transportation).

Changes in sea levels are likely to affect landward and alongshore migration of remnants of mangrove forests that provide protection for coasts and other resources. An increase in sea levels would adversely affect sea grass communities, which already are under stress from land-based pollution and runoff. Changes in these systems are likely to negatively affect fishery populations that depend on them for habitat and breeding grounds.\textsuperscript{44}

The abovementioned deliberations show that the concept of security has not only undergone many tumultuous phases but also gained new meaning through the incorporation of environmental view. The paradigm of security has been defined from different perspective namely realist to neorealist and neo liberal institutionalist. It also exhibits that the liberal institutionalist is considered as one of the widely acceptable theoretical paradigm to address the concern of environmental security. However, the global negotiations pertaining to climate change also display that all the countries are still not comfortable with the theory of neo-liberal institutionalism. In this regard example could be cited of US. The US attitude of taking unilateral actions still proves the relevance of realist theory in the conduct of international affairs and diplomacy. As a result it has failed to ratify many vital protocols pertaining to environment. However, the international community is striving hard to convince the US to comply with the international treaties on environment and climate change. One could be still optimistic for the circumstances that would compel the US government to adhere with it.

The above facts prove that the interdependence nature of environmental issues can be solved only through international co-operation and no single country can achieve

\textsuperscript{44} Teddy, n. 29, p. 61.
any solution alone on its own effort. It also shows that the issue of environment is transboundary and it is very unlikely that any country would be spared.

Review of the literature:

Books:


The book provides valuable information about climate change. The second chapter, *The Historical Development of Climate Change on the International Agenda*, provides details of how the issue of climate change became important for the global community. In similar vein the third and fourth chapters discuss the politics during the negotiation and give details about the stands taken by various countries during negotiation.


The book examines the relevance of the theoretical approaches currently used in international relations to the study of the global environment. It covers both theoretical issues and whole gamut of key international processes related with environment. The first chapter *Introduction The Environment in International Relations: Legacies and Contentions* by John Vogler, the second chapter *Environment Security as a Universal Value: Implications for International Theory* by Hugh C. Dyer and the fourth chapter *IR Theory: Neorealism, Neoinstitutionalism and the Climate Change Convention* by Matthew Patterson are relevant for the topic. The titles of the chapters itself talks about the issues dealt with regarding environment issues influencing the theories of international relations. The authors of the book are of view that neoliberal institutionalism is one of the most relevant theories to deal with climate change issue.


The report was prepared on the recommendation of the Third SAARC Summit (November, 1987, Kathmandu). During the summit the Head of States expressed concern
over the danger posed by the global sea level rise and its impact on the South Asian countries. The report has become a blueprint for tackling the impact of climate change. It provides factual data and measures for coping with the menace of climate change. In conclusion the report provides recommendations for the member states at domestic level and at the regional level. It strongly recommends the sharing of India’s experiences at regional level for tackling the menace of climate change.

**Bangladesh Climate Change and Sustainable Development, World Bank, (World Bank Group, 2001).**

The report provides detailed study of Bangladesh about the impact, mitigation and adaptation measures for climate change. Among various issues outlined in the report, particular emphasis has been put on burgeoning population and states that it could aggravate the menace of climate change. The report also states that in addition to natural resource/environment agencies there is a need for the involvement of the Ministry of External Affairs to strengthen Bangladesh’s negotiating positions for the United Nations Framework Convention for Climate Change.


The report provides ample information about the state of Bangladesh environment. For the proposed study chapter sixth (Energy) and tenth (Climate) are of immense importance. The section on *Global Climate Change and the Role of Bangladesh* by Dr. Saleemul Huq, provides information about climate change, role of Intergovernmental Panel on Climate Change, Bangladesh’s role, opportunities for Bangladesh to gain from the ongoing negotiations, Bangladesh strategy in the international negotiations and the adaptation measures. The section on *Negotiating for a Better Climate*, written by Dr. Mizan R. Khan, provides details about environmental diplomacy, North-South divide, flaws in the Kyoto Protocol and strategy of Bangladesh in the negotiating process. It also provides information about the measures taken by Bangladesh for climate change.

The book is a compilation of papers contributed by eminent scholars. It is unique because of being a first book dealing with Climate Change and Water Resources in South Asia. It covers most of the countries of South Asia and deals extensively with the impact of climate change on water resources. Most of the chapters provide a cooperative mechanism to address the problem. It advocates for regional cooperation and the chapters dealing with Bangladesh and India provide scope for bilateral cooperation. It is useful for the fifth chapter i.e. bilateral cooperation to reduce the vulnerabilities. However, it covers only the water management and suggests some measures where both countries can cooperate bilaterally.


The book is a first of its kind, deals with renewable energy of Bangladesh. It comprises of 22 chapters. It provides the present progress and proposes future steps to be taken for popularisation of the use of solar energy in Bangladesh. To increase awareness and social mobilization in the dissemination of environmentally friendly technology the author has emphasised the need for collective effort by NGOs, donor agencies and media support. The book concludes with a series of recommendations and follow-up steps for the sustainability of the solar PV system and the essential need for a power need matrix. It is helpful for chapter fourth and fifth because it provides the details of the progress made in solar photovoltaic system and also the shortcomings that has led to putting the issue to backburner by the government.


The book explores the relationship of environment and development in the context of South Asian countries with particular emphasis on Bangladesh. The authors of this book have given importance on the rural development and the environment. The authors have also analysed environmental degradation by analyzing poverty. And it
provides description of employment in context of an urban as well as a rural. The authors have used empirical data with a heavy emphasis on micro-data from villages. The book also provides real concerns for the environment and provides solutions that have broad applicability.


The authors explain about the threat of climate change as the single most pressing environmental issue for the 21st century. They have highlighted the main elements of climate change problem and its implications for Bangladesh. The study provides a brief picture, of how and why climate changes and the magnitude of problems. It concludes with reflections on the next steps for action and research.


The book covers wide spectrum of environmental problems in South Asia with specific emphasis on Bangladesh. It deals with the issues of development nexus, biodiversity and development, water and land use in Bangladesh, agricultural sustainability in marginal areas (including policies and principles of the government). The book provides valuable inputs in terms of government policies regarding coping with the environmental degradation that are presently under going in Bangladesh.


The book covers wide areas of the development issues related with Bangladesh. The third chapter by M.Q.Mirza and Ainun Nishat, “Development and Environment in Bangladesh: Past Approach Present Concerns and Future Issues”, provides a review of environmental consideration in planning in Bangladesh (1972-92). The chapter also discusses about various environmental issues like climate change, biodiversity, human
settlement etc. The author is of opinion that environmental problem that Bangladesh is facing can be addressed through people's participation in the planning process and it can be enhanced more through strong co-ordination among people, government and policy-planners.


The book presents a compilation of papers presented and discussed by prominent Indian researchers in a national seminar on Climate Change: Issues, Concerns and Opportunity. It offers an insight into issues, concerns and opportunities in the context of climate change with observations and model projections. It provides a rare concise and brief explanation about the impact of climate change on India. It also provides detailed descriptions of how India can benefit from the pro-active participation in the international negotiations of climate change. It also provides description of how development activities without further degrading the environment climate could be pursued.

*Energy, Environment and Climate Change Issues: India*, A Study by the Asian Regional Research Programme in Energy, Environment and Climate, Phase II.

The study of ARRPEEC-II in book form is very concise, dealing with various forms of energy in India. It provides data related with the consumption of energy and government's past, present and future approaches related with the energy sector. Though, it primarily deals with energy sector but at the same time it also provides information that how sustainable exploitation of energy could contribute in mitigating the impact of climate change. The concluding section of each chapter provides recommendations for the future.

*India Climate Friendly Development*, (Ministry of Environment and Forest, Government of India: Delhi, 2002).

The book provides detailed of the initiatives taken by the Government of India with regard to climate change. It also provides illustration of initiatives undertaken by private sectors and individuals to conserve energy, harness renewable energy and forest
protection. Lastly, the book points out how this climate friendly development by India is contributing effectively to global efforts for protecting our planet.

**Articles:**


Gaan, has emphasised in this article on how the environmental problem of South Asia region would act as a catalyst for promoting comprehensive regional security. The article also points out that the issue of environment serves as confidence building measures for the purpose heralding comprehensive national security in general and improving the relation between the region’s countries in particular.


In this article Gaan is of opinion that the mounting environmental problems and related issues should be approached from different dimensions unlike the conventional notion of security. The main thrust of the article is to link environment with security in a broader perspective and to identify the main causes of environmental degradation and its social effects leading to conflicts.


The article examines the environmental treaty implementation process of Bangladesh in the perspective of a developing country. It looks into the constitutional treaty ratification mechanism of Bangladesh to see how far it provides room for participatory system of environmental regulation. The relevant sectoral laws, policies and institutional structures are also examined to unfold the factors that interplay in the implementation process. For an effective compliance behaviour the author is of opinion that there is a need for the development of domestic legal and administrative frameworks supportive to achieve the broader objectives of the global environmental treaties ratified or acceded to by Bangladesh.

The author is of opinion that global environmental issues are deeply interwoven with socio-economic and political systems of each state. On the negotiation strategies the article draws certain important lessons for developing countries in general and for Bangladesh, in particular. Moreover, the author feels that weaknesses shown and mistakes made during the negotiations can provide us with important guidance in shaping the future course of action in relation to green diplomatic matters.


The article traces sources of environmental threats in the context of the security of Bangladesh. It also emphasises the concrete challenges with a focus on domestic, regional as well as global sources of environmental degradation. It is divided into four sections. The third section in particular is of importance for the topic under study. It provides description of climate change in the context of Bangladesh. It also provides description of the politics during the international negotiations.


The article provides a brief overview of available evidence on temperature, monsoon, water resources, human health, agriculture, forestry, coastal zone due to change in climate. It discusses some protocols, which have been negotiated so far to tackle climate change. It also provides the estimates of carbon dioxide for India using input-output technique for the year 1991-92 and 1996-7 and suggests some policy issues or some of the mitigation options.

The article provides background of the emergence of climate change issue at the international level. It also provides brief information about the United Nations Framework Convention on Climate Change and the Kyoto Protocol. The author is of opinion that for India the issue of climate change has several ramifications. At present India does not have any obligation to cut the emissions but the pressure is mounting, so it is important for India to develop a clear understanding of emissions’ inventory. The author is also of the view that there is a need to significantly improve ability to plan and adapt to extreme events such as floods, droughts, cyclones and other meteorological hazards.


The article provides a summary of the effects of sea-level rise on the low-lying regions of the world. The findings in the articles show that rise in sea levels would be inevitable primarily due to the melting of Greenland and other mountain glaciers. These phenomenon would lead to thermal expansion of water. The author is of view that there are three major ways by which coastal wetlands may be disrupted by the sea-level rise: inundation, erosion and sea water intrusion. At last the article provides some possible alternatives for protecting the coastal wetlands from rising sea.

The above-mentioned literature is general on the issue of climate change. The literature does not talk about the comparative and bilateral relevance. The proposed study will be of immense significance and will add in better understanding of the bilateral cooperation for climate change between India and Bangladesh. Towards this end the proposed study attempts to study the impact of climate change on the people of Bangladesh and India, both actual and potential and how this would impact particularly on the poor in these countries. It seeks to study the measures taken by the government in the alleviating the vagaries of environmental degradation and mitigating the impact of
climate change in Bangladesh and India. Also it analyses the obstacles that have prevented the governments from taking appropriate measures to address the issues of climate change. Additionally it examines how the wide prevalence of poverty and ignorance among the masses enhance the vulnerabilities of climate change in Bangladesh and India. Put forth are the issues that have been resolved through negotiations and the issues that are still lingering at the international level. Examine the scope of bilateral cooperation between Bangladesh and India for reducing the vulnerabilities and how they stand to benefit from experience and information sharing. Examine the relative approaches of the two countries to climate change in international negotiations.

Methodology:

Relevant information and data published on climate change have been interpreted both quantitatively as well as qualitatively. The study is based on primary and secondary sources. As far as primary sources are concerned, the reports and surveys, conducted by various national and international organizations are used. As secondary sources, existing literature and established journals both national and international are of main concern. Also, internet and working paper by research institutes are referred. Interviews with NGOs, government functionaries and stakeholders in both the countries have been conducted to assess the ground level realities.

Hypothesis:

1. The North-South divide on the stakes to climate change has resulted in the non-implementation of various proposed climate change mitigation measures in general and Kyoto Protocol in particular. 

2. Greater the bilateral cooperation between India and Bangladesh the lesser the adverse impact of climate change on them.

3. The issue of climate provides scope for the sharing of information and technology between India and Bangladesh.

Overall the study is an attempt to answer three important hypotheses:

Keeping the above facts in consideration, the study begins with analyzing the concept of security and moves on to global politics involved in the negotiations of climate change. Further, the study confines its horizon with comparative study of
Bangladesh and India and has attempted to know the impact that is likely to take place in Bangladesh and India due to change in climate. The impact study is based on the findings of the scientific community published in various reports, books and researched articles. Then it tries to study the measures taken in both the countries to address the concern of climate change. Lastly, it tries to identify the sectors in which the countries could go for bilateral cooperation to address the issue. The study is divided into six chapters, the overview of the chapters namely second, third, fourth and fifth is given below.

1. **Introduction**

   The Introductory chapter would explore the theoretical and scientific issues of climate change. It will also deal with theories of international relations related to security and explores and analyses the issues of environmental security and politics from the theoretical framework and trace the appropriate one that talks about environmental security. It will provide an overview of the following chapters.

2. **Climate Change Negotiations**

   The second chapter discusses the politics behind the negotiations of climate change and will cover the latest Conference of the Parties (COPs) to the Framework Convention on Climate Change (FCCC) deliberations. It would further discuss the various issues that have become impediments while addressing the issue of climate change. The chapter would make an attempt to review the stands taken by the leaders of Bangladesh and India during various international negotiations. It would also examine the advantage that Bangladesh and India enjoys by participating in negotiations and through ratifying various environmental treaties.

3. **Impact of Climate Change**

   The third chapter will provide details about the impact that Bangladesh and India will suffer due to change in climatic condition. Detailed study on all the sectors that will experience the impact of climate change will be covered under this chapter. It will be mainly based on the findings of reports like Inter Governmental Panel on Climate Change.
4. Measures for Reducing the Vulnerabilities of Climate Change

The fourth chapter would discuss the measures taken by the government of Bangladesh and India for addressing the climate change. Emphasis will be given on the clean energy policy. It will look further into the work of NGOs and research institutes, participating to address the menace of climate change. Their activities will also be examined in detail.

5. Bilateral Co-operation

The penultimate chapter would identify the areas where cooperation is possible to address the vulnerabilities of climate change like the management of Sunderban delta, cooperation in cleaner energy, alleviation of poverty and transfer of technology in goods and services.

6. Conclusion

The sixth and the last chapter is the conclusion and analyses of the preceding chapters. The findings of the preceding chapters will be discussed at length in the concluding chapter.