Scarcity of Resources and Its Impact on Security in Pakistan

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Take not life, which Allah hath made sacred, except by way of justice and law: thus does He commands you, that ye may learn wisdom.

(Surah Al-Anaam 6: 151)

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FINAL APPROVAL LETTER

This is to certify that we have read the dissertation by Mr. Tamur Shahani and in our judgment it is up to the standard of acceptance by Quaid-i-Azam University for the grant of degree of Master of Philosophy (M.Phil) in International Relations.

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TAMUR SHAHANI

Section 1:

Section 1: Introduction:

1.1: Abstract:

The overarching importance of global warming and anthropogenic climate change can not truly be negated, even if one is coming from the most skeptics of the skeptic schools of thought. Today the issue is of such a vital importance that shying away from discussing it or from considering it real, or worst still, considering it non anthropogenic is quite frivolous bordering on disastrous indeed. It is not only issues of morals and ethics, as studies have shown and this work will prove in the context of Pakistan, it is a national security emergency of dire consequences. This study proves that Pakistan is particularly vulnerable to the affects of global warming and if these extreme affects are not addressed than the consequences for the country will be dire. The study conducted offers explanations for as varied a phenomenon as depletion of water resources, degradation of food production, rising sea levels, rising levels of exotic diseases, etc. and correlates these phenomenon with global warming. We find that the carrying capacity of Pakistan is seriously strained due to population pressure, crippling natural disasters etc. and the consequences of global warming are exerting more and more burden on the already strained Pakistani state, stretching it to its breaking point.

This study proposes the indubitable linkages between global warming and national security, proposing to move the dominant thinking away from the preponderance of security in its traditional sense and conversely focusing on the peripheral thinking and the nontraditional aspects of security in a bid to understand how the changing world climate threatens to impact the nation state. Pakistan's case is fully explored and the causal linkages between looming and preexistent conflict and global warming are reconnoitered. We find, eventually, that though the linkages have been proven, through the small but powerful body of work that addresses this area, the implication are not entirely understood by the people, nor is there any substantial effort made to mitigate the problems being faced by the country. We find that bureaucratic fatigue, corruption at most if not all levels of

policy making and implementation and general apathy towards the issue have contributed to the lack of awareness and consequently lack of any action towards the extenuation of the threats faced by the country. Ultimately one hopes that this research will contribute positively towards the realization and the solution of the problems Pakistan faces due to global warming and the state and society will focus on more viable and sustainable means of development.

1.2: Background:

The environmental aspect of security is cited by many writers as being the ultimate discourse in security studies, while others regard any talk in this context as a waste of space. This divergent view is the reason why the environmental security issue is still a widely ignored area in the study of international politics. The most prominent argument levied in this regard is the fact that there is an inherent danger is using the term security and environment in the same context; however the damning evidence that has surfaced over the course of a few short years has made the realization of the acuteness of the problem a necessity. The new trends in studying and analyzing international and national security have focused on such nontraditional caveats such as environmental security, terrorism etc, this is a welcome innovation however, one cannot help but wonder whether this has come a little too late. Today the planet earth is over populated and its carrying capacity is greatly stretched, the fact is that human beings are intensely dependant on their natural environment and it is a known fact that the more underdeveloped the people are the more they are dependent on the traditional environment for their existence. It is also a known fact that roughly $3/4^{th}$ of the world's population is underdeveloped with development concentrated in a small specific area of the planet, it is needless to say that if one imagines the depletion of the environment one can quite easily imagine the extinction of the human race. The worrying fact is that such a scenario is now not just imaginable but also highly plausible.

When one talks about national security one thinks of such age old concepts such as territorial integrity and freedom from the fear of aggression from an adversary etc, however

as Barry Buzan has eloquently explained in his book *"security a new framework for analysis"* that environment is one of the five main avenues of human security that need to be high lightened. The severity of the issue did not become main stream until Robert D Kaplan published his seminal essay in the Atlantic monthly, even though Homer-Dixon had previously worked on the perils environmental degradation and climate change posed for the continuation of human life on this planet as we know it, his work had never managed to grab the attention of the policy makers as much as Kaplan's work did. The impact was so massive that the white house organized its first serious climate change impact meeting; Green had finally become main stream!

The case for climate change cannot be argued without analyzing the facts and the possibilities this scenario presents us with, climate change is not an abnormal phenomenon but is exacerbated by the various human activities that are helping it speed along the way. In 2007 the intergovernmental panel on climate change (IPCC) concluded that it was 90% likely that the increase in the global average temperature was due to human activity. In the last 100 years the earth's temperature is increased more than it should have and that's just the beginning. The IPCC scientists predict that if current trends in fossil fuel consumption are sustained then the world will see an average rise in temperature of 1 to 6.4'c till 2100. This doesn't seem all that much but if the fact that the earth has only had an average of 5' rise since the ice age(some 18000 years ago) is taken into account then the gravity of the situation can be fully understood.

Today the population of our planet is so much that its carrying capacity is already stretched, between 1970 to 1995 one third of all the world's resources were depleted as a result of human activity, if this pattern is projected into the future then experts say that all the oil reserves of the world will run out till 2050, while the strain on fresh water resources is unprecedented as well. In 1997 there were 430 million people living in areas with chronic water shortage; by 2052 this figure is estimated to be up to three billion or half of the world's total population (Homer-Dixon 1999) all these projections and more dire one's are said to worsen with the increase in global population which currently stands at 6 billion,

this figure is, according to the UN, predicted to grow to 8 to 9.4 billion by 2050. The annual global population is growing by a rate of 80 million people

Of all the aforementioned facts a very important dimension is the overall realization that the most trouble points exist in the global south or the developing regions of the world. According to the UN 90% of the world population growth is taking place in the developing countries, while the resources spent and the total consumption is much more in the developed world, similarly carbon emissions are not distributed evenly as well, with the highest cumulative output coming from the industrialized states of the global north[1] where as much lower rates emanate from the global south, ironically those who stand to lose the most are the people and nations of the global south.

This research will be divided into distinct parts that will serve to clearly explain and connect the proverbial dots that define the issue at hand. The first part will include the basic outline of the research to follow, whereby the basic hypothesis will be succinctly discussed and the importance of the case study explored. The second part shall focus on the theoretical framework which shall focus on critical theory and security studies in the context of the environment and its effects on human beings, while the third part will analyze the hypothesis and the perils for Pakistan's national security shall be critically analyzed following which the fourth and final part will state the results and derive conclusions while giving adequate policy options that if followed can stave off the impending crises that looms on the horizon.

1.3: Key questions and hypothesis of research:

The importance of environmental scarcity, resource depletion and global warming's effects on these phenomena cannot be ignored however the context of environment and national security is one that needs further scrutiny. The political circles will not consider the environment as a looming threat for national security until and unless irrefutable evidence is provided in this context. Keeping all this in view this study will postulate that global

[1] Nick Vaughan-Williams, *Critical Security Studies: An Introduction* (London: Routledge, 2010). p.92.

warming induced environmental scarcities have the potential to be hazardous to the national security of any given state, and this can be proven if the case study of Pakistan is carefully and thoroughly scrutinized. This study, while taking this postulation as the guiding beacon for research, will focus on the key areas of conflict and scarcity that Pakistan has been facing and will find evidence in the cases that this scarcity is indeed driven by anthropogenic climate change and that the violence ensued indubitably has the potential for long term, pervasive and all encompassing conflict, thus fatally endangering the national security of the country.

1.4 Significance of study:

The case of Pakistan is indeed a very peculiar case, with the country having a long history of internal and external problems, it becomes somewhat difficult to pinpoint the areas that actually exacerbate or cause conflict here, but as the work will prove that if carefully examined the case of Pakistan gives a simplistic and real meaning to a country embroiled in resource based conflict.

Pakistan is a country of the developing world that stands to lose much in light of climate change and the consequences it brings with it, being a country of 170 million people, it is resource starved as it is, as it is an agricultural economy it is safe to assume that with the increase in population the economy of the country is bound to take a dip, however that is the least of the country's worries in light of the environmental degradation that is fast becoming the country's worst nightmare. This research shall take Pakistan as the focal point and will extrapolate the irrefutable linkages that exist between climate change and national security. While hypothesizing that Pakistan's national security is dependent on climatic conditions, this work will explain the key concepts that guide the securitization of the climate and the underlying difficulties in doing so because even though it is a proven fact that the environment is one of the most pressing areas that need a overhaul in policy making the fact remains that it fails to receive the attention it deserves. The concept of security tied with climate change albeit contested is very relevant especially in the case of developing nations like Pakistan, where the population pressure and the increase in demand of commodities has already reached the tipping point, with the issue of climate change,

global warming and environmental degradation only serving to exacerbate a seemingly unending problem. The case of Pakistan shall explain why and exactly how a developing country like Pakistan is the most susceptible to the effects of the aforementioned phenomenon, and how much it actually stands to lose.

1.5: Literature review:

There is no dearth of literature when it comes to global warming and its impacts but the analysis of global warming as a security issue is new and hence not sufficiently explored. One of the first works in relation to global warming and its impact on human lives was the work of the United Nations world commission on environment and development, called *"our common future"* published in 1987 it spoke of how the affects of global warming will be felt all over the world and that a common action on the mitigation of this threat needed to take place. This was also the first time the concept of sustainable development was fully addressed and seen as a possible way of dealing with the problem of global warming. It was the first report to have put the environmental issues on the political agenda. Before the publishing of this report there had been international conventions dealing with anthropogenic environmental change like the 1980 convention on the conservation of Antarctic marine living resources or the Kuwait convention on the protection of sea life etc. but they were mostly of a regional nature and they were concerned with a very restrictive point, there wasn't an all encompassing global climate change convention till the framing of the united nations framework convention on climate change, promulgated in 1992 it derives heavily from the work of the United Nations world commission on environment and development.

When attempting to forge a connection between global warming, anthropogenic climate change and national security one must look at the work of the Welsh and the Copenhagen schools of thought, who have had a distinct role to play in moving the emphasis from traditional, militaristic security to nontraditional security studies. The most cited works in this context is of Barry Buzan's who argued in his book "people, states and fear" that the

focus on traditional conceptualizations of security is myopic and that there needs to be an emphasis on the human agency and the betterment of the human condition

The undeniable linkages between unchecked economic growth and degradation have been analyzed by many a theoreticians and commentators e.g. John McMurtry in his excellent book "*the cancer stage of capitalism*" who categorizes the global economic scenario a global market disorder and a pathogenic money code has observed that
"*These life-attacking money sequences have typically invaded their social and environmental life-hosts by the non-living vehicles of corporate conglomerates.*"[2]

Works by Thomas L Friedman also quote the rapid globalization of the world and the spread of the capitalistic system as one of the most fundamental reasons for the drastic disruptions of the biosphere of the world. Thomas Freidman has written extensively on a globalized world like his book "the world is flat" but he followed that up with the book "hot flat and crowded: why the world needs a green revolution, and how we can renew our global future". In this book Friedman has talked about how rapid population growth has led to a competition for energy and this over reliance on fossil fuels has only given rise to even more global warming. Thus Friedman's work provides an interesting insight into the phenomenon of energy competition, globalization and how these phenomena are connected to global warming.

Similarly when one looks at the availability of literature that ensures environment being taken as a national and global security emergency as it is, one looks at the work of Thomas Homer Dixon, who has most assertively championed the cause of global environmental degradation and its affects on human, national and global security. Homer Dixon's work is the basis for most of this study's theoretical framework, work spanning at least two decades has given Homer Dixon a distinct command and authority over the subject. He has worked on the basic theoretical underpinnings of the environmental security debate while corroborating his work with various case studies, including a very extensive case study of Pakistan. Thus Homer-Dixon's work forms the key building block of this research.

[2] John McMurtry, *The Cancer Stage of Capitalism* (London: Pluto Press, 1996), p. ix.

The research faces limitations in its search for relevant material on Pakistan by indigenous writers, the country is a very excellent case study opportunity for those in the west but when it comes to research at home we see that the trend is focused on studying the more obviously militaristic views on security, negating and/or ignoring the over arching influence of global warming on climate change.

1.6 Research methodology:

The methodology used to conduct this research was fairly straight forward; with a focus on induction and inference from preexisting data and statistics this research had both the primary and secondary data at its disposal. The researcher conducted informal interviews with the flood victims and recorded their observations, while building on the preexisting literature this work focuses on the derivation of plausible results and inferences from this data. The criteria for selection of data was based on the key questions that have been highlighted before and those who were talked to include flood victims who had migrated to the city centers etc. the researcher also consulted the officials of local inter governmental agencies working on the environment and its effects and deduced the necessary answers from there as well.

Time constraints did not let the researcher conduct a long term study of the effects of the natural disasters and environmental degradation and thus the design that was followed was the correlational research pattern where the linkages between the variables were hypothesized and extrapolated. The research conducted hence focused on the accumulation of data and very little interference was done in the processes that were taking place. Thus the key elements of the research design were observation, data accumulation, calculation of correlation between variables and inference of results based on the aforementioned steps.

1.7: Expected outcome of research:

The main result or outcome that this work will expect is that the correlation between the environmental degradation caused by anthropogenic climate change and national security is objectively proven. The skepticism against this debate is very prominent hence the researcher in the present case hopes to somehow explain that the linkages between these two variables are irrefutable. The case of Pakistan will stand to prove the point mentioned here and will seek to fully explain the causal linkages between environmental degradation and violent conflict and hopefully by the end of this work it will have been proven that ecoviolence is a stark reality and the nation state is the most vulnerable to it.

Section 2:

Theoretical framework:

For the purpose of this research and in the pursuit of the goals outlined in section 1, the need for the clarification and the applicability of the broader concept of security is indubitable, as the concept of environmental security and its linkages with national security cannot be isolated from the broader study of security. Thus the theoretical connotations of the various definitions, schools and caveats of international security will be extrapolated herein.

This section shall begin its journey into the deeper meanings of environmental security and its impact on national security by taking tentative steps towards the definition and background of the concept of security itself

2.1: Security a critical background: an attempt at post cold war theorization:

Many a decades ago any attempt to explain global politics was a relatively easy phenomenon, with the world permanently seen as one divided between two distinct blocks, the United States and the Soviet Union. At that time this bipolarity seemed to be a foregone conclusion, however the collapse of the Soviet Union brought hitherto unquestionable believes into the focus. Was the international system truly bipolar? And was the fact that two nuclear armed states could sustain an uneasy peace becoming a thing of the past, was everything changing? The state vs. state balance of terror [3]had ended and thus began the era of hitherto unknown agents of threat to the state, the system and the individual as well. Whether it was Fukuyama's last man or the civilizations clashing with each other in the manner of Huntington's postulation, the whole world seemed to wait for the next viable, potent and major threat to the nation state. The answer came in the form of Iraq's aggression against Kuwait and how this territorial, regional war became an area of global interest. It seemed as though the era of unipolarity was now upon the world, but upon closer inspection it seemed as though even that hypothesis was a faulty one This new era of security conceptualization and theorization focused on such hitherto unknown areas of security studies like state failure, regime stability and the burgeoning north south divide and tried to find

[3] John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: Norton, 2001), pp. 19-21.

plausible reasons as to why the system of war and peace was not feasible anymore. John Mueller's work for example, in 1989 focused on the fact that after witnessing two major wars the world failed to see any positive outcomes of an all out major clash, he argues that the total obsoleteness of major wars can be seen by analyzing the total destruction caused and the bloodshed in connection with the viability of war to conduct great power relations.[4]Similarly for thinkers like Martin van Creveld, it was the development and the destructive capability of the nuclear weapons that made an all out war a suicidal thought to begin with.[5]

The varying debates that raged on after the cold war also discussed the economically intertwined nature of our new world and the unfeasibility of war to economic gains, The world had globalized to the most extreme extent and that had led to the formation of linkages that didn't exist before, these linkages proved how fundamentally entwined we were and how complexly interdependent our fates had become. The globalized world faced a myriad of problems and as such the fixation with an all out war was for all intents and purposes forgone. Richard Rosecrance has expressed this as the rise of the "trading World" that had gained superiority over the "military territorial world".[6]

Thus from the brief aforementioned analysis it seems apparent that the demise of the bipolar, antagonistic system of the cold war led to the reevaluation and redefinition of the concept of security, with most analysts settling on the fact that the world had now become so correlated that the ignorance of such diverse phenomenon as the global economic order, the north south divide and the over arching affects of globalization and the emphasis on pure military security was a reckless and unrealistic assessment indeed and a reevaluation of the broader concept of security was absolutely necessary.

2.2: Defining security:

Security literally means the state or feeling of safety, freedom from worries or loss. The definition of security, simplistically put, is *"the absence of threats"*. it is a heavily contested

[4] John E Mueller, *Retreat from Doomsday: The Obsoleteness of Major War* (New York: Basic Books, 1989), p. 20.
[5] Martin Van Creveld, *The Transformation of War* (New York and Toronto: Free Press, 1991), pp. 5-7.
[6] Richard Rosecrance, *The Rise of the Trading State: Commerce and Conquest in the Modern World* (New York: Basic Press, 1986), pp. 22-28.

value when it comes to its definition in international politics, where the value of security has an inherent bias attached to it, it is most commonly associated with the alleviation of threats to cherished values, those which if left unchecked threaten the survival of a particular referent object[7], Ken Booth has called it "survival plus" defining that plus as such;

"Security in world politics is an instrumental value that enables people (s) some opportunity to choose how to live. It is a means by which individuals and collectivities can invent and reinvent different ideas about being human."[8]

The contested concept of security has through the ages been the focal point of most discourse in international politics whether it be the realist perception of national security and the maximization of power, or the idealist perception of economic liberalization and collective efforts to ensure our common good, the fact remains that security is a concept that needs a constant re evaluation and re definition. Thomas Jefferson said that "*every generation needs a new revolution* "and the concept of security in today's world needs to undergo a revolution of sorts from the over emphasis on national security to the constituents of the nations state itself. This is not a hitherto unknown postulation as the purpose of critical security studies, for example, has been to redefine and reevaluate the concept of security such that it fits a more wider conceptualization, Barry Buzan, in his book "*people, states and fear*" says that "*security has a meaning independent of the sate at the individual level*" hence while the nation state has been predominantly the center for discourse it needs to be understood that the individuals that make up the state face a myriad of insecurities which the traditional conceptualization of security cannot address.

The debate that surrounds the re definition of security rests on the epistemological break down of the very concept of security and the definition of the terms associated with its meaning, and that is done in the context of the major schools of thought that govern the study of international politics. The realists for example state the importance of the nation state and the accumulation of military might for the surety of the state's survival. Similarly the liberal economists view the economic survival of the state and of the predominant economic system to hold the key to security and peace in the world. The focus on the inherent insecurities for the realists and the

[7] Paul Williams, *Security Studies: An Introduction* (New York: Routledge, 2008), pp. 7-8.
[8] Ken Booth, eds., *Critical Security Studies and World Politics* (Boulder, CO: Lynne Rienner, 1995), p. 23.

need for development and growth for the liberalists determines th
security. However these aren't the only schools of thought that dete
of the concept and the definition of security, the Feminist schoo
preponderance of the apparent masculinity of the very concept of securi
that where are all the women?[9] And postulating that gender relations are socially reinf
thus the voices of women in the context of security studies are quite easily subdued or quashed.[10]
Similarly the critical theorists would consider the focus on human emancipation and questioning of preexistent ideas a fundamental part of any conceptualization towards security (details discussed in 2.3)

Hence the study of security has various caveats that need to be fully analyzed before agreeing on a definition and that process has been through the various debates through various schools of thought, today the new definition of security builds on all the theoretical perspectives and includes all the considerations of human, societal, gender, racial securities among others. The most interesting fact now is that the debate on security is now bifurcated into two distinct schools of thought the traditional school that focuses on the crude force and military aspect of international security, focusing on military buildup and the importance of the state and the nontraditional school that stresses the importance of those phenomena that cannot be tabulated in the traditional sense like the securitization of the environment or the complex interdependence between societies and cultures etc. thus with a debate on the real nature of security stemmed the two very different but not mutually exclusive conceptualizations which shall be discussed herein, with a focus on the critical analytical setup.

2.3: Security: the schools of thought and critical security studies:

The two schools of thought that need to be analyzed are the traditional security framework and the non-traditional security conceptualization. As the name suggests the traditional conceptualization is based on the realist and the neo realistic perceptions, the mainstream literature that stresses upon the nation state, its alliances and its mechanisms of power politics as

[9] Sandra Whitworth, *Feminism and International Relations,* (London: Palgrave, 1994), p. 65.
[10] Carol Cohn. *Wars, Wimps, and Women: Talking Gender and Thinking War* in, Michael S. Kimmel, Amy Aronson eds., The Gendered Society Reader , (New York: Oxford University Press, 2010). p. 608.

means for survival in the international system. Traditional security conceptualizations are fixated on the rugged power politics, focusing on military and diplomatic alliances to stave off potential attacks etc, this is the main mindset that leads to arms buildup, arms races and potential insecurity among nations, but it has also proved itself to be a valid explanation of interstate relations particularly in the cold war context, however it seems prudent to add that once the cold war subsided, the nation state was confronted with much complex issues, some so serious that could threaten its very existence.

The nontraditional school of thought basically talks about those issues that can't be explained by reliance on the traditional realistic interpretation of security.[11]The main unit of analysis for non traditionalists like Buzan and Booth is the human being, with the former focusing on human security which he has characterized into five distinct sectors, political, economic, societal and ecological including the military sector.[12] Thus Buzan's explains these factors as such.

- *Military*: concerned with the interplay between the armed offensive and defensive capabilities of states and states' perceptions of each other's intentions. Buzan's preference was that the study of military security should be seen as one subset of security studies and referred to as strategic studies in order to avoid unnecessary confusion
- *Political*: focused on the organizational stability of states, systems of government and the ideologies that give them their legitimacy.
- *Economic*: revolved around access to the resources, finance and markets necessary to sustain acceptable levels of welfare and state power.
- *Societal*: centered on the sustainability and evolution of traditional patterns of language, culture, and religious and national identity and custom.
- *Environmental*: concerned with the maintenance of the local and the planetary biosphere as the essential support system on which all other human enterprises depend.[13]

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[11] Ole Wæver, *Aberystwyth, Paris, Copenhagen: New Schools in Security Theory and Their Origins between Core and Periphery*. Paper presented at *International Studies Association Conference*. Montreal, 2004.

[12] Barry Buzan, *People, States and Fear: An Agenda for International Security Studies in the Post-Cold War Era*. (London: Harvester Wheatsheaf, 1991). p. 177.

[13] Barry Buzan, Ole Wæver and Jaap de Wilde, *Security: A New Framework for Analysis*. (Boulder,CO: Lynne Rienner, 1998), pp. 22-23.

Buzan argues that *"the state is more a social entity, an idea, than it is a physical being"* has sought to include these five sectors and focus on three levels while discussing security, the sub state, the state and the international system.

Whereas Ken Booth talks about human emancipation, arguing that the state is not a good referent object when it comes to the discourse on security studies mainly because states are unreliable in this context, and when it comes to security the question should be: whose security comes first the Individual's or the state's?

"Security means the absence of threats. Emancipation is the freeing of people (as individuals and groups) from those physical and human constraints which stop them carrying out what they would freely choose to do. War and the threat of war is one of those constraints, together with poverty, poor education, and political oppression and so on. Security and emancipation are two sides of the same coin. Emancipation, not power or order produces true security".[14]

The traditional and the nontraditional schools of thought did not come without their critics, both sides levied heavy criticism on each other. The traditional school was criticized for its over emphasis on the nation state and its security, the question asked was: what about the times when the nation state itself is the source of insecurity? This argument was used by the nontraditional school to champion it's cause but the traditionalists argued that the concepts propagated in the nontraditional literature were too abstract and diverse for the study and focus on international security, the question was how to gauge the relative importance or lack thereof of an issue to truly make it be an issue of international security.

In the context mentioned above, perhaps the most important development has been the conceptualization of the ***securitization theory*** put forward by the Copenhagen school which argues that security being a normative concept is defined by the value attached to it by the policy maker. And the process involved, i.e. *"who securitizes, on what issues (threats), for whom (referent objects), why, with what results and under what conditions".*[15] Security in Waever's conceptualization is an inert-subjective phenomenon where a legitimate actor chooses an issue of concern and presents that issue to the audience, now the acceptance of that issue depends as

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[14] Ken Booth, "Security and Emancipation," *Review of International Studies* 17.4 (1991), pp. 313-326.
[15] Ole Wæver, *Securitization and Desecuritization* in Ronnie D. Lipschutz ed., *On Security*, (New York: Columbia University Press, 1995), pp. 13-68.

much on the audience's perception of its importance as it's actual potency, hence in the process of securitization the medium ie the legitimate actor is a vital component to making an issue viable to be considered as a security issue. This seems to answer the questions raised about the true threat posed by any issue.[16]

The main focal point of the work of the nontraditional schools (e.g. the Copenhagen school or the welsh school etc) has been a reevaluation and a redefinition of the concept of security, to broaden it and to give it legitimacy in an ever changing global political arena. thus While the traditional school still has preponderance in the considerations of international politics, as is evident from the budgetary spending on arms etc, the nontraditional school has managed to carve an important place for itself.

2.4: National security:

For the purpose of this study the concept of national security must be critically analyzed, for the basic argument that will be analyzed will include the critical analysis and evaluation of the concept of national security. the first question that logically springs to mind is "what is a nation state?" the agreed upon definition in this regard is that a nation state is one which is "a legal territorial entity composed of a stable population and a government which has a monopoly on the legitimate use of force; its sovereignty is recognized by the other states in the international system"[17] this rudimentary definition of a nation state is enough to give an overview of its stature in international politics. The main idea propagated by realists is that the nation state is the central area of importance in international politics and that a nations power or lack thereof determines its security, hence the second concept defined by most realists is that "what are the constituents of national power?" the common consensus on the constituents of national power being geography, national resources, raw materials, industrial capacity, military preparedness, population and leadership etc is sufficient to explain the key areas that can help to quantify a nation's power however it's the nations security that is the next key concept. A nation is secure provided that it doesn't face threats from outside and its stable from within, now this concept is multi faceted as

[16] Ibid.
[17] For more in this regard see Timothy Dunne's "Realism" in S. Smith and J. Baylis (ed.), *The Globalisation of World Politics: An introduction to International Relations*, 2nd ed, (London: Oxford University Press, 2001), p. 144.

the nation's security is and shall always be a contested concept, within the realist framework a nation state is secure if it is militarily strong enough to trump any foreign aggression and is able to hold its own in an anarchical society. However this is a very simplistic definition as the nation state cannot be understood as a single block that can depend only on its military might for its security, consider for example the case of the military might of America and how it is practically thwarted in the face of irregular warfare waged by the terrorists. This example basically analyzes the importance of such new concepts in security as transnational terrorism etc as being integral to any discourse in this context. Similarly a nation state cannot imagine sustaining its military muscle if it is not economically strong, this by the realist's perception is not a true measure of a nation's security but in the globalized world this has proved to be a more pervasive concept of international as well as national security, consider for example the global market crash of 2008 and how it brought with it the global panic unprecedented in the modern age.

To adequately define national security one must realize what is the threat faced by the state, which is the object that needs to be secured. In this context Richard H. Ullman provides one broad definition, that a threat is an *"action or sequence of events that threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state."*[18] This definition of a threat opens up the debate on what really is national security, by this definition it could be the fact that a state can be threatened by immediate and evident threats such as a military intervention, war or a coup de tat or it could be a more pervasive kind of a threat for example declining food production, inflation or environmental degradation etc. another important concept to be noticed here is the emphasis on the inhabitants of the nation state, thus opening up the debate on the connections between human and national security that will be discussed subsequently. Hence the area of national security now comes with the realization of various new caveats and these cannot be logically ignored.

The main idea in the brief aforementioned debate on national security is that the concept of national security is a contested and confusing one in international relations, where many factors are intertwined to create the collage that truly reflects the real essence of national security but by and large the nation is the major referent object in the study on international relations, in the following section the complex relationship between human and national security will be

[18]Richard H. Ullman, "Redefining Security," *International Security* 8.1 (Summer 1983), pp. 129-153.

highlighted briefly and by the end of this work one hopes to highlight it's over arching complexity in the context of environmental security, while taking Pakistan as a case study.

2.5: Human security:

For the purpose of this study our focus shall be on the broader definition and application of the concept of human security and how it corresponds to the concept of national security, human security is defined by the report of the commission on human security (2003) as;

"Human security means protecting fundamental freedoms. . . . It means protecting people from critical (severe) and pervasive (widespread) threats and situations. It means using processes that build on people's strengths and aspirations. It means creating political, social, environmental, economic, military, and cultural systems that together give people the building blocks of survival."[19]

The United Nations development program has defined Human security as: *"First, safety from such chronic threats as hunger, disease and repression. And second... protection from sudden and hurtful disruptions to the patterns of daily life- whether in homes, in jobs or in communities"*[20]

The UNDP's human development report of 1994 was a groundbreaking initiative that defined the boundaries of human security for the generations to come; it thus codified the basic elements necessary to define human security by emphasizing on the need to move away from military spending and invest in development, this report also specifically gave a guideline as to how this should happen by proposing spending of 20% of national budget and 20% of foreign aid specifically for human development. This idea has been reiterated by the consequent reports by the UNDP, the most recent one calling for the right of every human being to a healthy and sustainable environment.[21]

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[19] Report of the Commission on Human Security, Human Security Now: Protecting and Empowering People, New York: UN (2003).This key report of an international commission that discussed the different aspects of human security and the ways to address different human security challenges.
[20] UNDP Human Development Report (1994).
[21] UNDP Human Development report summary (to be published in November 2011).

The argument that lies at the core of all debate concerning human security is the assumption that international order is crucially dependant on human security, and vice versa. The only sure fire way of containing and controlling a conflict situation is to ensure that the fundamental rights and freedoms of individuals are ensured, this however broadens the debate on human security with the fact that the boundaries that govern the formulation of a theory on human security are clouded with uncertainty. This is explainable by considering the fact that the opponents of this paradigm argue that human security is a very diverse area to be included in the study of international politics, the traditionalists argue that human security includes discourse about areas that are not clearly defined, further more they see an inherent problem in the securitization of such areas for example the environment as this would only lead to a global sense of paranoia. Critics have also speculated that the demand for human security grew out of the global north's perspective and is not feasible to be applied in the context of the global south, those who don't even know about their source of income are the least concerned with the fact that they are the referent objects of global security or not hence criticism for human security as a point of analysis for international security comes from many corners and many views.

However while some are busy defining, rejecting and redefining the core values that encompass human security, others are busy working on the issues identified on the ground. For as the human development report has highlighted many issues to be of importance to the human security discourse it has become apparent that these areas are in fact real and have a pervasive effect on human security and in consequence international security. The human development report had quite far back before 9/11 recorded terrorism as a human security issue. The events that unfolded led to terrorism becoming one of the most pervasive issue of international security, even though terrorists lack the mechanisms to effectively harm the nation state in anyway, the fact that the victims of terrorist attacks were human beings, individuals, citizens of a particular nation, it became the leading policy former in the context of international relations, wars were being waged and the boundaries of interstate relations became increasingly muddled.

2.6: Environmental security:

The Environmental threats facing the planet are not simply the result of scientific miscalculations. Nor are they merely the consequence of ill- conceived management decisions.

Ironically, it is the notion of security upon which our entire modern worldview is based that has led us to the verge of ecocide... in less than a century the practice of geopolitics has pushed the world to the brink of both nuclear Armageddon and environmental catastrophe, forcing us to reconsider the basic assumptions of security that animate the modern worldview.

(Jeremy Rifkin, Biospheric Politics) [22]

Hurricane Katrina off the shores of America in late 2005 raised a very critical question: was the disaster caused by Katrina a direct reaction of global warming?[23] the answer was in one of those grey areas that people don't often prefer to tread into, the fact that environmental scientists were raging about was that the raised temperature in the gulf of Mexico by a mere 2 degrees had led to the gathering of force by the hurricane that had made it so fatal, this they postulated can have a direct link to global warming, hence though Climate change and global warming did not create Katrina these factors did give it the fury that made it so fatal, The anarchy had finally come to the United States of America, the scenario explained by Kaplan[24] in the coming anarchy of west Africa was now the city of new Orleans, orphans and loitering mobs, lack of resources and the helplessness of the people all was very evident and apparent. This was how nature chose to manifest itself and bring the lives of many a thousand people to a stand according to James Lovelock, Gaia was furious[25].

The magnitude of destruction of Katrina, though great was not an isolated happening, humankind is helpless in the face of environmental disasters, the calamities inflicted upon us by God are, however catastrophic, out of our hands and hence nothing can be done about them or the consequent problems we face. Homer- Dixon argues otherwise finding the correlation between resource depletion and violent conflicts[26]; he argues that the eventuality of conflict following the depleting natural resources is unequivocally evident. Presenting various scenarios in which environmental degradation leads to violent conflict, Homer – Dixon's work has sought to prove

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[22] Taken from Simon Dalby, *Environmental Security*, (Minnesota: University of Minnesota Press, 2002), p.1.

[23] See Katrina and Global Warming: Was Katrina's power a product of Global Warming. 'PEW Center on Global Climate Change'.

[24] See The Coming Anarchy 'how scarcity, crime, over population, tribalism, and disease are rapidly destroying the social fabric of our planet' (The Atlantic Monthly, February 1994).

[25] James Lovelock, *The Revenge of Gaia: Why the Earth Is Fighting Back - and How We Can Still Save Humanity*, (London: Penguin Books, 2007), p. 147

[26] Thomas Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," *International Security* 16.2 (1991), pp. 76-116.

the correlation between the two variables. The work presented by Robert D Kaplan [27]a few years later made the Clinton administration stand up and take notice[28], where a copy of this article was circulated in the white house and the national security council. The circulation of this article opened up a brave new frontier whereby the over looming propensity of environmental degradation was finally realized by the decision making authorities, Clinton's vice president Al Gore (who went on to become a staunch activist in the environmental arena and the recipient of the noble peace prize for his dedication to the same) was particularly moved [29]by Kaplan's work. The administrations realization of the issue paved the way for a more serious reckoning on the environmental political arena and the importance of such theoretical concepts as the limits to growth, the tragedy of commons and the source sink theory of population pressure. Consequently the American public felt the gravity of the situation as well and as journalist Thomas Friedman would say "green had become main stream".[30] The influence of global warming and population pressure etc began to be felt at home as the world population began to realize the apparent affects. But while the concerned voices were being raised and the worried circles began inching towards a mobilization to do something about this global problem another equally, if not more, reverberating voice was being raised simultaneously. The growth optimists or the cornucopians [31]were arguing the fatal nature of Kaplan's findings and terming them a "preposterous overstatement of the facts". This end of the environmental debate spectrum was concerned with the air of doom the neo Malthusians or the growth pessimists were propagating, they justified their arguments by saying that growth is the inalienable right of all human beings. These and many other debates had ensued due to the mainstreaming of global ecology in its socio-political

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[27] See Robert D. Kaplan, "The Coming Anarchy: How scarcity, crime, over population, tribalism, and disease are rapidly destroying the social fabric of our planet," *The Atlantic*. February, 1994.

[28] *"When you look at the long-run trends that are going on around the world—you read articles like Robert Kaplan's article in The Atlantic a couple of months ago that some say it's too dour—... if you really look at what's going on, you could visualize a world in which a few million of us live in such opulence we could all be starring in nighttime soaps. And the rest of us look like we're in one of those Mel Gibson "Road Warrior" movies...I was so gripped by many things that were in that article, and by the more academic treatment of the same subject by Professor Homer-Dixon..."* President Clinton's Remarks to the National Academy of Sciences June 29, 1994.

[29] *"Our enemy is more subtle than a British fleet. Climate change is the most serious problem that our civilization faces, and it has caused enormous damage before in human history..."* Vice President Gore's Remarks at the White House Conference on Climate Action April 21, 1994

[30]See Thomas L. Friedman, "The Power of Green," *The New York Times*. 15 April, 2007.

[31] Liberal economy theorists who argue that free trade benefits all and say that basically today the human race is overall better and in a better condition to prosper and overpopulation is not because the overall birth rate has increased but it is because the overall life expectancy is much more. (Interestingly enough the term originates from Greek mythology where Cornucopia stands for Horn of Plenty. Colloquially they are also referred to as Boomers and their opponents the Malthusians as Doomers.)

connotations, where growth optimists saw it as a threat to their way of doing business the concerned part of the public saw it as a threat to life itself as they argues that Global warming and environmental degradation is the one truly universal threat. [32]

Barry Buzan has defined security as a set of "*threats and vulnerabilities... staged as existential threats to a referent object by a securitizing actor*"[33] hence to securitize the environment one must first gauge the apparent threat it poses to the existence of the nation state and realize its importance in its very truest of essences. The case of securitization of the environment first came to the fore in 1972 with the UN conference on the human environment, then came the article "the coming anarchy" by Robert D Kaplan where he categorically emphasized the importance of environmental security and positively stated "*it is time to understand the environment as it is, the national security issue of the early 21st century*" since the article raised an issue in the regions of power about how the impending environmental catastrophe had the potential of impacting the whole world, he says that "*Environmental scarcity will inflame existing hatreds and affect power relationships*"[34] and to explain this he gives various examples for instance he cites the example of the Caucasus where seemingly the conflict is between Armenians and the Azeri Turks, seemingly it's a conflict on the lines of the fault lines provided by Samuel Huntington but a closer look reveals that nothing is as simple as Huntington has elaborated[35], upon closer inspection the war is not based on religious identities but is based on historic ties between Turks and Turks and the relative deprivation the two groups have felt in relation with each other. This was the first time it was actually recognized as an issue of national security, where it was actually mainstreamed. The issues of how environmental scarcity can and has basically destroyed the social fabric of areas such as west Africa, and seemingly the next in line are the densely populated areas of Asia and China, highlighted by Kaplan and his assertion that the global north had a lot to loose along with the global south, was potent enough to make the world notice. Kaplan thus analyzed the issue of the burgeoning north south divide:

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[32] See "Our Common Future, From One Earth to One World", Report of the UN World Commission on Environment and Development.

[33] Barry Buzan, et al., *Security: A New Framework of Analysis,* (Boulder, CO: Lynne Rienner, 1998), p. 5.

[34] Robert D Kaplan, "The Coming Anarchy," *The Atlantic.* Feburary, 1994.

[35] Samuel Huntington, "Clash of Civilizations," *Foreign Affairs* 72.3 (Summer 1993), pp. 22-49 , Herein Huntington has argued that the fault lines of the civilizations will be the fault lines of future conflict, consequently Huntington laid the foundations for conflict theories based on the differences of identity, culture and most importantly religion as the fundamental building blocks of major conflicts.

"We are entering a bifurcated world. Part of the globe is inhabited by Hegel's and Fukuyama's Last Man, healthy, well fed, and pampered by technology. The other, larger, part is inhabited by Hobbes's First Man, condemned to a life that is 'poor, nasty, brutish, and short.' Although both parts will be threatened by environmental stress, the Last Man will be able to master it; the First Man will not. The Last Man will adjust to the loss of underground water tables in the western United States. He will build dikes to save Cape Hatteras and the Chesapeake beaches from rising sea levels, even as the Maldive Islands, off the coast of India, sink into oblivion, and the shorelines of Egypt, Bangladesh, and Southeast Asia recede, driving tens of millions of people inland where there is no room for them, and thus sharpening ethnic divisions."

(Kaplan 1994)

Herein Kaplan has defined the most fundamental assumption related to environmental and resource conflict, that it is derived as a means of structural violence. However he did not dwell upon this as much as Baechler did who summarized that though both north and south have contributed immensely to the various scarcities faced by the global south the contextual causal chain can be found to exist over decades. The global south has always been the grounds for harnessing for the global north[36], this structural exploitation has led to the resource scarcity felt at the moment by the south, but at the same time Baechler argues that there is no empirical evidence that environmental scarcity causes violent conflict or wars between states however he does find that environmental scarcity causes large population movements that in turn cause conflict[37]. Baechler postulates that environmental conflicts are in fact *"traditional conflicts induced by environmental degradation"* Baechler has quoted Libiszewski who has very succinctly defined degradation in one or more of the following fields as the cause of conflicts, thus;

- overuse of renewable resources;
- overstrain of the environment's sink capacity (pollution);

[36] Gunther Baechler, *Violence Through Environmental Discrimination: Causes, Rwanda Arena, and Conflict Model* (Dordrecht: Kluwer Academic Publishers, 1999), p. 99.
[37] Gunther Baechler, "Why Environmental Transformation Causes Violence: A Synthesis," *Environmental Change and Security Project Report* 4, (Spring, 1998), pp. 24-44.

- Impoverishment of the space of living.[38]

Using Libiszewski's hypothesis Baechler argues the two pronged nature of environmental conflict, the fact that environmental conflict is as dependant on the degradation of crucial resources as much as it is dependent on the management of those resources he argues that there occurs a transformation of society-nature relationships during the course of a particular nations evolution and hence if mismanagement coupled with discrimination or lack of foresight is immediately linked with the destabilization of the social fabric then it can very easily lead to a conflict of great proportions. Baechler tabulating enviornemnetal conflict as thus says that hard

The Role of the environment as a cause of conflict;

Reason

Transformation of society- nature relationships plays a role as a reason for conflict "The subjects of environmental conflicts are degraded sources and over-strained sinks"

Trigger

↓

Second, transformation of the landscape plays a role as a trigger if actors perceive discrimination as inevitable, transformation acts as a trigger in a bigger way if that transformation is caused by a third party and seems to be encroaching on the society's resources

Target

↓

Environmental concerns become a target of discriminated actors if transformation of the landscape is what the conflict is about

Channel

↓

A channel is a line of political, social, economic, or national cleavage. Channels thus are designed to shape the group identity by manipulating existing sociopolitical fault lines. Environmental concerns only indirectly serve as a channel.

Catalyst

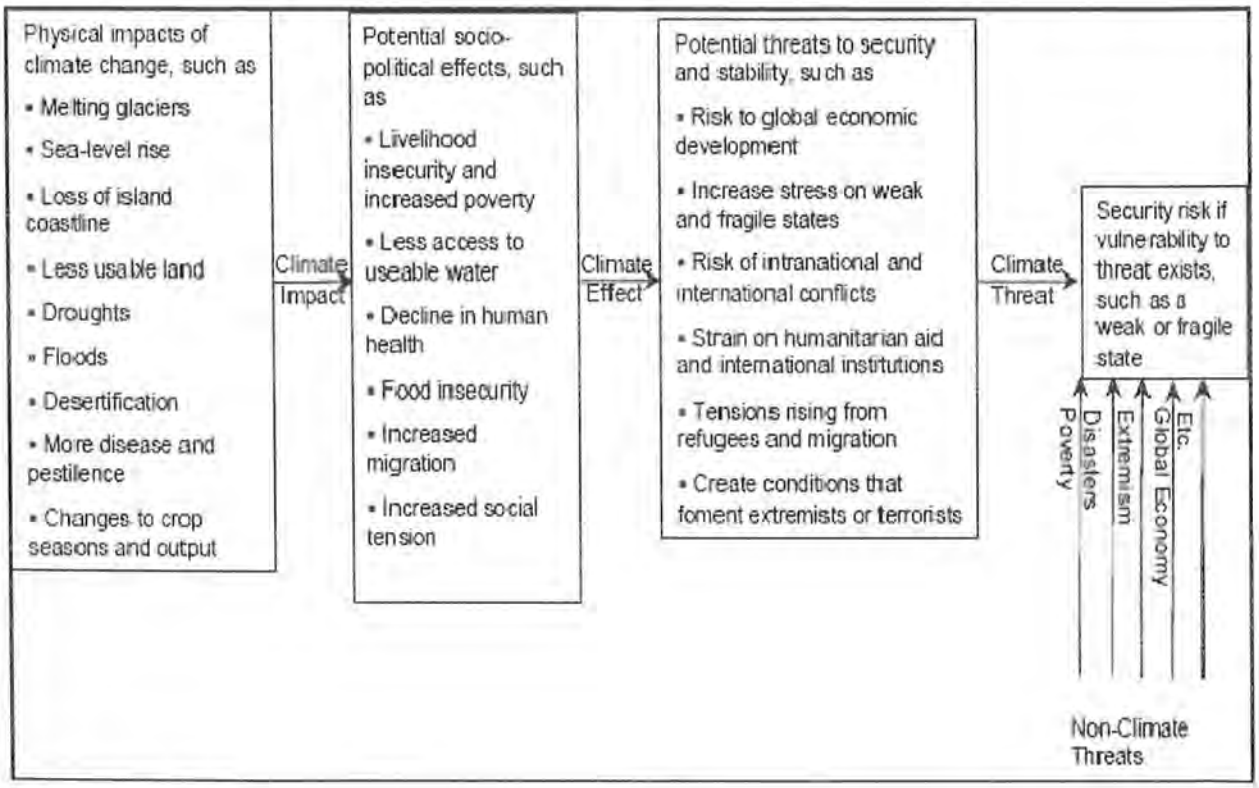
↓

Fifth, in only a few cases, the transformation of landscape becomes a catalyst of conflict. (However this can be a more potent catalyst if sudden events like floods or cyclones severely deteriorate the renewable)[39]

[38] Taken from, Stephan Libiszewski, "What is an Environmental Conflict?" *ENCOP Occasional Paper No. 1. Zürich/Berne: Swiss Federal institute of Technology/Swiss Peace Foundation, 1992.*

[39] Gunther Baechler, "Why Environmental Transformation Causes Violence: A Synthesis," *Environmental Change and Security Project Report* 4 (Spring, 1998), pp. 24-44.

as it might be to find linkages between economic scarcity and environmental scarcity [40]that is where the fundamental connecting dots exist. Where there is environmental scarcity there is conflict because there is a lack of sustenance and a lack of commodities. This basically puts environmental scarcity as the cause for economic scarcity. Hence Baechler's tabulation of environmental scarcity and the conflict it induces is very potent to explain deprivation driven conflicts in a society in which social change is driven by thus finding a causal linkage between environmental degradation and overall loss of optimum living conditions is not a relatively hard task to manage consider for example the Congressional research services tabulation of how climate change can affect security:



Source: CRS.

Notes: First two boxes were adapted from S. Smith and J. Vivekananda, A Climate of Conflict (International Alert, Nov. 2007), pp. 10-11, available at http://www.international-alert.org/pdf/A_Climate_Of_Conflict.pdf.

[40] Economic scarcity addresses the distribution problem of man-made goods between those interested in access to these goods. Environmental scarcity, on the other hand, highlights the input side of a third (external) factor, namely of natural resources provided by the landscape as a life support system (land, water, mineral, coal, oil, gas). Economic conflicts are political conflicts that deal with the production and (re-) allocation of human and physical capital, whereas environmental conflicts are political conflicts that are concerned with the availability of natural capital.

The environmental security debate is, however, not without its critics. For instance Jon Barnett argues that there is a definite need to be cautious about linking climate change with conflict, this idea is reiterated by Gleditsch who foresees a great tragedy if the frivolous linking of environment and conflict is not stopped for while championing the cause of the environment is absolutely important, the familiar trick of overtly dramatizing the environmental conflict hypothesis will only serve to work against the cause of conservation.[41]

It can hence be concluded that the environment is a potent and viable area for considerations of security; however this area is not free from criticism as well. There are Deniers, who constitute a significant proportion of people who insist that this debate will only serve to hamper growth and development which is an inalienable human right, along with the Deniers the principle environmental scientists also tend to focus on how to mitigate the problem rather than creating unnecessary hype. This study however will strive to prove undeniable linkages between national and environmental security, taking Pakistan as an example which is already on the threshold and coping with a myriad of problems, concluding that there is indeed proof that the environmental degradation is a stress multiplier and can easily contribute to the exacerbation of already present conflicts or triggers.

2.7: Legitimacy of securitizing agent: the scientist versus the politician;

A critical important aspect, that should be kept in mind while analyzing the environmental security debate is, to understand and give due importance to the dependence of this area on the scientific and empirical data. Barry Buzan et al, have highlighted this issue and have emphasized the need inherent in the environmental security debate for validation from the scientific community. In Buzan's words;

"One of the most striking features of the environmental sector is the existence of two different agenda: a scientific agenda and a political agenda. Although they overlap and shape each other in part, the scientific agenda is typically embedded in the (mainly natural) sciences and nongovernmental activity. It is constructed outside the realm of political activity by scientists and

[41] Nils Petter Gleditsch, "Armed Conflict and the Environment: A Critique of the Literature," *Journal of Peace Research* 35.3 (May 1998), pp. 381-400.

research institutions, and offers a list of environmental problems that already or potentially hamper the evolution of present civilizations. The political agenda is essentially governmental and intergovernmental. It consists of the public decision making process and the public policies that address how to deal with the environmental concerns. As such, the political agenda reflects the overall degree of politicization and securitization... the two agenda overlap in the media and in public debates. Ultimately the scientific agenda underpins the securitizing moves, whereas the political agenda is about three areas: (1)state and public awareness of issues on the scientific agenda (how much of the scientific agenda is recognized by the policy makers, their electorates and their intermediaries – the press); (2) the acceptance of political responsibility for dealing with these issues; and (3) the political management questions that arise: problems of international cooperation and institutionalization – in particular regime formation, the effectiveness of unilateral initiatives, distribution of costs and benefits, free rider dilemmas, problems of enforcement, and so forth."[42]

Herein we find a fundamental conundrum when it comes to the securitization of the environment even though as Rosenau has stated that "*questions of evidence and proof have become the organizing foci of global controversies*" none have in anyway shaped the future of policy making in an area as much as it has seen to effect the outcomes of policy making in the environmental policy sphere. The criticism leveled against most politicians who lobby for the securitization of the environment is that they have never studied the specialized scientific fields that deal with this area hence rendering them incapable of even hypothesizing the reality or not of the environmental security area. What Buzan et al have tried to extrapolate is that where every area of enquiry in the social sciences requires an empirical basis for its assumptions none have the all encompassing need to do so than environmental security and that a policy maker always has a genuine concern for the quantifiable empirical evidence before presenting his or her case. The trick according to Buzan et all is to ensure that the political agenda rightly assumes the presumed urgency of an issue and thereafter take the necessary steps needed. Not only should the environmental security agenda take the fore when it's at an impeding stage but governments and political parties must include environmental considerations in their regular strategy formation practices. Only then can the securitization of the environment be possible, the actual event of an

[42] Barry Buzan, et al., *Security: A New Framework of Analysis* (Boulder, CO: Lynne Rienner, 1998). pp. 71-77.

environmental disaster is not the one that will eventually result in successful securitization it's the successful prediction and/or lobbying of the importance of such an occurrence that will in the long run matter in terms of preparedness and applicability of the policies. However another important caveat if the over sensationalization of these issues by the political community as this will eventually work in the desensitization of the general public and the policy makers alike. In the twentieth century (1900 – 1990) 48.6 % people died as a consequence of civil strife, 39.1 % of famine, and the remaining 12.3 % from earthquakes (4.7%), volcanic outbursts (2.1%), cyclones (1.75%) floods (1.6%) and other hazards (0.5%)[43]. Hence it is clear to see that wars or political strife is still the major killer of human beings. The main reason why legitimacy of securitizing actor is such a major issue in environmental politics is the fact that international politics grapples with issues such as the sovereignty of the nation state and the regional dynamics of interstate relations and the environment being a truly global issue needs a more pervasive approach, for example when it comes to the limiting of CO2 emissions there is a heated debate between the developed and the developing nations as to what possible dividends they seek to derive and while keeping the political differences aside is a hard task the overwhelming scientific proof advocates just that.

The question of legitimacy as to who is the securitizing actor is thus a very heated area of debate in the environmental security area. However the fact remains that though introduced as a valid area of concern in the 70's environmental security did not enjoy the same level of interest and attention as the more fast acting and "real" areas of study. Environmental security remained bogged in the questions of what and against who... while the world continued to pollute and plunder the planet that was in its truest of essences a shared commodity.

2.8: Key areas of interest:

As highlighted before the key areas of interest to be analyzed in the context of environmental security are population explosion, land dilapidation and the degradation of our renewable resources e.g. water and air etc. *Gunther Baechler* devised an analysis program to effectively

[43] Disaster History, "Significant Data on Major Disasters Worldwide," *Washington D.C office of Foreign Disaster Assistance*, 1990.

differentiate the key areas of interest for those concerned with the study of environmentally induced conflict. Consider his tabulation as represented as follows:

Taxonomy of environmental conflicts according to different levels in the International System

Conflict Levels:	**Adversaries:**
A: Internal	Identity Group vs. Identity group
	Government vs. Identity group
	Government vs. migrants/ refugees
B: Internal with Interstate aspects Internationalized states	Governments and local populations vs. Immigrants from third states
C: Between States	Government vs. government International government vs. IOs/INGOs

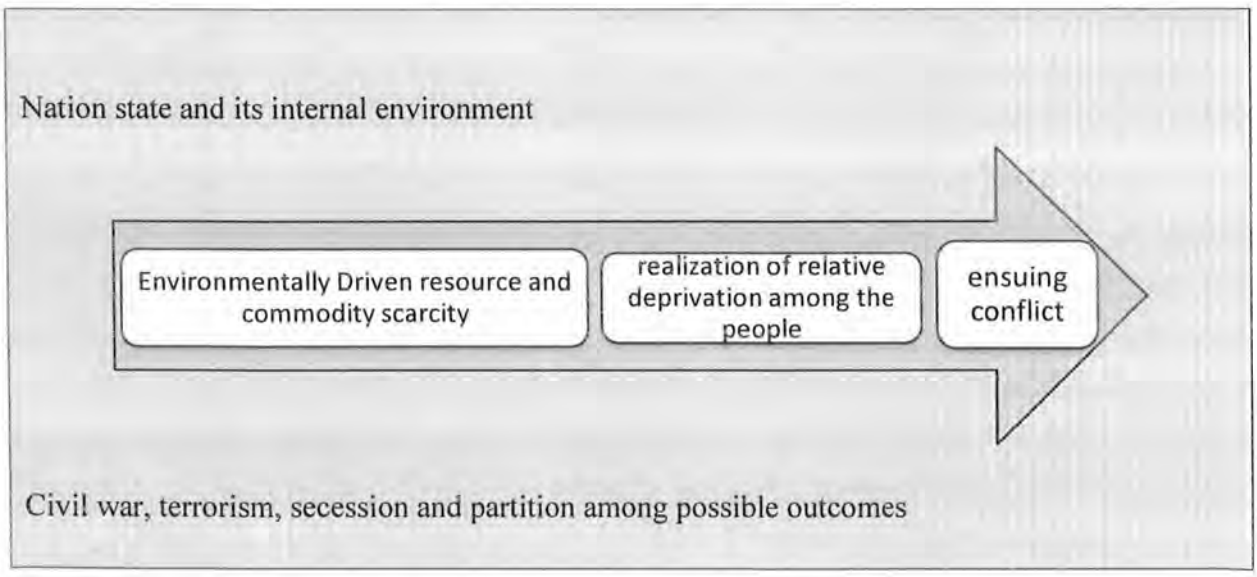
Taken from Gunther Baechler's paper for the Wilson Center titled "*Why Environmental Transformation causes Violence*"[44]

As described by Baechler the dynamics of environmentally induced conflicts are many pronged and have a far reaching impact on the stability of a country (conflict level A), a region (conflict level B) and eventually internationally (conflict level C)[45] .

Internal Conflict theories have encompassed many concepts but for the purpose of this study the most relevant one is scarcity and relative deprivation. *Tedd Robert Gurr* has given an excellent analysis in this context, the reason for conflict, he says is in the fact that the commodities with the most values attached to them become scarce and when a person or a group of people see that despite having the same capabilities they are not receiving the same amount of benefits as those who are, they feel frustrated which consequently engenders aggression in them, this leads them

[44] Gunther Baechler, "Why Environmental Transformation Causes Violence: A Synthesis," *Environmental Change and Security Project Report* 4 ,(Spring, 1998), pp. 24-44.
[45] This tabulation laid down by Gunther Baechler will be the focus of our future foray into the conflict scenario of our case study i.e. Pakistan.

to strive for those commodities that they truly believe that they are or should be entitled to.[46] Gurr has attributed relative deprivation to such diverse phenomenon as murder, mayhem to terrorism and civil wars. Gurr also explores the psychological underpinnings of violence by re visiting the Frustration- Aggression Hypothesis [47]by saying that frustration that is prolonged and pervasive can lead to violent conflict. These explanations amply provided by Gurr help to explain the conflict that is majorly driven by environment especially in Baechler's first case scenario ie environmental conflict that is classified as internal conflict. This context provides an ample opportunity for different groups to view how the inequality is functioning and that in turn sows the seed of discord and frustration as only close encounters can. Consider for example the fact that tow people are openly aware of their differences in endowment and while one is satisfied with himself being at a higher position the other who feels that he has the capability but is denied the means to reach the position attained by the former gets frustrated about his predicament, this frustration can breed over time and can hypothetically elicit one of two responses, it could either render him incapable of having a fighting spirit and make him give up completely, making him useless to himself and society or it could lead him towards aggression, which could be manifested in the form of violence. Baechler's environmental conflict scenario "A" is aptly understood by the application of the aforementioned theories of social behavior: thus the causal linkages can be defined as such:



[46] Ted Robert Gurr, *Why Men Rebel* (Princeton: Princeton University Press, 1970).
[47] Theory given by John Dollard and his colleagues that postulates frustration causes aggression and if frustration is not displaced soon it is taken out on a target that could be innocent.

While analyzing the third level of conflict we must understand the importance of geographical politics. The spatial congruence of conflict is very succinctly elucidated within the works of *Harold and Margaret Sprout* who have worked on the concept of "*environmental possibilism*" they were concerned with what they called the "*Ecological Triad*" which is composed of three elements: (1) an actor, or entity, of some sort, (2) an environment that surrounds the entity, and (3) the entity environment relationship[48]. The Sprouts defined a number of "possibilisms" without considering which the actor can not make a decision. The environment thus provides the actor many possibilities to make rational decisions. This inference then gives us the idea of contiguity in international conflicts. *Abler, Adams and Gould* have also extrapolated this fact by emphasizing the geographical contiguity and its relation with decision making, they postulate that the decisions actor make can have an emphasis on the environment they have to operate in and similarly the environment would have an effect on the decision making.[49]

Thomas Homer Dixon who has been fundamentally important to the securitization of the environment goes on to explain whence the environment actually becomes a national security issue. In his book "*Ecoviolence: links between environment, population and security*" Homer Dixon explains that the root cause of conflict is indeed scarcity and he goes on to explain that:

"Environmental scarcity is scarcity of renewable resources. Natural resources, in general, can be either non renewable (for example, oil and iron ore) or renewable (for example, forests, soil, lake and river water and the stratospheric ozone layer)... No- renewables are usually independent from one another – in other words depletion of one body of a non-renewable resource (such as a seam of iron ore) does not usually affect other bodies of non-renewables. In contrast, renewable resources are highly interdependent. A good example is the interdependence between a forest and its surrounding ecosystem of renewable resources. Severe regional forest loss from logging can significantly affect other renewables in the neighborhood: it can change the local cycles of rainfall, the stability of soil on hillsides, and the productivity of local fisheries (which are damaged when silt washes off the hills into rivers, lakes and the sea). As a result

[48] Harold Sprout and Margaret Sprout, "Environmental Factors in the Study of International Politics," In *International Politics and Foreign Policy*, edited by James N. Rosenau, (New York: Free Press, 1969), pp. 309-328.
[49] Ronald F. Abler, John S. Adams and Peter Gould, "*Spatial Organization: The Geographer's View of the World*," (Englewood Cliffs, NJ: Prentice-Hall, 1971), pp. 328-330.

depletion of renewables often produces unexpected effects – effects sometimes much more severe, complex and difficult to manage than originally anticipated." [50]

This conceptualization of the inherent difference between renewables and non- renewables is what is believed to be the key that explains the relevance of environmental conflict. The main ideas deduced from Homer – Dixon's hypothesis is that indeed the area of interest for students of environmental security is the correlation between the various resources that are present in the world. This is a concept also presented in the Brundtland commission report that stressed, way back in 1987, for a comprehensive strategy to avoid such a disaster that we are in the prospects of facing now from occurring. The report stated that:

"Few threats to peace and survival of the human community are greater than those posed by the prospects of cumulative and irreversible degradation of the biosphere on which human life depends. True security cannot be achieved by mounting buildup of weapons (defense in a narrow sense), but only by providing basic conditions for solving non-military problems which threaten them. Our survival depends not only on military balance, but on global cooperation to ensure a sustainable environment."

(Brundtland Commission Report, 1987)[51]

This was at that time as radical a thought as Nicholas Copernicus's views on astronomy were in his times, when the world was basking in the newfound glory of balance of power and accumulation of means of military muscle, this report was effectively negating the euphoria by pointing out the inherent dangers in unchecked growth[52]. Robin Eckersley has emphasized that "all beings are fundamentally embedded in ecological relationships[53]", he cites anthropocentrism as the root cause of all the environmental problems that the world faces and he considers the inexplicably interrelated nature of all living and non living beings a reason to move from anthropocentrism to ecocentrism, Thus defining another area of interest to the students of

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[50] Thomas Homer-Dixon. and J. Blitt, eds., "Eco-Violence: Links Among Environment, Population, and Security," (Lanham, Massachusetts: Rowan and Littfield, 1998), pp. 1-2.

[51] World Commission on Environment and Development, "*Our Common Future,*" (Oxford: Oxford University Press, 1987), p . 4.

[52] Skeptics have focused on the environmental conflict scenario as being a hoax and a means to restrict growth and have more often than not negated the view that the environment is anything but a fabricated area of security studies.

[53] Robin Eckersley, "*Environmentalism and Political Theory: Towards an Ecocentric Approach,*" (Albany: State University of New York Press, 1992), p.53.

environmental security. For Eckersley ecopolitics is fundamentally about the moral connotations of the concept of ecocentrism and he rejects anthropocentrism on these moral grounds.

Thus no talk about the areas of conflict or areas of interest to an environmental conflict analysis can ever be complete without analyzing the basis of the debate that has finally matured enough for it to become an issue of overarching importance. It is now an issue that must be dealt with to ensure the continuation of ours and numerous other species that share this biosphere with us.

Global Warming and Environmental degradation:

Global warming is one of the most hotly debated and discussed topic around but what exactly does it stand for and what it spells for environmental degradation is the question that shall be answered herein. Global warming is actually the name given to the continuing rise in the temperature of earth's atmosphere and oceans, this is a natural process of warming but the human activity has exacerbated it, consider this that almost 90% of researchers believe that Global warming as a problem that it is today has an anthropogenic cause. The more the green house gas accumulation in the atmosphere, which forms a layer that stops the escape of heat from the atmosphere, thereby, trapping it inside the earth's atmosphere. Climate model projections are summarized in the Fourth Assessment Report (AR4) by the Intergovernmental Panel on Climate Change (IPCC). They indicate that during the 21st century the global surface temperature is likely to rise a further 1.5 to 1.9 °C (2.7 to 3.4 °F) for their lowest emissions scenario and 3.4 to 6.1 °C (6.1 to 11 °F) for their highest. The ranges of these estimates arise from the use of models with differing sensitivity to greenhouse gas concentrations.[54]

Rapid increase in CO2 emissions are causing a very noticeable and real increase in the world's temperature, which will ultimately result in an extreme climate change, In addition to the natural fluxes of carbon through the Earth system,(the natural cycles and activities that release CO2 into the air, without human activity this would have been unnoticeable) anthropogenic (human centered) activities, particularly fossil fuel burning and deforestation, are also releasing carbon

[54] Schneider Von Deimling, Thomas; Held, Ganopolski, Rahmstorf (2006). "Climate sensitivity estimated from ensemble simulations of glacial climate". Climate Dynamics. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.172.3264&rep=rep1&type=pdf. Retrieved 20 July 2011.

dioxide into the atmosphere.[55] All our fossil fuel burning and the consequences of our growth are resulting in heat being trapped up in the earth's atmosphere. This would invariably lead to a rapid decrease in bio diversity (reports saying that we are now 5000 species less as we were at the start of the century) rising sea levels (which would obviously spell doom for countries on lower elevation such as Maldives[56]) and the decrease in agricultural output and the rapid melting of Himalayan glaciers. This is the most dire of all the consequences of environmental degradation with the effects clearly visible, however the highly optimistic can easily downplay this one too by suggesting that the melting glaciers will make newer untapped lands in Antarctica and the polar regions of the world ready for use, they also cite the phenomenon of global dimming as the equalization process to global warming unaware that global dimming has already caused more deaths by draughts and temperature change. The other less factual argument is that Global warming is all a political phenomenon and growth is being challenged this way, countries that are the sources of the most emissions are reluctant to cut down their emissions in any way and those who have done the least are paying the price. Here too the carrying capacity of the poorer nations will be challenged as rising temperatures will on one hand spell doom for the coastal areas but will also introduce newer and more virulent strains of diseases such as malaria etc. these super bugs(colloquially resistant diseases are given this pseudonym) will put more pressure on the nation state.[57]

The science of global warming provides indubitable proof of the complex interdependence of the natural systems and the social world. Any drastic change or even a minor fluctuation in the biosphere that human beings exist in can result in a catastrophic chain of events. The case study of Pakistan will strive to study the science of global warming in the realm of political studies, proving that the processes involved can morph into a complex new dimension of security and scientific study.

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[55] The Carbon Cycle; The Human Role, Earth Observatory, NASA.

[56] Interestingly in October 2009 The government of the Maldives held a cabinet meeting underwater to highlight the threat of global warming to the low-lying Indian Ocean nation. See the CNN report on the summit *"From underwater, Maldives sends warning on climate change"* CNN World. Report available online from http://articles.cnn.com/2009-10-17/world/maldives.underwater.meeting_1_maldives-climate-change-sea-levels?_s=PM:WORLD

[57] Catherine H. Maserang, "Factors Affecting Carrying Capacities of Nation-States," *Journal of Anthropological Research* 32. 3 (Autumn, 1976), pp. 255-275.

Environmental refugees:

In 1985 the United Nations environmental program Nairobi introduced the concept of environmental refugees who were defined as those people who had been "forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life" The case of environmental refugees has been analyzed as a potent and empirical evidence of the ills that environmental scarcity can bring upon the nation states. Myers has popularized the concept (which she also refers as population pressure refugees) as such:

"Environmental refugees are persons who can no longer gain a secure livelihood in their traditional homelands because of environmental factors of unusual scope, notably drought, desertification, deforestation, soil erosion, water shortages and climate change [my emphasis], also natural disaster such as cyclones, storm surges and floods. In face of these environmental threats, people feel they have no alternative but to seek sustenance elsewhere, whether within their own countries or beyond and whether on a semi-permanent or permanent basis." [58]

It is at times hard to differentiate between those who migrate in search for better living condition and those who just can not seem to be able to exist in their present situations. Hence the fact remains that environmentally driven refugees have never managed to get as much attention as they should as is evident from this statement of the UN high commissioner for refugees:

"Although there is a growing awareness of the perils of climate change, its likely impact on human displacement and mobility has received too little attention."

(António Guterres, UN High Commissioner for Refugees)[59]

The fact remains that most displaced people are driven from their homes and livelihoods by the outbreak or threat of war but environmental refugees are slowly joining their ranks. Thirty-six million people are internally displaced within their own countries as a result of natural disasters,

[58] Norman Myers, "Environmental refugees a growing phenomenon of the 21st century," *The Royal Society Magazine* 2001, pp. 609-613.
[59] Antonio Guterres, "Millions Uprooted," *Foreign Affairs Magazine* Sept/Oct. 2008, p. 90.

compared to 26 million internally displaced by conflict and human rights abuses.[60] It is estimated that within the next 40 years, as many as 200 million people could be displaced (the vast majority within their own country)[61] In the context of Pakistan this area will prove of significant interest as Pakistan has both recognized and recognized refugees, driven by war , hunger, environmental depletion and recently due to the natural disaster of flooding.

Sustainable development and adaptation:

"It is important to rescue the frog"

Al Gore "the inconvenient truth"

What is sustainable development and how is it important for the survival of the human race. And most importantly since when did such a technical concept become fundamental to the debate of ecopolitics and environmental security. The dominant cornucopian model of unrestrained development was challenged by the environmental activists who stated that it is our moral duty to ensure survival past our own myopic view. The 1987 "Brundtland Commission report" first gave the concept of sustainable society, while rejecting the neo Malthusian concept of limits to growth it gave the concept of growth with limits and defined a sustainable society as one that "*meets the needs of the present without compromising the ability of the future generations to meet their own needs*"[62]. Sustainable development is thus economic growth that does not deplete the resources needed to maintain growth. This is a fundamental concept in the environmental sphere as nations can not be expected to shun growth all at once, and as this concept basically correlates with the reclamation of the global commons it is somewhat of a glaring question whether nations and consequently humans will be selfless enough to shun personal gain for the common good. Regardless of the normative question attached to it sustainable development is

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[60] Brookings-Bern Project on Internal Displacement, *Improving the U.S. Response to Internal Displacement: Recommendations to the Obama Administration and the Congress*, June 2010, p. 2.

[61] UK Treasury, "Chapter 3: How Climate Change Will Affect People Around the World," in *Stern Review on the Economics of Climate Change*, 2005. Retrieved from http://www.hm-treasury.gov.uk/d/Chapter_3_How_climate_change_will_affect_people_around_the_world_.pdf.

[62] World Commission on Environment and development, *Our Common Future* (Oxford: Oxford University Press, 1987), p. 8.

the only acceptable notion that has seen to curb the effects of the damage already caused to the biosphere by unchecked growth.

Sustainable development basically rests on three pillars which are economic growth, societal well being at present, and a relatively generous supply of resources left for continual growth in the future. This is a method of checks and balances that can ensure that any development that takes place is just and equitable, the sad truth however is that even though the concept of sustainable development arose in 1987; its operationalization has still proven to be elusive.

The North- South divide in the realm of environmental security:

This is a very interesting phenomenon when considering the implications of environmental security, development on this planet has fundamentally been divided into the glaring differences between the global North i.e. the rich and developed countries and the global South i.e. the impoverished, developing so called third world countries. The main areas of development have been the global north and the main areas of suffering have been of the global south Baechler has analyzed this phenomenon and has postulated that the center periphery divide of Galtung that works so well to explain inequality has also been able to explain the inherent differences in the responsibility and the repercussions attached to the environmental conflict area. The fact remains that with the global emissions trend that is basically coming from the global south remains the same the sea level rise will lead to among other things disappearance of many impoverished global south countries (one example most aptly cited could be of the Maldives) whereas the rich countries of the global north could escape unscathed, furthermore the responsibility of polluting our stratosphere rests squarely on the shoulders of the global north however the rich countries just recently refused to pay the remuneration to the poor countries most badly effected . Similarly the Kyoto protocol that asked for a cut down on emissions by the rich countries was also very blithely ignored by the countries of the global north, amid protests by the poor countries of course. This proves that the rich countries have effectively washed their hands of the issue of the welfare of the poor countries and that is also a reason where inequality stems in global environmental politics.

The ingenuity gap and the ability to deal with environment perils:

The idea for the debate on how well a country can cope with the hardships it faces based on its relative environmental degradation has been derived from the work on "the new economic growth theory" or "endogenous growth theory" the argument here is that;

"Ideas, as embodied in new technologies, are a factor of economic production in addition to capital, labor, and land. Ideas have independent productive power. They also argue that productive ideas are not exogenously given to economic actors but are, at least in part, endogenously generated by the actors and the economic system"[63]

Hence this school of thought argues that technological advancements have a profound basis in the ideation of said advancement and such ideation only can flourish in certain societies in political structures,[64] this theory also seeks to explain the relative advantage that industrialized and developed societies have over non industrialized and underdeveloped and developing countries. This school of thought then extrapolates the context of development and backwardness in the international arena and study the impact of government policies, access to capital and human resources and internal processes effect economic growth. Homer Dixon has adopted this idea from the endogenous growth theory and considers the idea formation as ingenuity and that is what the context is for dealing with environmental problems. He argues that to understand the determinants of social adaptation to resource scarcity the examination of the role of ingenuity is of the most importance.

Homer Dixon merges the thinking of the neo Malthusians, who emphasize on the physical causes of scarcity i.e. population, availability and consumption of resources and of neo classical economists who argue that the fault lies in the unequal distribution of resources, faulty policies and bad economics are the true cause of scarcity. He consequently argues that the causes of scarcity are twofold, whereby when the physical scarcity threatens to effect a population and take

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[63] Elhanan Helpman, "Endogenous macroeconomic growth theory," *European Economic Review* 36.2-3 (1992), pp. 237-267.

[64] "The word technology invokes images of manufacturing, but most economic activity takes place outside of factories. Ideas include the innumerable insights about pack- aging, marketing, distribution, inventory control, payments systems, information systems, transactions processing, quality control, and worker motivation that are all used in the creation of economic value in a modern economy," (Paul Romer 32. (1993), p.544.).

away its livelihood etc, it is up to the ingenuity of the policy makers and the economists to figure a way out.

Paul Romer has defined ideas as:

"Ideas are the instructions that let us combine limited physical resources in arrangements that are ever more valuable, the most important thing about ideas is that they cannot be reduced to human capital, because human capital is rival whereas ideas are non rival"[65]

Hence an idea can be used repetitively and by a large number of people and can consequently serve a relatively large number of people without any restriction on its usage. An idea lives on when the person who was the originator of that idea is long gone; difficult as they might be to produce the first time around they are completely recyclable and reusable. Hence by ingenuity Homer Dixon means Ideas applied to solve practical social and technical problems.[66]

Conclusion:

The brief theoretical framework discussed here will provide the basis of our study into the environmental context of security and the implications of global warming driven environmental degradation in the context of Pakistan. This work will focus on whether the state and society of any country be able to cope with anthropogenic climate change and if the coping mechanism doesn't exist will that sate fail or will it try to manage its situation, and what way shall it try to manage that situation, what policy options does it have? The case of Pakistan is the most fitting and apt answer to all these questions and will be discussed in detail in the following section.

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[65] Paul M. Romer, "Endogenous technological change," *The Journal of Political Economy* 98.5 (1990) , pp. 71-102.

[66] Thomas Homer-Dixon, "The Ingenuity Gap: Can Poor Countries Adapt to Resource Scarcity?," *Population and Development Review 21.3* (1995), pp. 1-26.

Section 3:

Case study of Pakistan

3.1: Pakistan: a Brief Introduction:

Pakistan or the *LAND OF THE PURE* is situated in south Asia bordering the Arabian sea and comprising of distinct multi cultural and multi ethic identities. Its unique geographical location allows it to share borders with Afghanistan and Iran in the west, India in the east and china in the south. Sharing 2430 km of border with Afghanistan, 523 km with china and 2912km and 909 km with India and Iran respectively, its total coast line is 1046 km and total area is 803940 sq.km.[67] The country is divided into 4 provinces namely Punjab, Sind, Baluchistan and Khyber Pakhtoonkhwa (formerly the North West frontier province). it's a densely populated country with a total population (by modest estimates) to be 170 million, which according to studies doubles every 20 years, along with an ever increasing population it has a great imbalance in the distribution of this population with Punjab being the most populated as well as the most industrious province while Baluchistan and Khyber pakhtoonkhwa being lesser populated and consequently less developed.

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Figure 1: Map of Pakistan

[67] http://www.pakistanstudies-aips.org/pakistan/geography/facts.html retrieved 23rd july 2010.
[68] http://www.vista-tourism.com/pict/main_map2.jpg retrieved 23rd july 2010.

The vast physical features of the country are matched by the diverse ethnographical features, there are many languages spoken, cultures displayed and norms and values practiced in the country. Punjabi is the main language spoken by roughly 65% of the population, followed by sindhi spoken by 11% , Pashtu 8% and Urdu 9%. There are also many diverse ethnic languages like saraiki and hindko etc, while English is the official language of the country. Islam is the state religion practiced by 97 to 99% of the people while other religions such as Hinduism, Buddhism and Christianity are also practiced but very sparsely.

The temperature and physical features of Pakistan vary immensely as the temperature ranges from scorching hot in the plain/desert areas to arctic cold in the high mountains. On an average, however, there are four distinct seasons [69]winter, which is cool dry and with occasional winter showers in the north western areas, which mostly lasts from December through February. A dry and fairly warm, bordering on hot spring which lasts from March through may. Humid and wet summers, almost entirely overshadowed by the monsoon rains, which last from june till September and finally the period from September till December which can be categorized as autumn but is mostly the retarding monsoon period with low rain activity.

The physical features of Pakistan are as diverse as the climatic conditions with the country having lush green fields on the one hand to barren almost desert like plains on the other, it also boasts of snow capped peaks and treacherous mountains along with scattered forest areas, these diverse physical features allow for a very distinct flora and fauna as well. Agriculture is thus the country's main occupation, employing almost half of the country's population and accounting for 25% of its GNP. The main crops are sugar, rice, barley, wheat and cotton etc, it is thus rightly said that "agriculture is the backbone of this country"

Pakistan is part of many international conventions related to climate change and environment, namely convention for the convention for the protection of the ozone layer 1988, convention on biological diversity 1992, and importantly the united nation's framework convention on climate change 1994; however the applicability and adherence to these conventions is an entirely different question.

[69] Data taken from the "Encyclopedia of the Nations". Retrieved 23rd July 2010.

3.2: Pakistan's critical issues:

Pakistan is home to much social, economic, political and environmental instability. Despite having considerable economic growth initially and sustained growth later on the country has seen investment in defense spending, debt servicing and administrative costs and developmental concerns, especially those concerning human development have largely been put aside. After the partition Pakistan got 18 percent of the population, 17.5 percent of the financial assets, less than 10 percent of the industrial capabilities and less than 7 percent of the employment facilities of an undivided India[70]. In the wake of the partition Pakistan developed a strong administrative stricture, characterized as authoritarian bureaucracy, this has also been a reason for the unequal development as the bureaucracy has traditionally focused more on administrative development than human justice and development. Similarly the politicians of Pakistan are basically the rich agrarian elite or the industrial elite and they have proven to be more concerned with the maximization of their own power rather than working for the welfare of the people. Consequently the very strong military has had many reasons to jump in and that has resulted in a seriously muddled web of political games that feed on the development of the human agency in the context of Pakistan. So the causes of Pakistan's myriad of problems can be traced to a weak political structure, lack of accountability and an inherent sense of disconnectedness of the rulers and those on the upper echelons of power from the common people and their grievances.

Pakistan has unfortunately also been home to many natural disasters; in 2005 it witnessed a massive and lethal earthquake that shook the northern part of the country killing at least 75000 people with almost 10000 people directly injured and affected.[71] In 2010 the country witnessed yet another natural disaster in the form of the biggest natural disaster in its living history. The violent floods that swept the nation crippled its infrastructure and affected almost 20 million people with a death toll of almost 2000.[72] The damage in property and livelihoods was unimaginable. The world food program recounts in its 2011 report on the country that in the wake of the massive flooding;

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[70] Ayesha Jalal, *Democracy and Authoritarianism in South Asia: A Comparative and Historical Perspective* , (Lahore: Sang-E-Meel Publications, 1995), pp. 22-24.

[71] "*Earthquake toll leaps to 73,000*" BBC News. 2005-11-03. http://news.bbc.co.uk/2/hi/south_asia/4399576.stm. Retrieved 2010-08-12.

[72] Singapore Red Cross (September 15, 2010). "Pakistan Floods:The Deluge of Disaster - Facts & Figures as of 15 September 2010". http://www.reliefweb.int/rw/rwb.nsf/db900SID/LSGZ-89GD7W?OpenDocument. Retrieved 18, july 2010.

"What started as monsoon-related flash flooding in the country's north, later developed into a crisis of national and unprecedented proportions. As rivers swelled to more than ten or twenty times their typical size, almost one-fifth of the country's total landmass was submerged. Infrastructure, power and telecommunications systems were severely damaged or destroyed entirely. Millions of people were left without access to food, clean drinking water or health services, posing an enormous threat to their survival. Amid severe damage to the agricultural sector, one of the country's economic mainstays, people's prospects for recovering their livelihoods were severely threatened. The government estimated that some 20 million people across the country were affected by the crisis, of which more than 10 million were found to be in need of immediate assistance."[73]

This led to the exacerbation of an already dire pressure point for the country that was of the internally displaced persons, in the wake of the flooding those displaced by the floods joined the ranks of those displaced by fighting in the country's north, which was rattled by extremist insurgencies and the war against these extremists by the country's armed forces. The IDPs had already put a lot of pressure on the fairly weak urban centers which could not support the influx of refugees from the other parts of the country, these cities where the crime rate was already very high and sporadic and fairly lethal inter ethnic violence was not a new thing started seeing a fresh wave of violence that could be seen as the classic relative deprivation driven conflict defined by Gurr[74].

At the same time militant extremism was taking a financial as well as socio- political toll on the country, the many military operations launched against the extremists in the northern areas of Pakistan had a two pronged destabilizing effect. Firstly the armed forces had to incur losses both financially and in terms of morale, slowly becoming a disrespected and mistrusted national institution, and secondly the Internally Displaced People exerted a lot of pressure on the already weak urban structure of the metropolitan areas. These urban centers were already the hosts to a vast afghan refugee population (that has since started repatriation) but their carrying capacity

[73] World food program. Country profile Pakistan, http://www.wfp.org/countries/Pakistan/Overview, retrieved 22 june 2011.
[74] Ted Robert Gurr, *Why Men Rebel* (Princeton: Princeton University Press, 1970). For more information on Gurr's hypothesis refer to section 2.4

was seriously encumbered. As is seen by statistics that the rate of arrival of refugees and the rate of return are disproportional to say the very least.

MIGRANT POPULATION BY REASON OF MIGRATION								
						(In percent)		
Administrative Unit	Study	Marriage	Move with Head	Business	Employment/ Transfer	Returning home	Health	Others
Pakistan	1.17	17.10	42.78	8.75	12.08	1.09	0.09	16.94
Rural	0.86	24.54	38.39	9.84	3.95	1.06	0.07	21.29
Urban	1.34	12.88	45.28	8.13	16.70	1.10	1.10	14.47
N W F P	2.02	8.87	57.51	7.14	16.53	0.76	0.05	7.12
Rural	1.42	9.58	61.8	10.19	5.03	0.85	0.06	11.07
Urban	2.43	8.37	54.53	5.02	24.53	0.70	0.04	4.38
Punjab	1.05	22.64	38.00	8.72	9.06	1.17	0.07	19.29
Rural	0.79	28.35	34.27	9.46	2.86	1.16	0.05	23.06
Urban	1.29	17.41	41.41	8.04	14.75	1.18	0.09	15.83
Sindh	0.97	8.67	49.13	9.12	15.78	1.01	0.12	15.21
Rural	0.63	7.05	58.53	10.95	7.80	0.28	0.11	14.65
Urban	1.00	8.85	48.09	8.91	16.66	1.09	0.13	15.27
Balochistan	1.47	5.33	43.85	12.34	24.15	0.57	0.03	12.25
Rural	1.16	4.55	37.07	17.41	23.02	0.20	*	16.58
Urban	1.64	5.75	47.43	9.67	24.75	0.76	0.04	9.96
Islamabad	3.06	4.71	53.42	7.06	21.8	1.12	0.19	8.65
Rural	2.57	5.86	54.94	11.82	9.93	1.25	0.43	13.2

Urban	3.19	4.4	52.99	5.76	25.03	1.08	0.13	7.42
* Reference to a very small proportion			[75]					

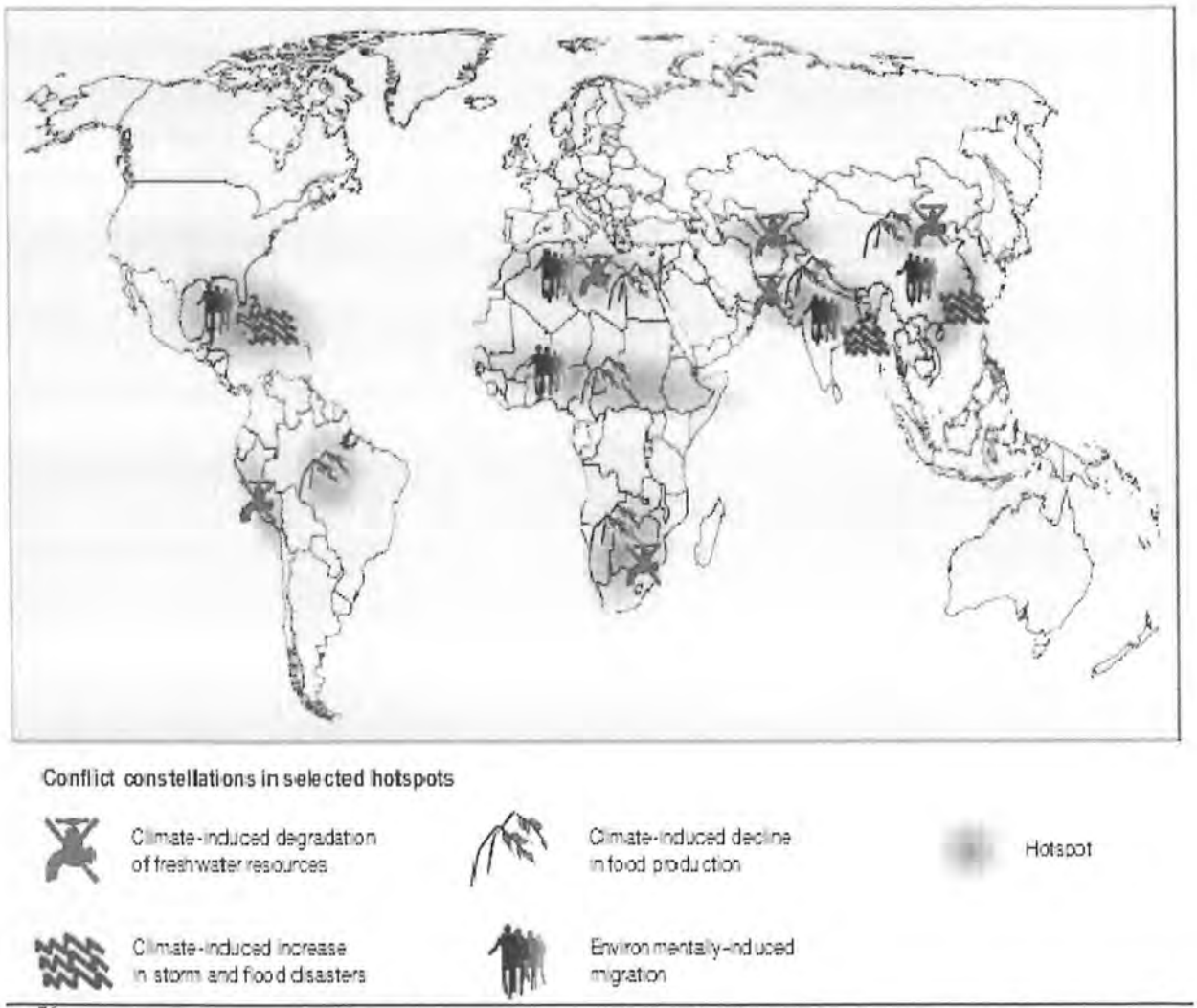
Along with the myriad of internal issues to grapple with the state and society of Pakistan has had to deal with external antagonism as well. It is common knowledge that Pakistan's relations with its neighbor India have been strained at the best of times, both countries viewing each other with nothing short of extreme mistrust. This mistrust has led Pakistan and India to indulge in an arms race at the expense of human development, consequently the population of both the countries has suffered tremendously. Today the conventional arms race coupled with the nuclear quagmire that Pakistan is stuck in add to its misery when it comes to the failure of development. Hence Pakistan's over indulgence in this security dilemma with India has come at the expense of its own people.

These are a few of the many internal and external pressure points faced by the Pakistani nation, added to these must be border insecurities from Afghanistan, support on the historical stance on Kashmir, having to deal with being the frontline state in the global war against terror and recently being the target of much drone predator strikes within the country by the U.S.A. all these factors have destabilized the state and society of Pakistan and as we shall see as this study progresses that these stressors coupled with the degradation of renewables and consequently environmental scarcity have the potential to seriously blight Pakistan's national security.

[75] Federal bureau of statitistics, http://www.census.gov.pk/ReasonMigration.htm. retrieved 23 july 2010

3.3: Pakistan's environmentally induced problems a brief overview:

Select security hot spots and their climate threats;



[76] *As is evident from the figure Pakistan is facing climate induced degradation of freshwater resources and climate induced decline in food production, these will consequently induce internal environmentally-induced migration.*

In this part of the study Pakistan's environmental problems will be briefly outlined, so that further explanation be made as succinctly and methodologically as possible. As the aforementioned part of the study depicts, Pakistan is already on the threshold with having to deal with such diverse issues as urbanization and IDPs acting as stressors for the carrying capacity of the urban centers, to a quagmire of foreign relations problems ranging from border delimitation

[76] R. Schubert, et al., Climate Change as a Security Risk (German Advisory Council on Global Change, May 2007), p. 4, available at http://www.wbgu.de/wbgu_jg2007_engl.pdf.

disagreements to a traditional security dilemma. Pakistan has hence historically functioned on pure Hobbesian considerations of foreign relations but the dawn of the revolution in security studies and the realization of the inherent problem in pigeon holing all policy options on a done to death rivalry with a considerably bigger neighbor, have led to the discovery of the hitherto ignored area of the most importance i.e the environmentally induced scarcity and how it effectively cripples the state's resources and its machinery to support the people.

Thomas Homer Dixon and Peter Gizewski, while conducting the case study of the environmental problems in Pakistan had this to say;

"We conclude that environmental scarcity rarely if ever acts as the sole cause of conflict. Other variables - most notably the character of the state, its development, its policies, and its relationship to the society at large - not only have increased environmental degradation, but also have interacted with environmental scarcity to generate social instability and conflict. We show that, together, these forces are triggering resource capture, marginalization of poor groups, rising economic hardship, and a weakening of the state. This interaction is heightening ethnic, communal, and class-based rivalries that have long plagued Pakistani society. This conjunction of pressures increases group-identity and deprivation conflict as groups turn to violence as a means of addressing their mounting grievances."[77]

Thus concluding that the state and society of Pakistan is faced with a two pronged assault while the physical environment of the country has drastically deteriorated since independence, the lack of accountability, inept politicians and their myopic policies and lack of overall development have played a disastrous role in the general disintegration of the country. It has now become apparent that there exist intricate and indubitable linkages between environmentally induced pressures and general mayhem in a society and Pakistan presents a very potent example in this context.

Pakistan generally faces environmental problems that can be categorized as ***anthropogenic*** in nature, consider for example the problem of falling crop lands in the country, here the problem lies in the overzealous agriculture and the use of pesticides and insecticides that can and

[77] Thomas Homer-Dixon, and J. Blitt, eds., *"Eco-Violence: Links Among Environment, Population, and Security,"* (Lanham, Massachusetts: Rowan and Littfield, 1998), p. 148.

eventually do render the land in arable in the long run. Similarly though flooding is common in the regions visited by the monsoon showers, the impact has been felt more due to the destruction of the river banks and the trees that served to protect the land from the worst of the effects.[78] Pakistan's population is also on the constant growth pattern that has increasingly led to rapid urbanization and as the pattern follows this urbanization is unable to be met by the state and its already floundering institutions. Pakistan is on the threshold, facing a quagmire that would be increasingly difficult to get out of unless rapid planning does not take place. And an example of how the Pakistani society is prone to disintegration is available from its history, the secession of East Pakistan, now Bangladesh can be seen as an example of how inequitable distribution of resources coupled with lack of political insight and corruption can lead to a complete remapping of the world. The Bangladesh secession started with the realization by the Bengali people of how their rightful place in the Pakistani society and services was denied to them, they demanded equitable distribution of all services and resources available to the administrators and wanted proper political representation, but any attempts made by the eastern part of Pakistan to assert its rights were quashed by the administrative set up of the west, the west did issue electoral reforms and the like but the injustice and its perception had seeped deep into the hearts and minds of the people of east Pakistan. This perception of injustice led to the people of East Pakistan to resort to dire measures and after the debacle of 1971 and with a little aid from foreign sources East Pakistan emerged as Bangladesh and thus ended a whole era of inequality for the Bengals.[79]

Now this example should have given a sense of positive action to the administrative setup of West Pakistan (now just Pakistan comprising the aforementioned four provinces) but we can clearly see now that the perceived inequality is now in the minds of the baluch people. The province of Baluchistan is rich in natural resources, raw materials and fossil fuels, but the state is seen as a plunderer in this region because only the tribal elders seem to get paid for the natural resources used and the common man does not hope to gain any dividends from it, hence the secessionist sentiments still exist especially in Baluchistan.

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[78] Consider for example the decline of the mangrove forests along the Indus river delta, as land use to sustain the burgeoning population has led to the cutting down of these important trees.

[79] Robert LaPorte, Jr. , "Another Try at Democracy," in Korson, ed, *Contemporary problems of Pakistan*, (Washington DC: Bill Archives, 1974), pp 92-171.

Another example of how the state's misappropriation has led to conflict can be seen in the case of Sindh where the conflict between the Mohajirs [80]and the rest has seen many a lives taken, bloodshed in the streets of Karachi is not a rare happening, after the independence the mohajirs who had to leave everything and migrate to Pakistan never seemed to be fully compensated for their monetary losses by the government of the newly independent Pakistan, similarly the introduction of the quota system in the country's educational as well as services system further marginalized the mohajir's causes, so much so that it has led them to demand, forcefully at times, for the recognition of the mohajirs as the fifth nationality of the country. As they are of a business and industrious inclination they still hold a considerably important position in Sindh's urban centers and violence sometimes in the form of gang wars has become common place especially with the influx of internal refuges etc.[81] These and other conflicts show how the Pakistani state and society is seemingly quite inept at handling issues of the allocation of resources and these issues are to be seriously multiply in the face of environmentally induced scarcities.

3.4: Environmental scarcity, resources capture and ecological marginalization: Pakistan's scenario:

It has be now been proven that the state and society of Pakistan are reeling from environmental problems and these do not bode well for the country but, the main terms associated with environmental degradation for the Pakistani state have been highlighted by Thomas Homer Dixon: he has extrapolated how the Pakistani physical environment has degraded immensely and how different scarcities have emerged in this context. Thus; these scarcities can be either demand induced i.e. due to the increasing population and the rising per capita resource consumption or they could be supply induce scarcities, those that are a result of resource depletion and degradation, there also exist another form of scarcity in this context which is the structural

[80] Colloquial reference for those who migrated from India to Pakistan, mainly Muslim and Urdu speaking population of India.
[81] Feroz Ahmed, "Pakistan's Problems of National Integration: The Case of Sind," in S. Akbar Zaidi *"Regional imbalances and the national question in Pakistan"* (New York: Vanguard books, 2005), p. 156.

scarcity, i.e. that scarcity that exists due to the unequal distribution of resources within the society.[82]

It is evident from the case of Pakistan that all these scarcities have an intricate interlinked nature. Pakistan's growing population has led to the need for more resources and that has led to the degradation of such resources and at the same time Pakistan's administrators have historically been misappropriating the resources of the country in ways that benefit them the most.

Then is the concept of resources capture, resource capture occurs when population growth combines with a decline in the quantity and quality of renewable resources to encourage powerful groups to alter the distribution of resources in their favor[83] this results in a pervasive inequality and condemns a certain section of the population to chronic poverty. This leads them to migrate to those areas that are away from the elites who misappropriate resources but that also leads them to areas that are not as ecologically well endowed as the ones that they left, this is ecological marginalization, and this is how the various environmental scarcities have interplay that lead to the destruction of societies. All this is facilitated to the most major extent by the lack of accountability inherent in the Pakistani setup; homer Dixon has tabulated this as such:

Figure 1: Some Causes of Increased Environmental Scarcity

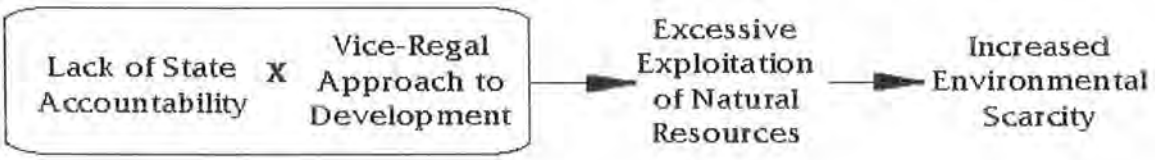

Figure 2 causes of increased environmental scarcity

adopted from Homer Dixon (1998)[84]

Homer Dixon has thus apparently seen that in the case of Pakistan the scarcity is primarily structural and has progressed from that to being demand and supply induced as well. The lack of accountability has given a sort of God like stature to the developers and the civil servants who

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[82] Thomas Homer-Dixon, "Environmental Scarcities and Violent Conflict: Evidence from Cases," *International Security* 19.1 (Summer 1994), pp. 67-69.

[83] Ibid

[84] Thomas Homer-Dixon, and J. Blitt, eds., "*Eco-Violence: Links Among Environment, Population, and Security*," (Lanham, Massachusetts: Rowan and Littfield, 1998), p. 156.

regularly shirk their duties and misappropriate funds that have been earmarked for development etc, Pakistan's elite focus on the maximization of their wealth and power and as this elite is also the political elite this mentality travels to the corridors of decision and policy making.[85] The developmental projects that have taken place in Pakistan in the recent few years pay testament to the fact that most of them are only prestige projects without having any considerable positive impact on the local population.[86] Overtime the lack of accountability, and an unabashed use of the country's available resources by the elites who owned the big conglomerates resulted in a massive supply induced scarcity that seeped into the whole fabric of the country's existence, coupled with a rapidly increasing population the resultant demand induced scarcity moved matters further into the realm of a disaster of epic proportions.

This study aims to prove that Pakistan's environmental scarcities foretell the looming doom that can impact the country if it remains unchanged for a couple of more decades, thus far it has been proven that there are overwhelming instances of scarcity in the context of the Pakistani state but the causal linkage between Pakistan's environmental problems and global warming remains to be seen.

3.4: Global warming and the nature of the Pakistani environmental security concerns:

"All across the world, in every kind of environment and region known to man, increasingly dangerous weather patterns and devastating storms are abruptly putting an end to the long-running debate over whether or not climate change is real. Not only is it real, it's here, and its effects are giving rise to a frighteningly new global phenomenon: the man-made natural disaster"

(BARACK OBAMA, speech, Apr. 3, 2006)

Interestingly, the most drastic changes have been seen in the least developed or the developing countries that have had the littlest to do in terms of creating this manmade disaster. Pakistan is no

[85] See for example the recent report of the transparency international that sees Pakistan as a frontrunner on the list of the most corrupt states.

[86] One very recent example is the 2007 construction of the Pakistan monument in Islamabad at the cost of more than 580 million Pakistani rupees, a cost that could be better served to the cause of the eradication of many of the fledgling social problems of the country.

exception, with its agricultural economy and reliance on the water system that has fed it for centuries Pakistan stands to lose its life line if climate change and the effects of global warming are not mitigated and stopped. As explained before a warming world would increase the glacial melting which has direct consequences for Pakistan. Similarly a mere degree of change in annual climate will result in a different weather pattern all together for a country like Pakistan as a little heating of air would result in a change in the rain patterns.[87]

Agriculture is the backbone of Pakistan's economy and anthropogenic global warming threatens to disrupt the agricultural system of Pakistan completely. It is estimated that a hotter drier world would significantly lower the agricultural productions and would significantly shorten the growing seasons and consequently the yields would be much lesser than before, whereas the need for these commodities will be increasing due to the increasing population.[88]

Today a cursory look at Pakistan proves that these predictions are not for the far, far future but for the immediate present. The devastating floods of 2010 are just a testament of how, if even remotely, the connection between global warming and massive disasters. Pakistan's state and society are still reeling from that disaster and have a serious lack of resources and even the ability to deal with the current scenario let alone the prospect of dealing with any future disasters. Pakistan is at the direct receiving end of problems that result from the onslaught of global warming. As it exists downstream a mass of ice, it is directly impacted by the amount of melt and the changing patterns. It can no longer support its fledgling population effectively and physical scarcities have now added up to the faulty practices of structural scarcities that the state of Pakistan has pursued over a long period of time.

In a nutshell Pakistan faces problems from many different stress areas whether it be scarcity induced water shortage or demand induced land degradation or the fact that a water war is not a preposterous idea for the overpopulated country all these problem areas will be comprehensively discussed in the following pages.

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[87] Narottam Gaan, *Environment and National Security: The Case of South Asia* (New Delhi: South Asian Publishers, 2000), p. 95.

[88] Bruce Elliot Johansen, *The Encyclopedia of Global Warming Science and Technology* Volume 1 (Santa Barbara CA: ABC-CLIO 2009). P. 267.

3.5: Environmental scarcity scenarios:

Scarcity scenario # 1:

Water:

Water is a critical element of environmental security, the first recorded instance of a war over water resources happened 4500 years ago, between two Mesopotamian city states in what is now Iraq and during the past half century there have been 450 water related disputes of hostile nature and on 37 occasions rival countries have fired shots, blown up a dam and undertaken other sort of violent action.[89]

The case of Pakistan is a curious one when it comes to analyzing the impact of water on its national security. Pakistan, being a primarily agrarian country, depends on the river systems that feed its crop lands and provide its people with sustenance. Pakistan is currently facing sever water shortages, with water availability decreasing from 5000 cubic meters per capita in 1951 to 1100 cubic meters this decade, estimates show that this amount is to dip below 700 by 2025 if current trends continue.[90]

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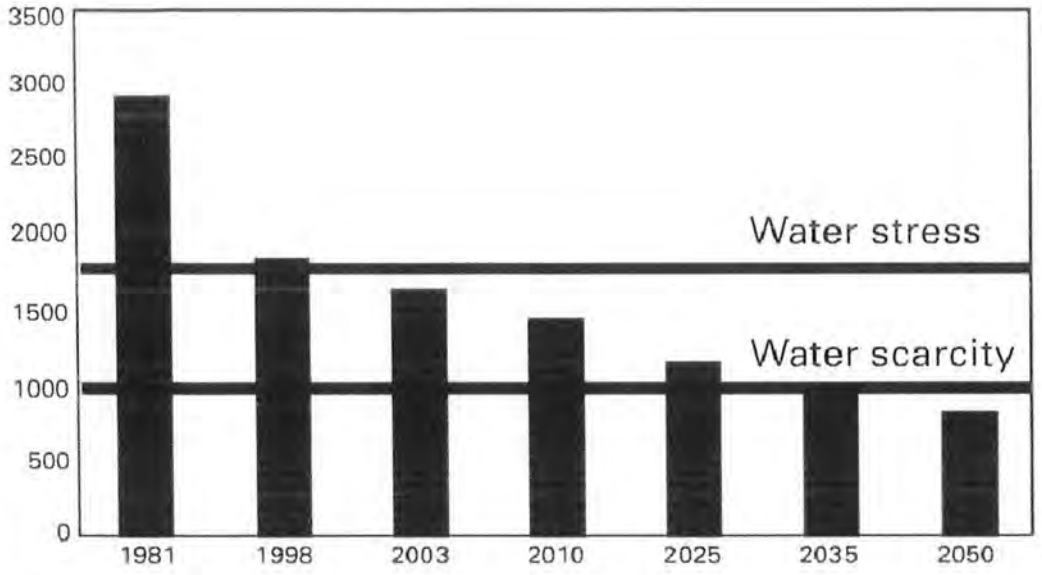
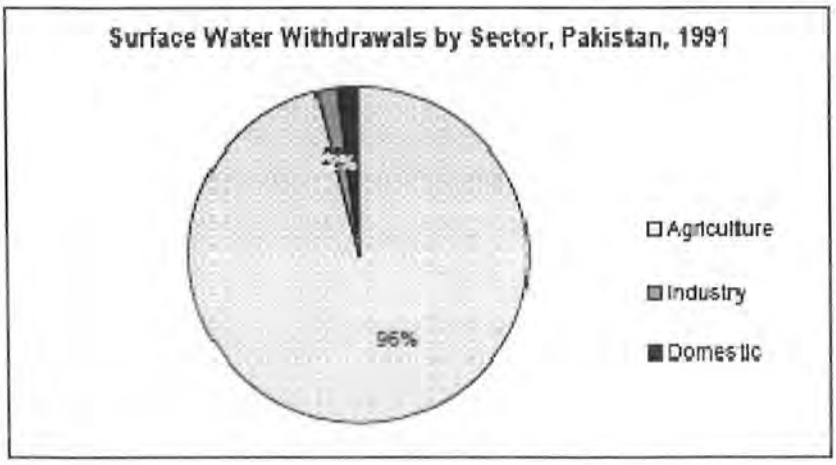
[89] Stephen Steck and Besnik Baraj eds., *Energy and Environmental Challenges to Security* (Brussels: NATO Book Store, 2007), p. 43.
[90] World Bank, *Pakistan Strategic Country Environmental Assessment*, vol. 1. 50.

Declining per capita water availability in Pakistan;



[91]

Even though Pakistan has a crucial shortage of water, it uses most of its water resources for irrigation and due to the lack of maintenance of the decades old system most of the water is wasted. Similarly there is a rapid trend of pollution in the rivers of the country, which spells doom for the local flora and fauna of the country, industrial and chemical waste etc are hazardous and render the coastal biosphere, where the rivers drain into, in serious peril.



[92]

[91] World Bank 2005 data adapted by F. Khan, "Water, Governance, and Corruption in Pakistan," in *Running on Empty: Pakistan's Water Crisis* (Washington DC: Woodrow Wilson International Center for Scholars, 2009), p. 83.

[92] http://earthtrends.wri.org/pdf_library/country_profiles/wat_cou_586.pdf retrieved July 29, 2011.

In the following pages, this work will closely analyze the different areas from which the water resources of Pakistan are threatened. This will begin by a technical and scientific analysis of the origions of the river system in Pakistan and the perils that origin ie the Himalayas face from global warming, this work will also delve deeper into how the depleting water resources effect Pakistan's national security, while analyzing the possibility of inter and intra state conflict over water.

The melting Himalayas and the prospective demise of the all important river system of Pakistan:

"Glaciers melting are an alarming sign and there would be no water from glaciers after 2060, so there is a dire need of taking active steps to take the challenge"[93]

This was said by the chairman of the Pakistan council of research in water resources thus verbalizing the threat that the country has tacitly known to exist for a long time. Pakistan has always had limited water resources, having either too much or too little water, an arid and semi arid country it has witnessed water shortages, causing rolling blackouts and shortages for irrigation in the country, Much of the water in the country is used for irrigational purposes and consequently, due to the poor maintenance of the irrigational system.

The main root cause of the water problem of Pakistan is the fact that with the projections indicated by the UNDP and other mapping and quantifying agencies, the projected loss of the "water tower of the world" will have catastrophic outcomes for those dependent on the freshwater supplied by the greater Himalayas, to understand this scarcity one must further elaborate the nature and significance of the greater Himalayas for this region.

The Himalayas and their significance for Pakistan:

Himalayas, literally meaning "abode of snow" is the name of the Asian mountain range separating the Indian subcontinent from the Tibetan plateau; sometimes called the roof of the world, it includes the greater mountain system that includes the Karakorum, the Hindu Kush and other lesser mountain regions. It's the planet's highest mountain system home to two of the

[93] http://www.defence.pk/forums/current-events-social-issues/61730-no-water-pakistan-glaciers-after-2060-undp.html, retrieved July 29, 2011.

highest peaks the Mount Everest and K2. Geographically it forms a 2400 km long arc from Kashmir/Xinxiang to Tibet/ arunachal pardes. Due to constant activity at the forming tectonic plates the Himalayas are rising at the rate of 5 mm a year.

The Himalayas are home to the origins of ten of the largest rivers in Asia, the basins of which feed 1.3 billion people[94]. Consider the following data on the Principle Rivers of the Himalayan region;

	River		River basin			
River	Annual mean discharge m^3/sec^a	% of glacier melt in river flow[b]	Basin area (km^2)	Population density (pers/km^2)	Population x1000	Water availability (m^3/person/year)
Amu Darya	1,376[a]	not available	534,739	39	20,855	2,081
Brahmaputra	21,261[a]	~ 12	651,335	182	118,543	5,656
Ganges	12,037[a]	~ 9	1,016,124	401	407,466	932
Indus	5,533	up to 50	1081,718	165	178,483	978
Irrawaddy	8,024	not available	413,710	79	32,683	7,742
Mekong	9,001[a]	~ 7	805,604	71	57,198	4,963
Salween	1,494	~ 9	271,914	22	5,982	7,876
Tarim	1,262	up to 50	1,152,448	7	8,067	4,933
Yangtze	28,811[a]	~ 18	1,722,193	214	368,549	2,465
Yellow	1,438[a]	~ 2	944,970	156	147,415	308
Total					1,345,241	

[a] The data were collected by the Global Runoff Data Centre (GRDC) from the following most downstream stations of the river basins: Chatly (Amu Darya), Bahadurabod (Brahmaputra), Farakka (Ganges), Pakse (Mekong), Datong (Yangtze), Huayuankou (Yellow)
[b] Estimation of the meltwater contribution is difficult and varies in an upstream and downstream situation; approximates are given here.
Source: IUCN et al. 2003; Mi and Xie 2002; Chaltse and Khanal 2001; Merz 2004; Tarar 1982; Kumar et al. 2007; Chen et al. 2007
Note: The hydrological data may differ depending on the location of the gauging stations. The contribution of glacial melt is based on limited data and should be taken as indicative only.

If one looks at the statistics for the Indus river basin one sees that the Indus has the most percentage of glacial melt comprising the waters of the river, has a very high population density per area and the water availability per person is relatively very less. These statistics not only prove that the population in the Indus river delta is swelling and is causing a strain on the

[94] ICIMOD *"the changing Himalayas: impact of climate change on water resources and livelihoods in the greater Himalayas"* available online from http://books.icimod.org/uploads/tmp/icimod-the_changing_himalayas.pdf.

carrying capacity of the river but also that the crucial dependence of the river on glacial melt from the Himalayas.

The Himalayas are home to almost 15000 big and small glaciers[95], the 70 km long Siachin glacier is one of the second longest glaciers outside the polar region and the Indus River irrigation systems in Pakistan depend on snowmelt and glacial melt from the eastern Hindu Kush, Karakoram, and western Himalayas for about 50% of total runoff.[96]

In addition to housing most of the water for the rivers downstream, the Himalayas are also very important to the region in terms of biodiversity, supporting many ecosystems and species with their importance for the wetlands downstream. This biodiversity supported by the Himalayas is thus integral to the optimal existence of the human population as well, providing livelihoods and sustenance.

Impact of climate change on the Himalayas:

As mentioned before, estimates have already shown the cascading effects of climate change on the greater Himalayas. Water released from seasonal snow and permanent ice is stored in high mountain wetlands and glacial lakes but most of it flows downstream into the large river systems fed by the melt. Consequently an increase in glacial melt rate will indubitably affect the flow of rivers downstream consider the amount and weight age of glaciers for the following rivers;

[95] From the Merriam- Webster dictionary "a glacier is a large body of ice moving slowly down a slope or valley or spreading outward on a land surface" these large bodies of ice are effective reservoirs of water which upon increasing temperature release freshwater into the rivers downstream, these being those present on land.

[96] M. Winiger, M. Gumpert, and H. Yamout, "Karakoram-Hindu Kush-Western Himalaya: assessing high-altitude water resources," (*Hydrological Processes: 19*, 2005), pp. 2329-2338.

Table 3: Glaciated areas in the Himalayan range

Drainage basin	No of glaciers	Total area (km^2)	Total ice reserves (km^3)
Ganges River	6,694	16,677	1971
Brahmaputra River	4,366	6,579	600
Indus River	5,057	8,926	850
Total	16,117	32,182	3,421

Source: Qin 1999

[97]

It is apparent from the aforementioned tabulation that the Indus River is fed by many glaciers and its very survival is dependent on the survival and pervasion of the glaciers in the greater Himalayas. However recent trends have shown a great reduction in glacial density in this region. Recently Glaciologist Matthias Huss of the Fribourg University has discovered that in land glaciers all over the world are melting at an alarmingly high rate and once a glacier shrinks so much that it can not support a river anymore then there is no going back.[98] The International center for integrated mountain development that works in the Himalayan region has quantified the changes observed and the projected changes in its report on the Himalayas. The effect of climate change on the Himalayas is firstly observed when tabulating the rise in temperature or the global mean warming trends. It was observed that warming being a global trend as a cause of anthropogenic climate change obviously effects the Himalayas, however there is an abnormality in the trend as a study of the past 100 years has shown that the temperature of the Himalayas has increased more than the projected mean e.g. the temperature in Tibet has increased 0.6'c this shows a pattern that higher temperature with higher altitude is prevalent all over the Himalayas. Another factor observed is the apparent rise in precipitation[99], which consequently results in a greater value of melting and affects the weather patterns. Studies show that Pakistan has an increasing precipitation trend and there is a projected decrease in monsoon precipitation up to

[97] D. Qin, *Map of glacier resources in the Himalayas* Beijing: Science Press and Chinese Academy of Sciences, Lanzhou Institute of Glaciology and Geocryology (1999)

[98] http://www.swissinfo.ch/eng/science_technology/Melting_glaciers_store_up_trouble_.html?cid=30671470 retrieved July 29, 2011.

[99] "Precipitation: the quantity of water deposited" , taken from Merriam Webster dictionary.

20%.[100]Perhaps the most glaring affect of global warming discovered by the ICIMOD was the observable pattern of glacial retreat, the report says that in the first part of the 20th century, 82% of the glaciers in western china have receded on the Tibetan plateau the glacial area has decreased by 4.5 percent over the last 20 years.[101]

Similarly the IPCC's fourth assessment report says with a high measure of confidence that in the coming decades most glaciers in the region will retreat some disappearing completely, it is estimated that with a 2' increase by 2050 35% of the present glaciers will disappear completely.[102]

Similarly the phenomenon of glacial retreat will drastically render the surrounding landscapes unstable causing frequent landslides and the formation of glacial lakes. These natural dams are very unstable as they can break out and cause massive flooding downstream. One such lake that recently formed in Hunza, Pakistan is the Attabad Lake, which is a constant flashpoint as it can at any point spill its boundaries, causing massive population migration from that area. The glacial lakes thus need to be closely monitored so that any change in them is duly registered. All this is a unwanted consequence of abrupt and heavy glacial melting. In the Karakoram, there is growing evidence that catastrophic rockslides have a substantial influence on glaciers and may have triggered glacial surges.[103]

The changes in precipitation induced by global warming in the greater Himalayas will have a direct impact on the pattern of rains, glacial run off and melting rate over a time and space, thus seriously affecting the downstream rivers, it is estimated that initially all these factors will result in a surge in the river run off i.e. increasing the river's waters, however if these trends are sustained over a period of time then the high mountain reservoirs of water, the ice and the snow

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[100] Rupa Kumar, K; Sahai, AK; Krishna Kumar, K; Patwardhan, SK; Mishra, PK; Revadkar, JV; Kamala, K; Pant, GB 'High resolution climate change scenario for India for the 21st Century'. (*Current Science* 90:2006), pp. 334-345.

[101] The river Indus has its true origin in the Tibetan plateau region of the Himalayas and hence the origin is in Chinese control.

[102] IPCC (2007a) Climate Change 2007*: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S; Qin, D; Manning, M; Chen, Z; Marquis, M; Averyt, KB; Tignor, M; Miller, HL (eds)]. (Cambridge and New York: Cambridge University Press, 2007)

[103] K Hewitt, "The Karakoram anomaly? Glacier expansion and the 'elevation effects," (*Karakoram Himalaya. Mountain Research and Development* 25:2005), pp. 332-240.

of the glaciers will disappear. So what will initially seem as an increase in water availability will actually spell doom in the long run.[104]

The depletion of water resources and the potential for conflict and threat to national security;

The south Asian region is on the threshold when it comes to the availability and use of freshwater resources, having been at the center of much conflict scenarios, almost all the states have experienced problems when it comes to the sharing of water resources. Water has also been a point of serious contention between Pakistan and India, which was evident before the settlement of that dispute by the World Bank brokered Indus waters treaty. As David Lilienthal, the former chairman of the tennesse valley authority on whose model the Indus basin treaty has been based has said:

"The rivers pay no attention to partitions; the Indus just keeps rolling along through Kashmir and India and Pakistan"

And as was discussed before according to Harvey Starr et all, the reason states go to wars has something to do with the connection between opportunity and willingness, and water resources present a very potent opportunity for the states to go to war as rivers do not care for manmade boundaries and that presents an opportunity for states to cut of water supply to the country downstream. This happened in the case of Pakistan, as after the partition it transpired that the origins of the river Indus lied in the region where india could and would want to carry out its own developmental programs, this was a source of much consternation for Pakistan as it would always be insecure about this. Initially the issue was settled by the inter dominion accord of 1948, which stated that India would release sufficient water for use in the Pakistani territory and Pakistan would pay the Indian government annually. This was a permanent solution open to negotiations from both sides however the negotiations hit a stalemate as could be expected when it came to the traditional rivals and India saw its territorial right to indulge in projects upstream regardless of how it affected Pakistan, Pakistan was miffed at the Indian stance and sought to take the issue to the international court of justice, India however stressed the need for a bilateral

[104] ICIMOD "the changing Himalayas: impact of climate change on water resources and livelihoods in the greater Himalayas" available online from http://books.icimod.org/uploads/tmp/icimod-the_changing_himalayas.pdf

solution to the problem thus the issue was submitted to the world bank's offices and eventually on the suggestions of David Lilienthal the issue was solved with the decision that the three western rivers be allocated to Pakistan and the three eastern rivers be allocated to India. Although this was unacceptable to Pakistan, but both the countries were eager for a settlement and unwilling to go to all out war, which seemed to loom on the horizon if this issue was not solved and the treaty was finally signed in 1960.[105]

Since its entry into force the Indus waters treaty has been one of the most successful models of cooperation on water resources. Pakistan and India have the most contentious relationship as it is and would have proven to be the most potent examples for a water war however this hasn't happened yet. Some commentators say that the two nations have realized the potential of elevation of conflict over this issue (the treaty has already survived two wars) and rationally decide to not go that way.[106] However the consensus among environmentalists is that the moment the stress on the rivers increases, mainly due to global warming, the issue will rear its head again, possibly worst than ever before. Recently Pakistan lodged a complaint with the World Bank against the Indian construction of the Baglihar dam on the Chenab River, citing the fact that the water level in the Chenab had fallen below the minimum allocated by the World Bank.[107]

Apart from the prospect for interstate conflict Pakistan's dwindling water resources pose a threat to its internal cohesion as well. The provinces of Punjab and Sind have engaged in heated debates and sporadic conflicts over the water sharing by the provinces. Sind has always felt that it has gotten the tougher end of the deal. The distribution of water among the provinces is managed under the Indus water accords of 1991, but the level of squabbling that has existed over the issue on national and provincial forums suggest that the issue is far from being resolved. Pakistan has a distinct socio- ethnic background that has always been prone to serious social conflicts. It is suggested that the instance of conflict breaking out in areas where there is a preexisting socio- ethnic milieu supported by the apparent distinction between the haves and the

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[105] Indus waters treaty, World Bank. Available online from http://siteresources.worldbank.org/INTSOUTHASIA/Resources/223497110573725358 8/IndusWatersTreaty1960.pdf

[106] Undala Z Alam, "Questioning the Water Wars Rationale: A Case Study of the Indus Waters Treaty," (*The Geographical Journal* 168: 2002), pp. 341-353.

[107] Khaleeq Kiani,"Protest Lodged with India over Reduced Water Flow," *Dawn* (Karachi), September 2008/09/08, www .dawn .com .html

haves-nots, is very high.[108] Pakistan presents a very potent case study in this context. The country's flawed politics has always pitted the more populated and prosperous province of Punjab against the rest of the three provinces and that has given rise to a collective feeling of relative deprivation. Even though there are now secessionist movements working in Baluchistan and Khyber Pakhtoonkhwa, and that there is a rising and pervasive resentment against the state policies and the province of Punjab in the hearts and minds of the people of the country, the faulty and discriminating policies see no change. In one recent instance, the Punjab provincial government rejected a request by the national Indus River System Authority to reduce Punjab's withdrawal of water from the Tarbela Dam, which exceeded its agreed-upon intake for the season.[109]

One such example of severe provincial conflict over the sharing of water resources has been the construction of the Kalabagh dam, which would regulate and store water upstream and will provide for the generation of electricity. But the province of Khyber Pakhtoonkhwa strongly opposed this on account of the fear of bearing the environmental brunt, getting inadequate compensation and fearing a monopoly by Punjab, similarly Sind feared that the salinity level downstream near the Arabian sea would rise so much that it would threaten the survival of the crucial coastal mangrove forests and local agriculture.[110]

Even though the Kalabagh Dam project was shelved due to the political outcry against it, the not so distant future and the strain global warming will put on Pakistan's water resources will demand the construction of several big and small dams that is bound to spark provincial disquiet again and if the perceived deprivation is too much, in the absence of an accountable and strong center, the prospect of serious intrastate conflict is not so farfetched.

The phenomenon of ecological marginalization will thus rear its head like a mut6ated monster that will threaten to seriously affect Pakistan's national security. It is a known fact that in Pakistan the poorest of the poor farmers have the least water rights and the water is allocated based on land ownership not land usage or personal usage, there is also the phenomenon of

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[108] Schubert et al., "*World in Transition: future bioenergy and sustainable land use*" (London: Earthscan, 2010), p. 86.

[109] Khaleeq Kiani, "IRSA and Punjab at Odds over Cut in Water Flow," *Dawn News* September. 2008, www.dawn .com

[110] The dam, had it been constructed, was intended to provide 11750 kilowatt hours of electricity and Irrigate 2.4 million acres; see "Goodbye, Kalabagh Dam!" *Daily Times* 28 May. 2008, www.dailytimes.com.pk

rampant corruption in the irrigation department. These two factors ensure that the rich landowners get the control of water and they use this control top exert societal and unjust pressures on the poor farmers.[111] At times the treatment meted to these poor farmers is so harsh that they have to leave everything and migrate. Thus these lacks of accountability and faulty policies have driven a considerable population to desperate times. In such a scenario of socio-economic inequalities coupled with lack of education, these people can be easily indoctrinated and enticed to join anti state groups and worse they could be persuaded to join the insurgents like the local terrorist bodies etc.[112]

Pakistan depends on its rivers to feed its hydro electric power generation and there have been many dams built on the river Indus, however the fact remains that Pakistan has mainly treated water as a raw material focusing on the most optimum usage and harnessing of this resource, with emphasis on the bigger the better philosophy while making dams. Currently hydropower contributes 28% to the country's total power generation of 17651 MW. The cost of generation has drastically increased due to fossil fuel based generation and projections say that a situation that would bring about a shortage of water resources will lead to severe consequences, for example, a draught situation would cause a decline in generation up to 200 MW. [113]The truth is that Pakistan's big hydro power generators are in dire need of repair as they are now filled with silt and only contribute to salinity downstream. In the summer of 2008 there were rolling blackouts in the cities and towns of Pakistan (most villages still not being equipped with electricity), the result was riots on the streets and the overall major losses especially to the textile industry of Faisalabad. The alarming fact is that three years later these rolling blackouts still continue. A gallop survey in 2009 showed that 53% of Pakistanis live without electricity for more than 8 hours a day.[114] Pakistan's investments in national infrastructure have consistently fallen below the levels needed to maintain its aging irrigation canals, dams, and power generation and distribution networks. As of 2006, for instance, the state spent only 0.25 percent of GDP on water supply and sanitation. Since 1999 Pakistan's total installed power generation

[111] See Frank R. Rijsberman, "Water for Food: Corruption in Irrigation Systems," in Zinnbauer and Dobson, eds. "*Transparency International Global Corruption Report 2008*",

[112] Michael Kugelman and Robert Hathaway, eds., *Running on Empty: Pakistan's Water Crisis*, (Washington DC: Woodrow Wilson Center, 2009), p. 1019.

[113] M Moinulqadar mirza and Qazi Kholiquzzaman Mirza, *Climate change and water resources in South Asia* (London: Taylor and Francis, 2005), p . 222.

[114] Gilani Research Foundation/ Gallup Pakistan, "Half of the Nation Is Deprived of Electricity for More than Eight Hours a Day," July 21 ,2009, www .gallup .com.pk/ Polls/ .pdf.

capacity has increased by only 2990 megawatts, or 17.8 percent. For its estimated population of 174.6 million, its total power generation capacity thus amounts to approximately 0.0001 Megawatt per person. By comparison, Americans enjoy approximately 0.003 megawatt per person.[115] Pakistan should boost investment in repairing and maintaining existing infrastructure in order to decrease water profligacy—thereby lowering costs and safeguarding precious water supply. More emphasis should also be placed on modest, indigenous technology—such as drip irrigation.[116]

The threat to national security is hence self evident after this detailed analysis of the depletion of water resources of the country. Not only is the water stress which will be natural consequence of global warming cause interstate conflict between India and Pakistan it will be a cause of severe intra state conflict with the threat of secessionist and separatist movements always looming on the horizon. This and the rising instances of terrorism and extremism in the country speak volumes about the irreparable damage the bad policies have already caused. This damage is sure to be exacerbated by the degradation of water resources due to anthropogenic climate change and global warming.

Scarcity Scenario # 2:

Food production, land degradation, demographics and food insecurities;

Pakistan is an agricultural country with agriculture accounting for 25% of its GDP and 80% of its exports, with about 70% of the population dependent on agriculture.[117] Pakistan's agricultural production includes both food crops and cash crops Major food crops are cereal grains (mostly wheat and rice, and also barley, corn, millet, and sorghum) and milk products (buffalo, cow, and goat). Other commodities include other products such as fruits, vegetables, cattle, mutton, and eggs. Most livestock (60%-90%, depending on the area) are pasture or rangeland-fed and are not

[115] According to the U.S. Department of Energy, U.S. power generation capacity is 1,008 Gigawatts. See U.S. Energy Information Administration, *Annual Energy Outlook 2010*, December 2009, www .eia.doe.gov/ neic/ speeches/ newell.pdf. This is based on an estimated U.S. population of 307.2 million; see *CIA World Fact Book*, www .cia .gov/ library/ publications/ the- world- factbook/ geos/ us .html.

[116] See M. Kugelman in the introduction to *Running on Empty: Pakistan's Water Crisis*, (Washington DC: Woordrow Wilson International Center for Scholars. 2007), p. 1020

[117] FAO,"Food and Agriculture Indicators," 2006,http://www.fao.org/es/ess/compendium_2006/pdf/PAK_ESS_E.pdf

generally fed cereal grains which are needed for human consumption.[118] There is also mixed farming that takes place in mostly arid areas of Khyber Pakhtoonkhwa and Baluchistan depending on the availability of water. Pakistan has mainly two seasons of crop production rabi and kharif, with the rabi crops sown during October through December and harvested during April to June and the kharif crops sown during April to June and harvested from October through December.[119] The population of Pakistan, which was placed at 167 million in 2010 making it the sixth most populous country in the world, is critically dependant on the indigenous crop production. This dependence is stressed by the ever increasing population, ecological marginalization and the changes brought about by the anthropogenic climate change.

Agriculture is the source of livelihood of almost 44.7% of the total employed labor force in the country, with the world bank viewing the agricultural sector as the major source of income for 38 million Pakistanis including 13 million of the poorest 40% of rural households.[120]As mentioned before the agriculture sector contributes a lot to the country's GDP, 21.8% to be exact, with cash crops like cotton contributing extensively to the country's textile and apparel industry.

The country with its biggest canal system in the world and its dependence on both freshwater and groundwater resources for agriculture make the crop availability and productivity functioning all year round, about 25 million tons of cereal crops are produced per annum. However this sector is constrained by the lack of new and better technology use, and growing population, these constraints exert a lot of negative pressure on Pakistan's road to food self sufficiency.

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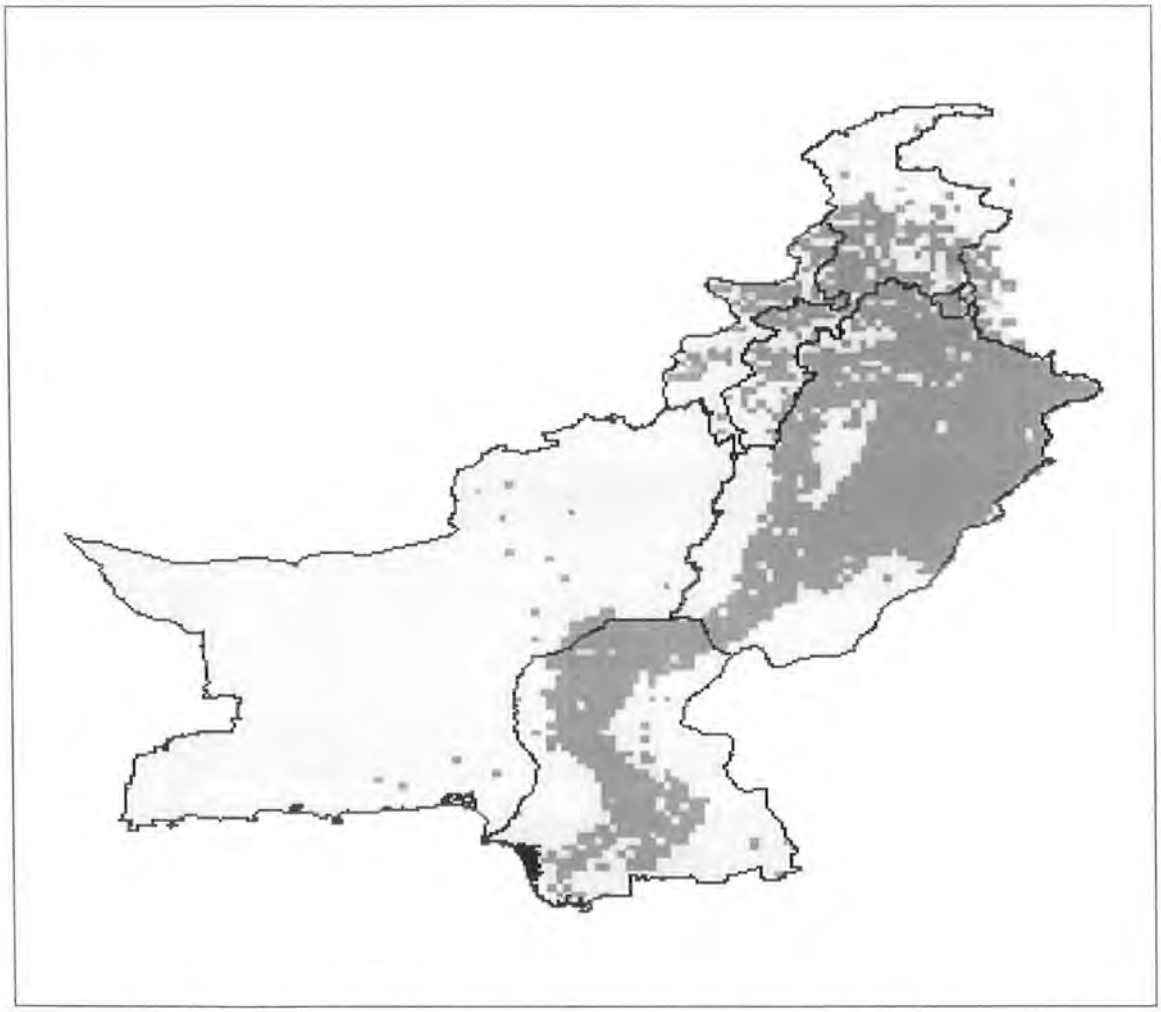
[118] Muhammad, D., "*Pakistan. Country Pasture/Forage Resource Profile*," 1998 (data last updated in October 2006),
http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Pakistan/Pakistan.htm

[119] Muhammad Behnassi et al (eds) "*global food insecurity: Rethinking agricultural and rural development paradigm and policy*" (Springer publications 2011), p. 22.

[120] World Bank report on agriculture and food security in Pakistan, available online from "http://www.worldbank.org.pk/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/PAKISTANEXTN/0,,contentMDK:21571064~menuPK:50003484~pagePK:2865066~piPK:2865079~theSitePK:293052,00.html#3analysis"

Picture showing permanent crops and arable land in Pakistan;



Taken from the FAO country profile and data for Pakistan[121]

The map also shows that the volume of arable land is directly proportional to population density in that area. For instance there is considerable variation in population distribution. Some arid areas of Baluchistan average as few as 2 persons per square kilometer, while irrigated districts of

[121] FAO country profile, data and maps available online from "http://www.fao.org/countryprofiles/Maps/PAK/12/al/index.html"

the Punjab average 400 persons. Water and soil availability are the chief reasons for such variation. Thus, areas of low density have little spare absorption capacity[122].

The population of Pakistan, which is at an ever increasing trend, making it the sixth most populated country in the world is also exerting a lot of pressure on Pakistan's food production and food self sufficiency. Despite being an agricultural country Pakistan witnessed an increase of 72% of food imports in the first half of 2011. According to the figures released by Federal Bureau of Statistics, the country spent $3.54 billion on food's import during July-February period of 2010-11 against $2.058 billion in July-February 2009-10, registering an increase of 72.34 percent in one-year period. According to the break-up, the milk's import went up by 76.35 percent, dry fruit's import by, 7.84 percent, tea's import by 25.42 percent, spices, 63.47 percent, soybean oil, 569.05 percent, palm oil, 59.87 percent, sugar 392 percent, pulses, 89.25 percent and all other food items import enhanced by 33 percent during July – February. [123]These figures quite clearly show that the increasing demographic trends tend to adversely affect the agricultural trends and goals of the country, thus exerting a two pronged attack on the poorest of the poor as the increasing demand increases the prices of goods.

Another problem that the country's food production is facing is the decrease in the soil quality by wind and water erosion, salinity and solidicity, water logging and flooding and loss of necessary soil ingredients. The phenomenon of human induced land degradation is not new to Pakistan, whereas Land degradation refers to the temporary or permanent reduction in the productive capacity of land as a result of human action, Generally viewed as having been a cause of over grazing, excessive annular agricultural usage, water erosion etc. the complete classification is provided by the food and agriculture organization using the GLASOD survey conducted by Oldeman et al. The full set of definitions may be found in Oldeman et al. For present purposes, it is important to note the degrees of degradation, defined in terms of reductions in land productivity. In abbreviated form, these definitions are as follows:

- Light: somewhat reduced agricultural suitability.

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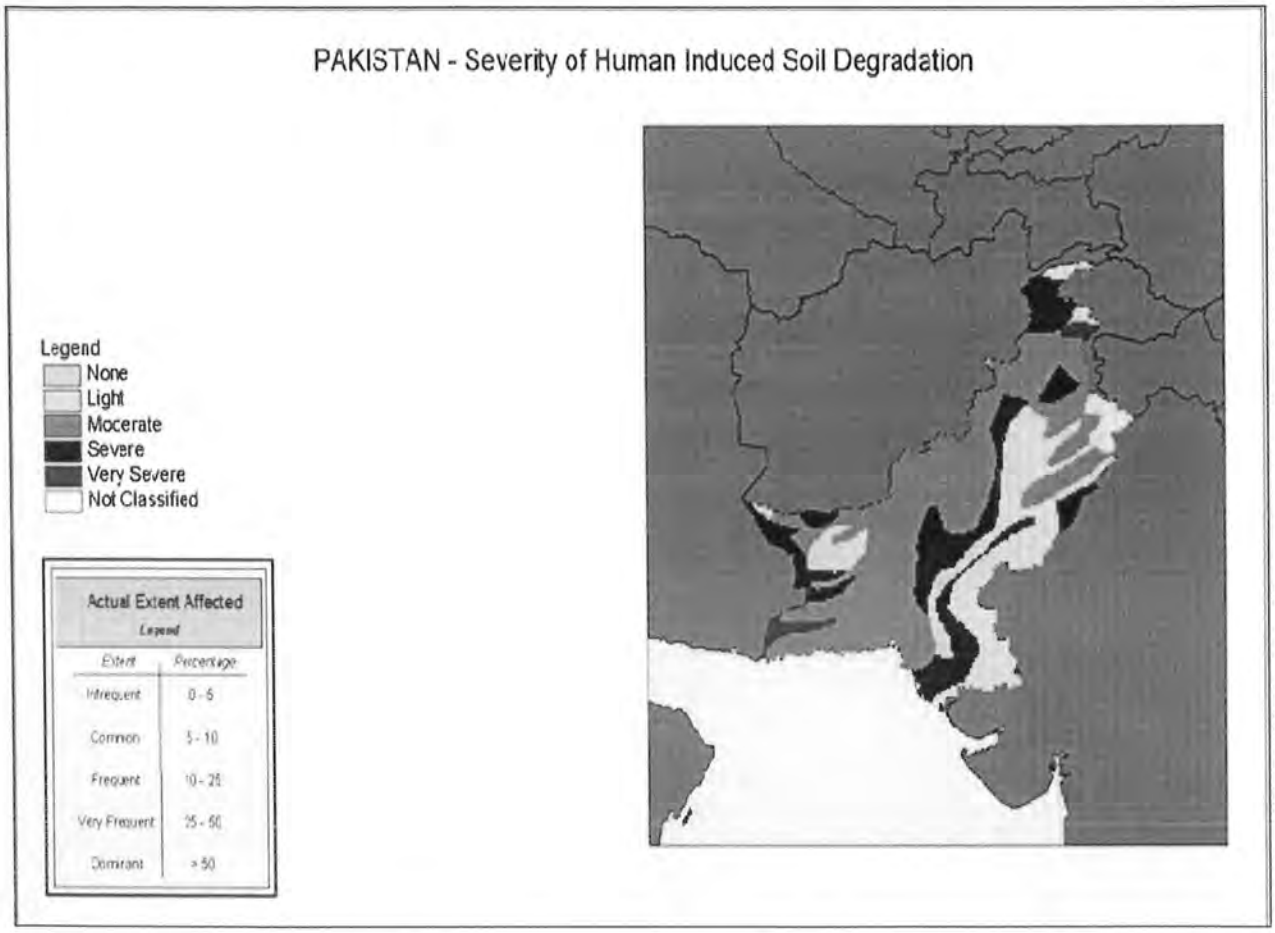
[122] Government of Pakistan, *The Pakistan National Conservation Strategy* (Karachi: Government of Pakistan/Joint Research Council-International Union for the Conservation of Nature Pakistan, 1992).

[123] Imran Ali Kundi. "Massive rise in food imports" *The Nation* published March 19, 2011. Available online from http://www.nation.com.pk/pakistan-news-newspaper-daily-english-online/Business/19-Mar-2011/Massive-rise-in-food-imports.

- Moderate: greatly reduced agricultural productivity.
- Strong: biotic functions largely destroyed; non-reclaimable at farm level.
- Extreme: biotic functions fully destroyed, non-reclaimable.[124]



Food and Agriculture Organization, Land and Development Division.[125]

As is evident from the figure above Pakistan is facing severe to moderate soil degradation and that spells doom for a country as dependent on agriculture as Pakistan is. According to the government's Report on the Pakistan National Conservation Strategy, 17 percent of surveyed soils (which include most of the soils usable for agriculture, forestry, or ranching) are affected by

[124] L R Oldeman, Hakkeling and Sombroek. "Worldmap of the status of human-induced soil degradation. An explanatory note". ISRIC/UNEP, 1990.
[125] FAO/AGL maps available from http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp?country=PAK&search=Display+map+%21.

water erosion, 7.6 percent by wind erosion, 8.6 percent by salinity and sodicity, and 8.6 percent by flooding and ponding; fully 96 percent suffer from less-than-adequate organic matter.[126]

Table : Area Affected by Water Erosion

Degree of Erosion	Province					Pakistan
	Punjab	Sind	NWFP+FATA	Baluchistan	N.A.	
	(1,000 Hectares)					
Slight (sheet & rill erosion)	61.2	-	156.3	-	180.5	398.0
Moderate (sheet & rill erosion)	896.8	-	853.8	1,805.0	25.8	3,581.4
Severe (rill, gully, and/or streambank erosion)	588.1	58.9	1,765.1	829.6	504.2	3,745.9
Very Severe (gully, pipe, and pinnacle erosion)	357.9	-	1,517.0	-	1,571.6	3,446.5

[126] "Salinity" is the accumulation of salts in a given amount of water or soil, primarily due to overirrigation and a lack of adequate drainage. See Peter Collin, *Dictionary of Ecology and the Environment* (London: P. Collin Publishers, 1988), and Andy Crump, *Dictionary of Environment and Development* (London: Earthscan, 1991). "Sodicity" refers to the impact of high concentrations of sodium on soil. While saline soils generally have normal properties, sodic soils undergo physicochemical reactions which cause the slaking of aggregates and the swelling and dispersion of clay materials, leading to reduced permeability and poor tilth. The loss of permeability may so restrict water infiltration into the root zone that plants become stressed from lack of water. Crusting can also impede seedling emergence and reduce crop stand. For an extended discussion, see Kenneth K. Tanji, ed., *Agricultural Salinity Assessment and Management* (New York: American Society of Civil Engineers, 1990) data taken from "Pakistan National Conservation Strategy" Government of Pakistan.

TOTAL	**1,904.0**	**58.9**	**4,292.2**	**2,634.6**	**2,282.1**	**11,171.8**

Source: Alim Mian and Yasin Javed Mirza, *Pakistan's Soil Resources: Pakistan National Conservation Strategy Sector Paper* (Karachi: IUCN-World Conservation Union).[127]

Table: area affected by salt.

		Punjab	**Sind**	**NWFP**	**Total Indus Plains**
		(1,000 Hectares)			
Total Command Canal Area (CCA):		7,891	5,351	320	13,562
Within CCA:	Salt Affected Area	1,614	1,532	14	3,160
	Percent	20.4	28.6	4.3	23.3
Outside CCA:	Salt Affected Area	1,129	1,019	502	2,650
TOTAL		**2,743**	**2,551**	**516**	**5,810**

Source: Ministry of Food and Agriculture, Government of Pakistan, *Report of the National Commission on Agriculture.*[128]

The data above shows the extent of damage caused to the soil of Pakistan's different provinces, studies show that the rate of human induced soil degradation is greater than the natural soil renewal, this basically means that the soil's healthy equilibrium is being lost and the lack of education in Pakistan is a big problem as the farmers are not educated towards the proper usage of soil and the methods in which they can sustainably harness the full advantages of the soil.

Pakistan's declining agricultural production:

In the last few years Pakistan's agricultural production grew because of use of chemical fertilizers and use of high yielding crops etc but in the recent years production has dropped drastically. Among the many reasons cited for this decline are.

- shortage of irrigation water and deterioration in the irrigation network, including severe drought conditions in 2000-2001
- Soil degradation from fertilizers and other chemical inputs, and low efficiency from most farm inputs.
- low technology use, and lack of farmer knowledge of operating and technological characteristics within the agricultural sector
- Large differences in yields among provinces.
- Uncertain land tenure.
- poor government investment in agricultural research and marketing;
- Domination of large landowners and other vested interests, including price control by cartels.
- lack of crop diversification and focus on wheat production, particularly by some donor organizations, and
- Poor governance and corruption.[129]

[128] Thomas Homer-Dixon. and J. Blitt, eds., "Eco-Violence: Links Among Environment, Population, and Security," (Lanham, Massachusetts: Rowan and Littfield, 1998), p . 163.

[129] Comments from presenters at "Hunger Pains: Pakistan's Food Insecurity," Woodrow Wilson International Center conference, Washington, DC, June 2009; U.N., "Pakistan, Country Profile," 2002, http://www.un.org/esa/agenda21/natlinfo/wssd/pakistan.pdf.

Of these factors the one that is mostly cited as related directly to global warming is the lack of irrigation water availability, as discussed in scarcity scenario # 1, Pakistan faces acute water shortage due to global warming induced climatic change, glacial melting and mismanagement and the agricultural area will be the most affected. In pakistan fresh water sources are of 5 types: modern surface systems, traditional surface systems, springs and karezes and wells. Out of the 18.23 Mha irrigated area in pakistan, 7.06 Mha is irrigated by canals, 7.17 by canals and tubewells, 3.24 by wells and 0.20 by other sources. The storage capacity of the three major reservoirs is severely depleted due to silting up of dams. The total inflow of the three eastern rivers fell to 11.22 Mha-m in 2001-02 from 19.57 Mha in 1992-1993 and the water shortage registered during the last few years were as high as 40-50 %. Over time the pumped water is becoming saline and many of the tube wells are being shut down due to this[130]. If the present trends continue, researchers have concluded that the shortfall of 0.43 Mha-m during the Rabi (winter) season in 1990s could increase to 1.6 Mha-m by the year 2017.[131] About 70-75 % of the ground water in Punjab province is unfit for irrigation because of residual sodium carbonates and farmers are forced to use brackish water which further exacerbates the problem of Salinization.[132]

Hence it is evident that the farmland, the people of Pakistan depend on is on the verge of a very catastrophic scenario. Similarly the fertility rate of Pakistani soil is also falling very rapidly consider the following figures discussed by independent researchers Zia ul Hassan and Muhammad Arshad;

"The fertility of soils is rapidly depleting. The data generated by public and private organizations reflect the general agreement about the deficiency of nitrogen in 100 per cent soils. Same is the situation with the organic matter content, which is on around average 0.5 per cent only. In case of phosphorus, more than 90 per cent soils are deficient. Potassium deficiency in soils, not a soil fertility problem earlier, is increasing rapidly due to discriminate use of only nitrogenous and phosphate fertilizers. Various public and private organizations are reporting a

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[130] Rattan Lal eds., *Climate Change and Terrestrial Carbon Sequestration in Central Asia* (London: Taylor and Francis, 2007), p. 239.
[131] S.A Qutab and Nasiruddin, "Cost-effectiveness of improved water management practices," In "*Water and Community: assessment of On-Farm Water Management Programmme*", (*SDLI*, Islamabad. 1994), pp. 11-14.
[132] Rattan Lal eds., *Climate Change and Terrestrial Carbon Sequestration in Central Asia* (London: Taylor and Francis, 2007), p. 240.

soil potassium deficiency in the range of 20-40 per cent.. Among micronutrients, field scale deficiencies of economic significance prevail in case of zinc, boron, and iron. All the provinces show negative nitrogen balance, although in Punjab the deficit is declining. Over the decade, negative phosphorus balances did not change significantly in Punjab but worsened in the other three provinces. In 1985-86, the level of deficit was highest in Punjab. However, in 1995-96 they were all fairly similar".[133]

The above mentioned excerpt shows the level of damage already inflicted on the soils of Pakistan and that which the ongoing trends in cultivation will sustain, the fact remains that farmers in Pakistan are seriously indifferent and ignorant of the needs of the soil and routinely abuse it by using strong pesticides and synthetic fertilizers to reap the maximum benefit from it. This decreases the fertility of the soil in the long run. Similarly the uneven distribution of land leads to intensification of its usage by large and small landowners. Landowners also tend to over irrigate cash crops which then lead to water logging and salinity.[134]

Thus these issues coupled with the issue of global warming and the effects it is already having on crop productivity are seriously attacking the backbone of Pakistan's economy and undermining its ability to sustain its ever increasing population.

Potential for conflict and threat to national security:

"Without food, people do one of three things: revolt, migrate, or starve. When governments can no longer provide food security, states fail."[135]

(Josette Sherman the executive director of the UN food program)

The main concern for analysts in the context of food insecurities and land degradation is the potential for conflict it has internally and the prospect of the economic decline it could spell for the country. Thomas homer Dixon has termed this scarcity as demand and supply induced

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[133] Zia ul Hassan and Muhammad Arshad "Land degradation – a threat to agriculture" available online from http://www.pakissan.com/english/issues/land.degradation.threat.to.agriculture.shtml, retrieved 29 july 2011.
[134] Tarique Niazi, "Land Tenure, Land Use, and Land Degradation: A Case for Sustainable Development in Pakistan" *The Journal of Environment and Development:12,(* September, 2003), pp. 275-294.
[135] Josette Sheeran, "How to End Hunger," *The Washington Quarterly*, April 2010.

scarcity, in the context of Pakistan he mentions the increase of agricultural production during the green revolution that introduced new methods of cultivation, technology and pesticides etc to increase agricultural production. The trouble with these policies was that these favoured the large landowners and that in turn raised their monetary status while the poor farmers are still as downtrodden as ever, the aforementioned fact of relative deprivation then takes a very potent and viral turn and one witnesses the rise of such clashes that are simplistically put as ethnic or tribal or inter provincial clashes but deeper study reveals that these are in fact resource based problems. The schisms that already exist between the various provinces of the country are widened when reports on the micronutrient deficiency trends come and show that Punjab for instance fares much better in this context case in point The U.N. reports that the nutritional status of Pakistani children under five years of age is "extremely poor".[136] At a national level almost 40% of children under five years are underweight; about 37% of children are affected by stunting and about 13% by wasting.[137] The interesting fact to be noticed is that the UN researchers found the inherent variations in malnutrition among the people of the different provinces. The UN FAO thus noted that;

"The prevalence of stunting appears to be associated with the overall level of development of the provinces, being lowest in Punjab and highest in Baluchistan, the least developed province"[138]

The aforementioned facts reiterate the point that the deprivation felt by the other provinces lead to the fostering and continuation of already present conflicts in the country, today Pakistan faces the deep seated problems of secession and the demand for more provinces because people fear for their survival and the acquisition of such basic necessities as food and nutrition. From May 2007 to October 2009 (when wheat flour increased in price), riots in Pakistan reportedly led to the stealing of massive amounts of grain and flour. In January 2008, Pakistan deployed 6,000 soldiers to secure flour mills, food distribution canters, and to escort supply trucks.[139] In Baluchistan almost 20 – 25 districts were considered food insecure while all of the federally

[136] FAO, "Nutrition and Consumer Protection, Pakistan," http://www.fao.org/ag/AGN/nutrition/PAK_en.stm
[137] Ibid; and FAO STAT, "Food Security Statistics, Pakistan," http://www.fao.org/faostat/foodsecurity/Cous_en.htm. Data are reported for 2001-2003 period.
[138] FAO, "Nutrition and Consumer Protection, Pakistan," http://www.fao.org/ag/AGN/nutrition/PAK_en.stm.
[139] Peiris, V., and K. Jones, "Pakistan Roiled by Flour and Electricity Shortages," http://www.buzzvines.com

administered tribal areas were considered food insecure. Interestingly these areas are also the most vulnerable when it comes to being the sources of internal conflict.[140]

Thus it seems self evident what the shortage of food and the degradation of available land will do when it fails to support the burgeoning population of Pakistan, clearly qualifying as a national security dilemma.

Scarcity scenario # 3:

Rising temperature, changing weather conditions, exotic diseases and the frequency of natural disasters:

Pakistan is already prone to many natural disasters. A World Bank study has stated that between 1990 and 2008 natural disasters killed 60,000 and affected 750 million people in South Asia with $45 billion in damages.[141] It is a known fact that in the past couple of years Pakistan has seen possibly the hottest years in its history, it is no coincidence that these years have also seen the rise of viral and infectious diseases and natural disasters, in fact studies show that 2010 was the hottest year in recorded history of the planet and along with the extreme heat came the devastating floods in Pakistan and Australia, with Pakistan facing its worst natural disaster in the nation's history.[142] This part of the study will focus on how the rising temperature, an outcome of anthropogenic climate change, contributes to the unlikely events of natural disasters and the spread of such exotic diseases as dengue and gastroenteritis etc. all this can be linked with the climate changing effect of global warming and this section will prove just how far this hypothesis can be taken.

If one is to only look at the past year of 2010 one sees that it was the worst year when it came to the natural disaster of flooding, the devastating floods, as mentioned before, rendered many a families homeless and without any means to sustain themselves. While Pakistan has a history of

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[140] "Urban Food Security Deteriorating," U.N. Office for Coordination of Humanitarian Affairs, IRIN, January 8, 2008.

[141] "Pakistan's Current Monsoon Leads to an International Emergency Appeal for Assistance," http://www.examiner.com

[142] The green blog "2010 might be the hottest year on record" available online from http://www.green-blog.org/2010/07/11/2010-might-be-the-hottest-year-ever-recorded-in-human-history/

floods and other natural disasters, many experts believe that the weather systems that led to the unprecedented 2010 mega-floods were the result of climate change. They point to the fact that the floods are in line with scientists' predictions that climate change will cause an increase in the frequency and intensity of extreme weather events (including variability in the monsoon) and to meteorological data showing a doubling of recorded natural disasters over the past two decades. [143]. Last year the monsoons shifted their pattern by not taking place further north and feeding the Indus basin but pouring over the Khyber Pakhtoonkhwa these monsoon winds due to a slight shift in their pattern met the low pressure wave that usually by passes this area in summer. Thus this jet wave of sorts met with the monsoons and caused amazing amounts of rain.[144]Experts believe that this slight abnormality was also responsible for the heavy rains that caused landslides that killed 1200 people in china and the ferocious wild fires in Russia.[145] Experts are of the view that this abnormality of sorts was caused by the increase in water surface temperature in both the Mediterranean Sea and the Bay of Bengal which resulted in an abnormally large quantity of water to be released in the atmosphere.[146] The heating of water surface is directly attributed to anthropogenic global warming. Thus the task force on climate change concluded;

"It is projected that climate change will increase the variability of the monsoon rains and enhance the frequency and severity of extreme events such as floods and droughts"[147]

[143] Emergency Events Database. Retrieved from www.emdat.be.
[144] N. Gronewold, "Pakistan: The night the river roared in 'like a demon,'" *The New York Times* 12 Oct. 2010.
[145]University of Reading Walker Institute, Pakistan Floods. Retrieved from http://www.walker-institute.ac.uk/news/news_pakistanfloods.htm.
[146] N. Gronewold, "Pakistan: The night the river roared in 'like a demon,'" *The New York Times* 12 Oct. 2010.
[147] Planning Commission Government of Pakistan, "Executive Summary and Salient Recommendations of Final Report," in *Task Force on Climate Change*,(Feb. 2010), p. 2.

Consider the extent of damage inflicted as thus:

[148]

as is evident from this figure most of Pakistan was submerged and in collaboration with the aforementioned figures it becomes apparent that the short term losses might have been monetary and in terms of fatalities but in the long term livelihoods were destroyed, infrastructure was completely shaken and the country is still reeling from the aftermath. An "Atlantic Monthly" pictorial survey conducted a year after the floods concluded that even though it has been one

[148] Taken from the united nations office for the coordination of humanitarian affairs 2011 available online fromhttp://www.unocha.org/what-we-do/coordination-tools/environmental-emergencies

year and even though aid has been funneled in Pakistan in the manner of millions there is still much to be done as Pakistan.[149]

Similarly the melting glaciers can easily cause a glacial lake outburst that could inundate many areas and can render many people homeless as well. This phenomenon was witnessed last year as well with the formation of attabad Lake in Hunza valley. Here too we find that the government either failed to provide assistance to the locals or was to apathetic to their plight, With 242 houses, 135 shops, four hotels, two schools, four factories and several hundred acres of agricultural land flooded, and almost 25 kilometers of the Karakoram Highway and six bridges destroyed this area is on the brink of collapse.[150]

As a consequence of all these natural disasters the people of Pakistan face a myriad of problems related to their health as well. As the floods waters receded, the dead carcasses of people's livestock spread sepses in the areas. Malnourishment that was already a problem was exacerbated and led to many deaths; the standing, stagnant water provided breeding grounds for mosquitoes which in turn gave rise to the epidemic of malaria and the more dangerous strain of dengue malaria in the country. People living in flood-affected areas are also at risk of contracting skin diseases, acute respiratory infections, and even hepatitis A and hepatitis B. Under normal circumstances, these diseases may not be life threatening. However, the risk of these diseases and others becoming serious is compounded by lack of access to medical services. Medical facilities were damaged; stocks of essential medicines destroyed, and access to health care may be limited or prevented by the current state of the infrastructure in Pakistan.[151] UNICEF reports that waterborne diseases such as cholera, dysentery and hepatitis cause roughly one- third of all deaths in Pakistan, imposing a cost of 1.8 percent of GDP and tying up 20 percent to 40 percent of the nation's hospital beds at any given time.[152]

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[149] Pakistan Floods one year later Alan taylor in focus with the Atlantic Monthly available online from http://www.theatlantic.com/infocus/2011/08/pakistan-floods-one-year-later/100121/

[150] "Water level rises in Attabad lake". DAWN Media Group. 14 Jun, 2010. http://www.dawn.com/wps/wcm/connect/dawn-content-library/dawn/news/pakistan/12-water+level+rises+in+attabad+lake--bi-03. Retrieved 16 July 2011

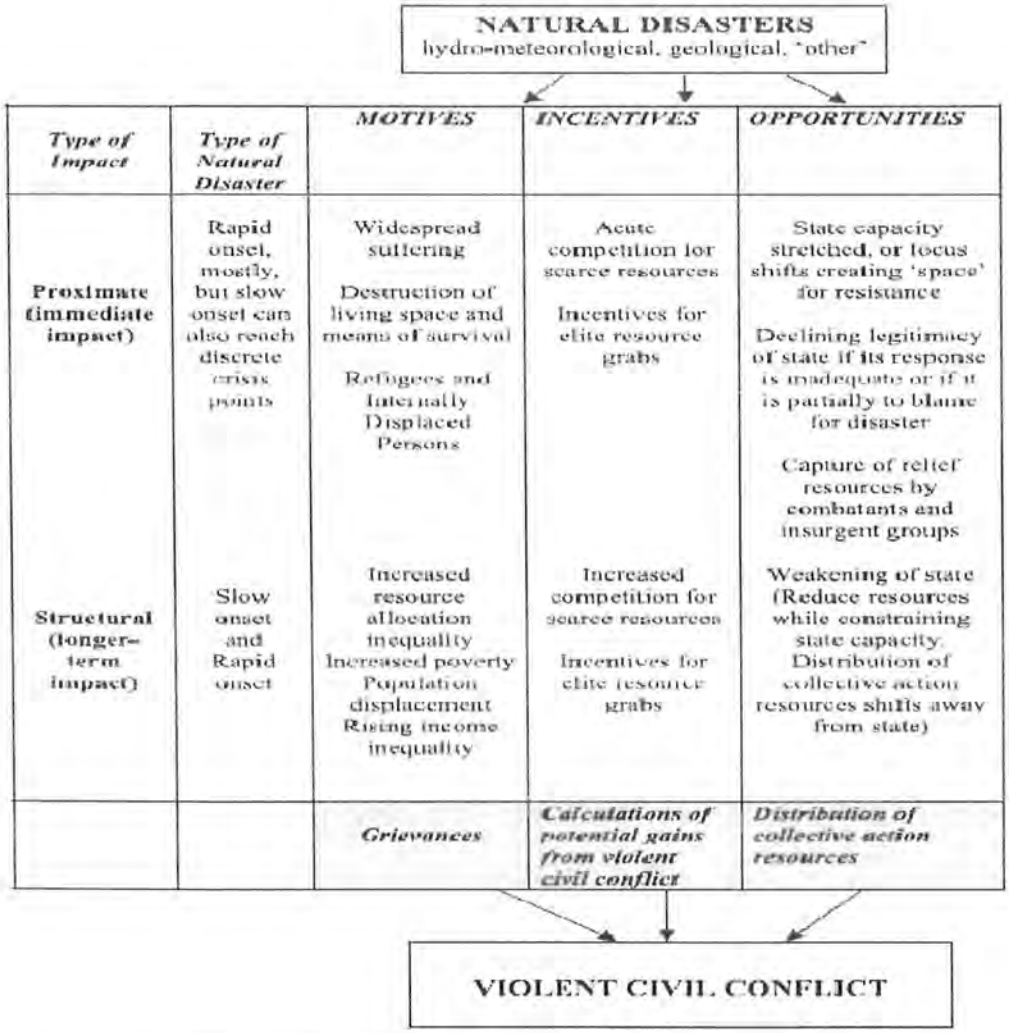
[151] Sajjad Imran and Ally Pregulman "battling diseases in post flood Pakistan" *Global Health Magazine*.(November 2010), pp. 1-5. available online from http://www.globalhealthmagazine.com/field_notes/field_notes5/

[152] World Bank, *Pakistan Strategic Country Environmental Assessment*, vol. 1, 51.

Threat to national security:

All these scenarios present a very dire picture for Pakistan as the country will fall into the clutches of internal unrest because of the apathy of the nation's leaders and their corruption at appropriating aid. In this context of utter dismay, the religious and in all possibility extremist organizations have been sending their social workers and doctors to the areas for help and rehabilitation, in the absence of a firm and authoritative response by the government the people will naturally turn to those they see as helping and sympathetic. In this context it will become very easy for these parties and their recruitment agents to gain access to impressionable young and disenchanted minds, which see the social work and the on filed doctors as angels and will naturally, be inclined towards hearing their cause and responding to it as happened in the case of the 2005 quakes.[153]The tabulation of how a natural disaster can cause severe violent conflict has been given by Philip Nel and Marjolein Righarts whose tabulation shows the linkage between severe conflict and natural disasters is as thus:

[153] Ashfaq Yusufzai, "Militants Gain legitimacy Through Quake Relief," http://ipsnews.net.



. Summary of Causal Argument Linking Natural Disasters and Violent Civil Conflict. [154]

This tabulation basically proves that Pakistan is facing this problem head on, already on the verge it is edging towards more and more of an epic disaster. What is curious about the case of Pakistan is the fact that according to Nel and Righart there are two distinct cases of natural disasters and Pakistan sadly is in the epicenter of both, for example the flood of 2010 was a rapid onset natural disaster to begin with but with the passage of time and it has become a pervasive and sustained issue as well. The closer analysis into the case of Pakistan reveals that the correlation between the two scenarios is ostensibly not that obvious but is irrefutable. Hence in

[154] Philip Nel and Marjolein Righarts, "Natural Disasters and the Risk of Violent Conflict," *International Studies Quarterly* 52 (2008), pp. 159-185.

this context it seems to be proven that in the aftermath of the degradation brought upon by the curse of natural disasters the country still stands to lose its frail national security apparatus.

Scarcity scenario # 4: (correlates to scenario number 3)

Massive internal migration as a consequence of state policies and natural disasters:

The floods in Pakistan have provided this research with current data that supports the argument of environmental refugees, a phenomenon that has a massive impact on the national security and stability of Pakistan. Pakistan is already the home of many afghan refugees displaced by the fighting in the country similarly the number of internally displaced persons has increased due to the army's operation against the insurgents in the northern areas of the country, estimates suggest that this number stands at 3 million in 2009.[155] This already precarious situation has exacerbated when the environmental refugees of the floods are added to the mix.

When the floods hit almost 80% of the country, the most badly affected were the poor farmers and those who already had the worst deal of everything got the worst of the floods as well. Similarly another little known phenomenon that is most likely to cause massive population displacement and internal migration if the rise of sea level in the mega city of Karachi. At about 8 meters elevation, Karachi is the largest population center likely to feel the effects of rising sea levels.[156] With the lower rinds of the population already pushed to the brink, ecologically marginalized and downtrodden a pervasive increase in sea levels will push them further inland creating a new class of helplessness which will exert further pressure.

Similarly state policies in the north west, fighting with the extremists etc have pushed many of the people to migrate towards city centers and pursue employment opportunities there, Pakistan is already facing massive unemployment and the refugees stress it out even more, the unrest in the general population due to this becomes palpable in the from of riots etc.

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[155] William Branigin, "U.S. to Provide $110 Millions for Pakistani Refugees," *The Washington Post*, May 20, 2009.
[156] As of 2002, the sea level near Karachi was estimated to rise at a rate of 1.1 millimeters per year. See T. M. A. Khan, D. A. Razzaq, and Q. Chaudhry, "Sea- Level Variations and Geomorphological Changes in the Coastal Belt of Pakistan,"(*Marine Geodesy* 25. 2007), pp 25-44.

Threat for national security;

Ted Gurr conceptualizes violent conflict to be accompanied by the attempt by one group to thwart, defeat and/or gain the resources of the opposing group.[157] Pakistan's fledgling refugee population is unsustainable for the urban centers they flock to and these refugees hence exist as marginal men all along facing a myriad of economic and social problems. The frustration-aggression hypothesis hence holds true in the context of refuges and the natives, as the refugees see themselves getting buffeted to the negative end of the spectrum. The easiest expression of discord in the Pakistani society has been expressed in the form of ethnic clashes which have been exacerbated and abetted by the environmentally driven conflicts such as these.

3.6: environmental degradation caused by global warming: a threat multiplier in the case of Pakistan:

After the brief analysis of pakistan's internal and external issues and its trigger spots and problem areas, it seems safe to assume that though Pakistan faces problems on the environmental front the root cause of problems isn't juts resources based. Thomas Homer Dixon and peter Gezewski have concluded that though Pakistan faces a lot of environmental hardships and faces scarcities on many fronts it is basically the more insidious causes of state failure that will give rise to a massive internal conflict, the one pervasive and formidable cause to Pakistan's predicament is the problem of corruption, Whereby misappropriation of resources and the mafia like character of the state's bureaucracy has only resulted in the continuation of the problems that Pakistan was born with. The Pakistani people have had to deal with loss of resources and faced hardships in the form of natural disasters but that speaks nothing in comparison to the general apathy for those problems displayed by the leaders and the civil military commands. Homer-Dixon thus concludes:

At the same time, certain characteristics of the Pakistani state worsened environmental scarcity, while others interacted with the resulting scarcities to produce resource capture, economic

[157] Ted Robert Gurr, *Why Men Rebel* (Princeton: Princeton University Press, 1970), pp. 163-165.

hardship, huge migrations of the poor from ecologically stressed rural areas into cities, and a weakening of the state's ability to respond to these rising challenges. The result has been an increase in group-identity and deprivation conflicts[158]

Thus in conclusion it can be said that after analyzing the different scarcities that the Pakistani state faces due to global warming, the trend that is most troubling is the fact that the realization of the problem is nonexistent, as is the need and demand to do anything about it. Pakistan is already on the threshold facing a myriad of problems due to mismanagement and corruption, and the environmental scarcities seem to be the last nail in the coffin.[159]

Pakistan's water issue can lead it to a violent confrontation with neighboring India but the chances of that happening are not foreseeable in the near future because the integrity of the Indus waters treaty still seems to be intact, however if the water depletes any further this will also become a very foreseeable scenario.

Even though the environmental problems Pakistan faces are many and varied and the fact that the country will eventually succumb to these problems is still skeptically viewed. Daniel Markey has analyzed all of Pakistan problems related to climate change but has ended on a positive note saying the Pakistani society is resilient and has the tendency to face problems head on, the main issue is the lack of realization of the problem of climate change, resources depletion etc as an actual problem and that is what needs changing, hence to conclude he says that though the threat to national security is evident, the threat to the nation state is not that much, provided proper steps are taken.[160]

Hence in conclusion it can be said that the severity of Pakistan's environmental problems is a reality that cannot be ignored and the results and findings, will most definitely show that a change in the perspective of policy making is indubitably needed. The next section will discuss these basic points and provide a succinct conclusion to the work conducted.

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[158] Thomas Homer-Dixon. and J. Blitt, eds., "Eco-Violence: Links Among Environment, Population, and Security," (Lanham, Massachusetts: Rowan and Littfield, 1998), p. 156.
[159] Congressional Research Service, "Security and Environment in Pakistan," 2010.
[160] Daniel Markey "Pakistan" written for "Climate Change and National Security: A Country Level Analysis" ed., Daniel Moran, (Washington: Georgetown University Press, 2011), pp. 88-92.

Section 4:

4.1: Results and discussions:

After the extensive study that has been undertaken by the researcher the results have been as such

- *There is a direct causal pathway between resource depletion and conflict*

This has been discussed quite thoroughly in section 2 wherein the works cited have proven without doubt that the linkages between resource depletion and conflict are irrefutable, there has been preexisting literature as discussed, which suggests that the existence of such conflicts can be empirically proven.

- *The relationship between environmental degradation and conflict and/or violence is not necessarily easily provable but the aforementioned linkages provide enough proof of the existence of ecoviolence and the case of Pakistan also proves this point beyond any doubt.*

As mentioned before the relationship between the environmental degradation and conflict is a conundrum for most theoreticians, where two distinct views exist. This work however has proven that the linkages between environmental degradation and violent conflict are undeniable as the case study proves adequately.

- *The case of Pakistan is the most curious and the most apt to the present discussion as this work has proven that in case of Pakistan environmental degradation caused by global warming is contributing to the worsening of preexisting conflict as well as giving rise to new and more complex conflict scenarios, further more future projections predict a worsening of the problem rather than things getting better.*

The relevance and the importance of Pakistan as a case study have been proven by the results and the discussions of sections 3. When the scarcity scenarios discussed by the researcher are scrutinized the apparent emergence of the whole situation comes to the fore. The most pressing and easily provable scenario is that of water shortage and if that is to be objectively analyzed then the results are apparent, Pakistan is on the threshold, its water resources are depleting, the

water resources support the food production and the agriculture, the depleting water resources hence predict a depleting food production and falling agricultural productions, all this will lead to food insecurity and the failure of an economy which is predominantly based on agriculture, these falling standards will give rise to unrest and that unrest of not dealt with will only get worse, leading to violent conflict in all possibility. Hence the conclusion drawn from this result corresponds to the hypothesis discussed in section 1, so it would be succinct to bring the results to a close by deriving the fact that environmental degradation caused by global warming is a major threat to Pakistan's national security, by giving rise to both inter and intra state conflicts and exacerbating the preexistent ones.

4.2: Policy options:

In light of the results and the discussions, at the culmination of the case study it can be safe to assume that the researcher can have some viable and fairly usable policy options at his disposal, gauging from the results of the study, it is apparent that Pakistan as a country lacks the necessary requirements and infrastructure needed to deal with the problem of environmental degradation. Pakistan today seems to dismiss the various inter ethnic and communal problems it is having as just routine unrest when, as the study has proven, the underlying problems are not known, the state and society of Pakistan are ignorant to the repercussions of turning a blind eye to the problem of environmental degradation and global warming. It is as they say a matter of our common future, so the first thing that needs to be realized is the importance of awareness, Pakistan needs to work on awareness of climate change and its impacts and that can be done only with a collaborative effort by the free media and the government emissaries. Today the best defense that Pakistan has against global warming is awareness as only through awareness can a true change be elicited in the policy making and also in individual action.

This work has proven the over arching preponderance of corruption and how it is contributing to the socio-economic demise of the country, what has become evident after the conduction of the case study is that in the environmental security context the corruption is leading to a mass scale pervasion of the phenomenon of relative deprivation, as discussed above this has led to the increasing feeling of frustration that invariably leads to aggression, hence the one, truly one and

only way, towards any sense of mitigation is through the exacerbation and ending of this phenomenon in Pakistan at every level.

The case study also proves that due to years of neglect in this area Pakistan is not fully capable of dealing with the phenomenon of global warming and mitigating its effects of environmental degradation on its own hence Pakistan should bring this issue to the fore of its policy concerns and work with major NGOs and international organization towards the mitigation of this problem. Similarly Pakistan needs to procure aid to help it deal with such problems as the cleaning of irrigation systems and dams etc which at their present state only contribute to the wastage of precious resources. The ingenuity gap discussed by Homer Dixon is also a real phenomenon in the case of Pakistan and hence a real and immediate over hauling of the situation needs to take place where new technologies should be introduced and supported.

And lastly this issue should be discussed more firmly and frequently on international forums and serious action should be taken rhetorically, so that Pakistan's voice is also heard and listened to. Pakistan should raise its own environmental issues stress the importance of global action to deal with this issue on the whole so that developing countries like Pakistan all benefit from such a positive action.

These are the major policy options that this research seems to indicate should be taken by the state and society of Pakistan.

4.3: Conclusion:

This study has been an enlightening experience as it has highlighted the very central importance of the biosphere to human activity, no life can exist on its own and a nation state is a living breathing entity that depends on the people, its environment and its policies on a whole. Pakistan is no exception and can not hope to exist in a biosphere that is rendered incapable of dealing with the effects of global warming and climate change. This study has proven without a doubt that a nation state is not invulnerable to the affects of global warming. It is an irrefutable reality of this century, and its affects are far reaching and very pervasive. The traditional security conceptualization hence seems to fail to explain how and why the nation state is and should

depend on the biosphere and as such cannot explain how the nation's security is affected by it either. This work hence seeks to move away from the prevalent literature and seek a plausible extrapolation elsewhere. The study has also proven that Pakistan as a state is on the verge of a major breakdown if the affects of global warming are not mitigated. The various scenarios discussed provide ample evidence into this affect and demand a change in the nation's policy if it seeks to somehow deal with all these problems and emerge a survivor at the end. This work will obviously have its critics, as the discourse on environmental security has had many deniers and many skeptics but the empirical evidence that is apparent from the case study should prove the conceptualization. The uneasy fact is that the environment is the most integral part of human existence and once the damage is too far gone nothing would be possible, hence it is of utmost prudence that the issues at hand be discussed and mitigated.

This work has exclusively focused on Pakistan as the country already has various areas of interest for those who seek to study the nature and escalation of conflicts, this study, while building on the works of Thomas Homer Dixon among many others, also postulates that the reason why environmental degradation is a point of concern for Pakistan is that it functions as a "threat multiplier" in the face of the various problems Pakistan already faces. Pakistan is presently and has been historically embroiled in ethnic and political scuffles that when paired with environmental scarcities could and would spell doom for the country. Today the country is at doldrums and faces a conundrum when seeking to explain the causes of its exacerbating deterioration, mainly because of the myopic lenses with which the issue of environmental scarcity driven by anthropogenic climate change is being viewed by the policy makers, the indigenous academia and the individual citizen. The fact that needs to be understood is that being a mainly man made problem, environmental degradation can not be challenged without the realization that something needs to be done to counter this problem. Pakistan and indeed the rest of the world can not seek to escape the after effects of pervasive and extreme climate change, the fact of the matter is that keeping the extent of the importance of this issue in mind what has been done and said is much lesser than what would be expected, as mentioned in the aforementioned policy options it is absolutely prudent for Pakistan as a country to take concrete and tangible steps to try its hardest to deal with the situation and come up with some viable solutions. It is also a known fact that the less developed, the developing and the least developed countries will have to indubitably bear the brunt of any and all harmful effects of anthropogenic climate change

and environmental degradation, hence the responsibility to mitigate these problems also lies with us and must be met. The major nations however are not invulnerable either and seek to loose a lot if not all in the wake of a complete breakdown of the biospheric infrastructure of our world.

This work has also brought to light the importance of such rudimentary measures such as population control and vegetation buildup and what they can do to save us in the long run. It is the basis of the Malthusian principle that the mouths to feed will only increase whereas the food and the means of sustenance will decrease, this foresight should be applied to the planning of nations so that in the long run the affects are not as severe. Due to global warming we are losing many species of flora and fauna everyday and that has the potential of effectively destroying complete ecosystems. We are already overstretching the potential of this planet to support us and the fact that the realization is still farther away will eventually inflict irreversible damage.

The conclusion derived from this work is thus very simple, and can be easily recounted. So with an object of presenting a succinct review one could say that this study reasserts the already widely accepted notion of environmental security, while analyzing the relationship the nation state has with its biosphere and how it coexists within it, the overarching importance of the environment hence becomes very clear. In this day and age being a climate change skeptic or a denier is foolhardy and naïve, for the evidence suggests that the linkages between environmental degradation and resource driven violent conflict are indubitable. Taking Pakistan's case as an example this research thus clearly proves that once resources dwindle to a point where the competition for them is very tough, the population can not be expected to react normally and cordially about it. Similarly the failure of the state to understand and access the root cause of already existing conflicts just puts it in epicenter of the problem. Hence the ability of the environment as a threat multiplier as well as a threat originator is unquestionable.

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ANNEX - A

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

UNITED NATIONS
1992

FCCC/INFORMAL/84
GE.05-62220 (E) 200705

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

The Parties to this Convention,

Acknowledging that change in the Earth's climate and its adverse effects are a common concern of humankind,

Concerned that human activities have been substantially increasing the atmospheric concentrations of greenhouse gases, that these increases enhance the natural greenhouse effect, and that this will result on average in an additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind,

Noting that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs,

Aware of the role and importance in terrestrial and marine ecosystems of sinks and reservoirs of greenhouse gases,

Noting that there are many uncertainties in predictions of climate change, particularly with regard to the timing, magnitude and regional patterns thereof,

Acknowledging that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions,

Recalling the pertinent provisions of the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972,

Recalling also that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction,

Reaffirming the principle of sovereignty of States in international cooperation to address climate change,

Recognizing that States should enact effective environmental legislation, that environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply, and that standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries,

Recalling the provisions of General Assembly resolution 44/228 of 22 December 1989 on the United Nations Conference on Environment and Development, and resolutions 43/53 of 6 December 1988, 44/207 of 22 December 1989, 45/212 of 21 December 1990 and 46/169 of 19 December 1991 on protection of global climate for present and future generations of mankind,

Recalling also the provisions of General Assembly resolution 44/206 of 22 December 1989 on the possible adverse effects of sea-level rise on islands and coastal areas, particularly low-lying coastal areas and the pertinent provisions of General Assembly resolution 44/172 of 19 December 1989 on the implementation of the Plan of Action to Combat Desertification,

Recalling further the Vienna Convention for the Protection of the Ozone Layer, 1985, and the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987, as adjusted and amended on 29 June 1990,

Noting the Ministerial Declaration of the Second World Climate Conference adopted on 7 November 1990,

Conscious of the valuable analytical work being conducted by many States on climate change and of the important contributions of the World Meteorological Organization, the United Nations Environment Programme and other organs, organizations and bodies of the United Nations system, as well as other international and intergovernmental bodies, to the exchange of results of scientific research and the coordination of research,

Recognizing that steps required to understand and address climate change will be environmentally, socially and economically most effective if they are based on relevant scientific, technical and economic considerations and continually re-evaluated in the light of new findings in these areas,

Recognizing that various actions to address climate change can be justified economically in their own right and can also help in solving other environmental problems,

Recognizing also the need for developed countries to take immediate action in a flexible manner on the basis of clear priorities, as a first step towards comprehensive response strategies at the global, national and, where agreed, regional levels that take into account all greenhouse gases, with due consideration of their relative contributions to the enhancement of the greenhouse effect,

Recognizing further that low-lying and other small island countries, countries with low-lying coastal, arid and semi-arid areas or areas liable to floods, drought and desertification, and developing countries with fragile mountainous ecosystems are particularly vulnerable to the adverse effects of climate change,

Recognizing the special difficulties of those countries, especially developing countries, whose economies are particularly dependent on fossil fuel production, use and exportation, as a consequence of action taken on limiting greenhouse gas emissions,

Affirming that responses to climate change should be coordinated with social and economic development in an integrated manner with a view to avoiding adverse impacts on the latter, taking into full account the legitimate priority needs of developing countries for the achievement of sustained economic growth and the eradication of poverty,

Recognizing that all countries, especially developing countries, need access to resources required to achieve sustainable social and economic development and that, in order for developing countries to progress towards that goal, their energy consumption will need to grow taking into account the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general, including through the application of new technologies on terms which make such an application economically and socially beneficial,

Determined to protect the climate system for present and future generations,

Have agreed as follows:

Article 1

DEFINITIONS*

For the purposes of this Convention:

1. "Adverse effects of climate change" means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.

2. "Climate change" means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

3. "Climate system" means the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions.

4. "Emissions" means the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time.

5. "Greenhouse gases" means those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.

6. "Regional economic integration organization" means an organization constituted by sovereign States of a given region which has competence in respect of matters governed by this Convention or its protocols and has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to the instruments concerned.

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* Titles of articles are included solely to assist the reader.

7. "Reservoir" means a component or components of the climate system where a greenhouse gas or a precursor of a greenhouse gas is stored.

8. "Sink" means any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.

9. "Source" means any process or activity which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere.

Article 2

OBJECTIVE

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Article 3

PRINCIPLES

In their actions to achieve the objective of the Convention and to implement its provisions, the Parties shall be guided, inter alia, by the following:

1. The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

2. The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration.

3. The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. 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 benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.

4. The Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change.

5. 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. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.

Article 4

COMMITMENTS

1. All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:

(a) Develop, periodically update, publish and make available to the Conference of the Parties, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties;

(b) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change;

(c) Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;

(d) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems;

(e) Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods;

(f) Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change;

(g) Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies;

(h) Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;

(i) Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations; and

(j) Communicate to the Conference of the Parties information related to implementation, in accordance with Article 12.

2. The developed country Parties and other Parties included in Annex I commit themselves specifically as provided for in the following:

(a) Each of these Parties shall adopt national[1] policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs. These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention, recognizing that the return by the end of the present decade to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol would contribute to such modification, and taking into account the differences in these Parties' starting points and approaches, economic structures and resource bases, the need to maintain strong and sustainable economic growth, available technologies and other individual circumstances, as well as the need for equitable and appropriate contributions by each of these Parties to the global effort regarding that objective. These Parties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention and, in particular, that of this subparagraph;

[1] This includes policies and measures adopted by regional economic integration organizations.

(b) In order to promote progress to this end, each of these Parties shall communicate, within six months of the entry into force of the Convention for it and periodically thereafter, and in accordance with Article 12, detailed information on its policies and measures referred to in subparagraph (a) above, as well as on its resulting projected anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for the period referred to in subparagraph (a), with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol. This information will be reviewed by the Conference of the Parties, at its first session and periodically thereafter, in accordance with Article 7;

(c) Calculations of emissions by sources and removals by sinks of greenhouse gases for the purposes of subparagraph (b) above should take into account the best available scientific knowledge, including of the effective capacity of sinks and the respective contributions of such gases to climate change. The Conference of the Parties shall consider and agree on methodologies for these calculations at its first session and review them regularly thereafter;

(d) The Conference of the Parties shall, at its first session, review the adequacy of subparagraphs (a) and (b) above. Such review shall be carried out in the light of the best available scientific information and assessment on climate change and its impacts, as well as relevant technical, social and economic information. Based on this review, the Conference of the Parties shall take appropriate action, which may include the adoption of amendments to the commitments in subparagraphs (a) and (b) above. The Conference of the Parties, at its first session, shall also take decisions regarding criteria for joint implementation as indicated in subparagraph (a) above. A second review of subparagraphs (a) and (b) shall take place not later than 31 December 1998, and thereafter at regular intervals determined by the Conference of the Parties, until the objective of the Convention is met;

(e) Each of these Parties shall:

(i) coordinate as appropriate with other such Parties, relevant economic and administrative instruments developed to achieve the objective of the Convention; and

(ii) identify and periodically review its own policies and practices which encourage activities that lead to greater levels of anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol than would otherwise occur;

(f) The Conference of the Parties shall review, not later than 31 December 1998, available information with a view to taking decisions regarding such amendments to the lists in Annexes I and II as may be appropriate, with the approval of the Party concerned;

(g) Any Party not included in Annex I may, in its instrument of ratification, acceptance, approval or accession, or at any time thereafter, notify the Depositary that it intends to be bound by subparagraphs (a) and (b) above. The Depositary shall inform the other signatories and Parties of any such notification.

3. The developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12, paragraph 1. They shall also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of implementing measures that are covered by paragraph 1 of this Article and that are agreed between a developing country Party and the international entity or entities referred to in Article 11, in accordance with that Article. The implementation of these commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among the developed country Parties.

4. The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.

5. The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.

6. In the implementation of their commitments under paragraph 2 above, a certain degree of flexibility shall be allowed by the Conference of the Parties to the Parties included in Annex I undergoing the process of transition to a market economy, in order to enhance the ability of these Parties to address climate change, including with regard to the historical level of anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol chosen as a reference.

7. The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties.

8. In the implementation of the commitments in this Article, the Parties shall give full consideration to what actions are necessary under the Convention, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the impact of the implementation of response measures, especially on:

(a) Small island countries;

(b) Countries with low-lying coastal areas;

(c) Countries with arid and semi-arid areas, forested areas and areas liable to forest decay;

(d) Countries with areas prone to natural disasters;

(e) Countries with areas liable to drought and desertification;

(f) Countries with areas of high urban atmospheric pollution;

(g) Countries with areas with fragile ecosystems, including mountainous ecosystems;

(h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products; and

(i) Landlocked and transit countries.

Further, the Conference of the Parties may take actions, as appropriate, with respect to this paragraph.

9. The Parties shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology.

10. The Parties shall, in accordance with Article 10, take into consideration in the implementation of the commitments of the Convention the situation of Parties, particularly developing country Parties, with economies that are vulnerable to the adverse effects of the implementation of measures to respond to climate change. This applies notably to Parties with economies that are highly dependent on income generated from the production, processing and export, and/or consumption of fossil fuels and associated energy-intensive products and/or the use of fossil fuels for which such Parties have serious difficulties in switching to alternatives.

Article 5

RESEARCH AND SYSTEMATIC OBSERVATION

In carrying out their commitments under Article 4, paragraph 1 (g), the Parties shall:

(a) Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;

(b) Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction; and

(c) Take into account the particular concerns and needs of developing countries and cooperate in improving their endogenous capacities and capabilities to participate in the efforts referred to in subparagraphs (a) and (b) above.

Article 6

EDUCATION, TRAINING AND PUBLIC AWARENESS

In carrying out their commitments under Article 4, paragraph 1 (i), the Parties shall:

(a) Promote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities:

(i) the development and implementation of educational and public awareness programmes on climate change and its effects;

(ii) public access to information on climate change and its effects;

(iii) public participation in addressing climate change and its effects and developing adequate responses; and

(iv) training of scientific, technical and managerial personnel;

(b) Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:

(i) the development and exchange of educational and public awareness material on climate change and its effects; and

(ii) the development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.

Article 7

CONFERENCE OF THE PARTIES

1. A Conference of the Parties is hereby established.

2. The Conference of the Parties, as the supreme body of this Convention, shall keep under regular review the implementation of the Convention and any related legal instruments that the Conference of the Parties may adopt, and shall make, within its mandate, the decisions necessary to promote the effective implementation of the Convention. To this end, it shall:

(a) Periodically examine the obligations of the Parties and the institutional arrangements under the Convention, in the light of the objective of the Convention, the experience gained in its implementation and the evolution of scientific and technological knowledge;

(b) Promote and facilitate the exchange of information on measures adopted by the Parties to address climate change and its effects, taking into account the differing circumstances, responsibilities and capabilities of the Parties and their respective commitments under the Convention;

(c) Facilitate, at the request of two or more Parties, the coordination of measures adopted by them to address climate change and its effects, taking into account the differing circumstances, responsibilities and capabilities of the Parties and their respective commitments under the Convention;

(d) Promote and guide, in accordance with the objective and provisions of the Convention, the development and periodic refinement of comparable methodologies, to be agreed on by the Conference of the Parties, inter alia, for preparing inventories of greenhouse gas emissions by sources and removals by sinks, and for evaluating the effectiveness of measures to limit the emissions and enhance the removals of these gases;

(e) Assess, on the basis of all information made available to it in accordance with the provisions of the Convention, the implementation of the Convention by the Parties, the overall effects of the measures taken pursuant to the Convention, in particular environmental, economic and social effects as well as their cumulative impacts and the extent to which progress towards the objective of the Convention is being achieved;

(f) Consider and adopt regular reports on the implementation of the Convention and ensure their publication;

(g) Make recommendations on any matters necessary for the implementation of the Convention;

(h) Seek to mobilize financial resources in accordance with Article 4, paragraphs 3, 4 and 5, and Article 11;

(i) Establish such subsidiary bodies as are deemed necessary for the implementation of the Convention;

(j) Review reports submitted by its subsidiary bodies and provide guidance to them;

(k) Agree upon and adopt, by consensus, rules of procedure and financial rules for itself and for any subsidiary bodies;

(l) Seek and utilize, where appropriate, the services and cooperation of, and information provided by, competent international organizations and intergovernmental and non-governmental bodies; and

(m) Exercise such other functions as are required for the achievement of the objective of the Convention as well as all other functions assigned to it under the Convention.

3. The Conference of the Parties shall, at its first session, adopt its own rules of procedure as well as those of the subsidiary bodies established by the Convention, which shall include decision-making procedures for matters not already covered by decision-making procedures stipulated in the Convention. Such procedures may include specified majorities required for the adoption of particular decisions.

4. The first session of the Conference of the Parties shall be convened by the interim secretariat referred to in Article 21 and shall take place not later than one year after the date of entry into force of the Convention. Thereafter, ordinary sessions of the Conference of the Parties shall be held every year unless otherwise decided by the Conference of the Parties.

5. Extraordinary sessions of the Conference of the Parties shall be held at such other times as may be deemed necessary by the Conference, or at the written request of any Party, provided that, within six months of the request being communicated to the Parties by the secretariat, it is supported by at least one third of the Parties.

6. The United Nations, its specialized agencies and the International Atomic Energy Agency, as well as any State member thereof or observers thereto not Party to the Convention, may be represented at sessions of the Conference of the Parties as observers. Any body or agency, whether national or international, governmental or non-governmental, which is qualified in matters covered by the Convention, and which has informed the secretariat of its wish to be represented at a session of the Conference of the Parties as an observer, may be so admitted unless at least one third of the Parties present object. The admission and participation of observers shall be subject to the rules of procedure adopted by the Conference of the Parties.

Article 8

SECRETARIAT

1. A secretariat is hereby established.

2. The functions of the secretariat shall be:

(a) To make arrangements for sessions of the Conference of the Parties and its subsidiary bodies established under the Convention and to provide them with services as required;

(b) To compile and transmit reports submitted to it;

(c) To facilitate assistance to the Parties, particularly developing country Parties, on request, in the compilation and communication of information required in accordance with the provisions of the Convention;

(d) To prepare reports on its activities and present them to the Conference of the Parties;

(e) To ensure the necessary coordination with the secretariats of other relevant international bodies;

(f) To enter, under the overall guidance of the Conference of the Parties, into such administrative and contractual arrangements as may be required for the effective discharge of its functions; and

(g) To perform the other secretariat functions specified in the Convention and in any of its protocols and such other functions as may be determined by the Conference of the Parties.

3. The Conference of the Parties, at its first session, shall designate a permanent secretariat and make arrangements for its functioning.

Article 9

SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE

1. A subsidiary body for scientific and technological advice is hereby established to provide the Conference of the Parties and, as appropriate, its other subsidiary bodies with timely information and advice on scientific and technological matters relating to the Convention. This body shall be open to participation by all Parties and shall be multidisciplinary. It shall comprise government representatives competent in the relevant field of expertise. It shall report regularly to the Conference of the Parties on all aspects of its work.

2. Under the guidance of the Conference of the Parties, and drawing upon existing competent international bodies, this body shall:

(a) Provide assessments of the state of scientific knowledge relating to climate change and its effects;

(b) Prepare scientific assessments on the effects of measures taken in the implementation of the Convention;

(c) Identify innovative, efficient and state-of-the-art technologies and know-how and advise on the ways and means of promoting development and/or transferring such technologies;

(d) Provide advice on scientific programmes, international cooperation in research and development related to climate change, as well as on ways and means of supporting endogenous capacity-building in developing countries; and

(e) Respond to scientific, technological and methodological questions that the Conference of the Parties and its subsidiary bodies may put to the body.

3. The functions and terms of reference of this body may be further elaborated by the Conference of the Parties.

Article 10

SUBSIDIARY BODY FOR IMPLEMENTATION

1. A subsidiary body for implementation is hereby established to assist the Conference of the Parties in the assessment and review of the effective implementation of the Convention. This body shall be open to participation by all Parties and comprise government representatives who are experts on matters related to climate change. It shall report regularly to the Conference of the Parties on all aspects of its work.

2. Under the guidance of the Conference of the Parties, this body shall:

(a) Consider the information communicated in accordance with Article 12, paragraph 1, to assess the overall aggregated effect of the steps taken by the Parties in the light of the latest scientific assessments concerning climate change;

(b) Consider the information communicated in accordance with Article 12, paragraph 2, in order to assist the Conference of the Parties in carrying out the reviews required by Article 4, paragraph 2 (d); and

(c) Assist the Conference of the Parties, as appropriate, in the preparation and implementation of its decisions.

Article 11

FINANCIAL MECHANISM

1. A mechanism for the provision of financial resources on a grant or concessional basis, including for the transfer of technology, is hereby defined. It shall function under the guidance of and be accountable to the Conference of the Parties, which shall decide on its policies, programme priorities and eligibility criteria related to this Convention. Its operation shall be entrusted to one or more existing international entities.

2. The financial mechanism shall have an equitable and balanced representation of all Parties within a transparent system of governance.

3. The Conference of the Parties and the entity or entities entrusted with the operation of the financial mechanism shall agree upon arrangements to give effect to the above paragraphs, which shall include the following:

(a) Modalities to ensure that the funded projects to address climate change are in conformity with the policies, programme priorities and eligibility criteria established by the Conference of the Parties;

(b) Modalities by which a particular funding decision may be reconsidered in light of these policies, programme priorities and eligibility criteria;

(c) Provision by the entity or entities of regular reports to the Conference of the Parties on its funding operations, which is consistent with the requirement for accountability set out in paragraph 1 above; and

(d) Determination in a predictable and identifiable manner of the amount of funding necessary and available for the implementation of this Convention and the conditions under which that amount shall be periodically reviewed.

4. The Conference of the Parties shall make arrangements to implement the above-mentioned provisions at its first session, reviewing and taking into account the interim arrangements referred to in Article 21, paragraph 3, and shall decide whether these interim arrangements shall be maintained. Within four years thereafter, the Conference of the Parties shall review the financial mechanism and take appropriate measures.

5. The developed country Parties may also provide and developing country Parties avail themselves of, financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels.

Article 12

COMMUNICATION OF INFORMATION RELATED TO IMPLEMENTATION

1. In accordance with Article 4, paragraph 1, each Party shall communicate to the Conference of the Parties, through the secretariat, the following elements of information:

(a) A national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be promoted and agreed upon by the Conference of the Parties;

(b) A general description of steps taken or envisaged by the Party to implement the Convention; and

(c) Any other information that the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends.

2. Each developed country Party and each other Party included in Annex I shall incorporate in its communication the following elements of information:

(a) A detailed description of the policies and measures that it has adopted to implement its commitment under Article 4, paragraphs 2 (a) and 2 (b); and

(b) A specific estimate of the effects that the policies and measures referred to in subparagraph (a) immediately above will have on anthropogenic emissions by its sources and removals by its sinks of greenhouse gases during the period referred to in Article 4, paragraph 2 (a).

3. In addition, each developed country Party and each other developed Party included in Annex II shall incorporate details of measures taken in accordance with Article 4, paragraphs 3, 4 and 5.

4. Developing country Parties may, on a voluntary basis, propose projects for financing, including specific technologies, materials, equipment, techniques or practices that would be needed to implement such projects, along with, if possible, an estimate of all incremental costs, of the reductions of emissions and increments of removals of greenhouse gases, as well as an estimate of the consequent benefits.

5. Each developed country Party and each other Party included in Annex I shall make its initial communication within six months of the entry into force of the Convention for that Party. Each Party not so listed shall make its initial communication within three years of the entry into force of the Convention for that Party, or of the availability of financial resources in accordance with Article 4, paragraph 3. Parties that are least developed countries may make their initial communication at their discretion. The frequency of subsequent communications by all Parties shall be determined by the Conference of the Parties, taking into account the differentiated timetable set by this paragraph.

6. Information communicated by Parties under this Article shall be transmitted by the secretariat as soon as possible to the Conference of the Parties and to any subsidiary bodies concerned. If necessary, the procedures for the communication of information may be further considered by the Conference of the Parties.

7. From its first session, the Conference of the Parties shall arrange for the provision to developing country Parties of technical and financial support, on request, in compiling and communicating information under this Article, as well as in identifying the technical and financial needs associated with proposed projects and response measures under Article 4. Such support may be provided by other Parties, by competent international organizations and by the secretariat, as appropriate.

8. Any group of Parties may, subject to guidelines adopted by the Conference of the Parties, and to prior notification to the Conference of the Parties, make a joint communication in fulfilment of their obligations under this Article, provided that such a communication includes information on the fulfilment by each of these Parties of its individual obligations under the Convention.

9. Information received by the secretariat that is designated by a Party as confidential, in accordance with criteria to be established by the Conference of the Parties, shall be aggregated by the secretariat to protect its confidentiality before being made available to any of the bodies involved in the communication and review of information.

10. Subject to paragraph 9 above, and without prejudice to the ability of any Party to make public its communication at any time, the secretariat shall make communications by Parties under this Article publicly available at the time they are submitted to the Conference of the Parties.

Article 13

RESOLUTION OF QUESTIONS REGARDING IMPLEMENTATION

The Conference of the Parties shall, at its first session, consider the establishment of a multilateral consultative process, available to Parties on their request, for the resolution of questions regarding the implementation of the Convention.

Article 14

SETTLEMENT OF DISPUTES

1. In the event of a dispute between any two or more Parties concerning the interpretation or application of the Convention, the Parties concerned shall seek a settlement of the dispute through negotiation or any other peaceful means of their own choice.

2. When ratifying, accepting, approving or acceding to the Convention, or at any time thereafter, a Party which is not a regional economic integration organization may declare in a written instrument submitted to the Depositary that, in respect of any dispute concerning the interpretation or application of the Convention, it recognizes as compulsory ipso facto and without special agreement, in relation to any Party accepting the same obligation:

(a) Submission of the dispute to the International Court of Justice; and/or

(b) Arbitration in accordance with procedures to be adopted by the Conference of the Parties as soon as practicable, in an annex on arbitration.

A Party which is a regional economic integration organization may make a declaration with like effect in relation to arbitration in accordance with the procedures referred to in subparagraph (b) above.

3. A declaration made under paragraph 2 above shall remain in force until it expires in accordance with its terms or until three months after written notice of its revocation has been deposited with the Depositary.

4. A new declaration, a notice of revocation or the expiry of a declaration shall not in any way affect proceedings pending before the International Court of Justice or the arbitral tribunal, unless the parties to the dispute otherwise agree.

5. Subject to the operation of paragraph 2 above, if after twelve months following notification by one Party to another that a dispute exists between them, the Parties concerned have not been able to settle their dispute through the means mentioned in paragraph 1 above, the dispute shall be submitted, at the request of any of the parties to the dispute, to conciliation.

6. A conciliation commission shall be created upon the request of one of the parties to the dispute. The commission shall be composed of an equal number of members appointed by each party concerned and a chairman chosen jointly by the members appointed by each party. The commission shall render a recommendatory award, which the parties shall consider in good faith.

7. Additional procedures relating to conciliation shall be adopted by the Conference of the Parties, as soon as practicable, in an annex on conciliation.

8. The provisions of this Article shall apply to any related legal instrument which the Conference of the Parties may adopt, unless the instrument provides otherwise.

Article 15

AMENDMENTS TO THE CONVENTION

1. Any Party may propose amendments to the Convention.

2. Amendments to the Convention shall be adopted at an ordinary session of the Conference of the Parties. The text of any proposed amendment to the Convention shall be communicated to the Parties by the secretariat at least six months before the meeting at which it is proposed for adoption. The secretariat shall also communicate proposed amendments to the signatories to the Convention and, for information, to the Depositary.

3. The Parties shall make every effort to reach agreement on any proposed amendment to the Convention by consensus. If all efforts at consensus have been exhausted, and no agreement reached, the amendment shall as a last resort be adopted by a three-fourths majority vote of the Parties present and voting at the meeting. The adopted amendment shall be communicated by the secretariat to the Depositary, who shall circulate it to all Parties for their acceptance.

4. Instruments of acceptance in respect of an amendment shall be deposited with the Depositary. An amendment adopted in accordance with paragraph 3 above shall enter into force for those Parties having accepted it on the ninetieth day after the date of receipt by the Depositary of an instrument of acceptance by at least three fourths of the Parties to the Convention.

5. The amendment shall enter into force for any other Party on the ninetieth day after the date on which that Party deposits with the Depositary its instrument of acceptance of the said amendment.

6. For the purposes of this Article, "Parties present and voting" means Parties present and casting an affirmative or negative vote.

Article 16

ADOPTION AND AMENDMENT OF ANNEXES TO THE CONVENTION

1. Annexes to the Convention shall form an integral part thereof and, unless otherwise expressly provided, a reference to the Convention constitutes at the same time a reference to any annexes thereto. Without prejudice to the provisions of Article 14, paragraphs 2 (b) and 7, such annexes shall be restricted to lists, forms and any other material of a descriptive nature that is of a scientific, technical, procedural or administrative character.

2. Annexes to the Convention shall be proposed and adopted in accordance with the procedure set forth in Article 15, paragraphs 2, 3 and 4.

3. An annex that has been adopted in accordance with paragraph 2 above shall enter into force for all Parties to the Convention six months after the date of the communication by the Depositary to such Parties of the adoption of the annex, except for those Parties that have notified the Depositary, in writing, within that period of their non-acceptance of the annex. The annex shall enter into force for Parties which withdraw their notification of non-acceptance on the ninetieth day after the date on which withdrawal of such notification has been received by the Depositary.

4. The proposal, adoption and entry into force of amendments to annexes to the Convention shall be subject to the same procedure as that for the proposal, adoption and entry into force of annexes to the Convention in accordance with paragraphs 2 and 3 above.

5. If the adoption of an annex or an amendment to an annex involves an amendment to the Convention, that annex or amendment to an annex shall not enter into force until such time as the amendment to the Convention enters into force.

Article 17

PROTOCOLS

1. The Conference of the Parties may, at any ordinary session, adopt protocols to the Convention.

2. The text of any proposed protocol shall be communicated to the Parties by the secretariat at least six months before such a session.

3. The requirements for the entry into force of any protocol shall be established by that instrument.

4. Only Parties to the Convention may be Parties to a protocol.

5. Decisions under any protocol shall be taken only by the Parties to the protocol concerned.

Article 18

RIGHT TO VOTE

1. Each Party to the Convention shall have one vote, except as provided for in paragraph 2 below.

2. Regional economic integration organizations, in matters within their competence, shall exercise their right to vote with a number of votes equal to the number of their member States that are Parties to the Convention. Such an organization shall not exercise its right to vote if any of its member States exercises its right, and vice versa.

Article 19

DEPOSITARY

The Secretary-General of the United Nations shall be the Depositary of the Convention and of protocols adopted in accordance with Article 17.

Article 20

SIGNATURE

This Convention shall be open for signature by States Members of the United Nations or of any of its specialized agencies or that are Parties to the Statute of the International Court of Justice and by regional economic integration organizations at Rio de Janeiro, during the United Nations Conference on Environment and Development, and thereafter at United Nations Headquarters in New York from 20 June 1992 to 19 June 1993.

Article 21

INTERIM ARRANGEMENTS

1. The secretariat functions referred to in Article 8 will be carried out on an interim basis by the secretariat established by the General Assembly of the United Nations in its resolution 45/212 of 21 December 1990, until the completion of the first session of the Conference of the Parties.

2. The head of the interim secretariat referred to in paragraph 1 above will cooperate closely with the Intergovernmental Panel on Climate Change to ensure that the Panel can respond to the need for objective scientific and technical advice. Other relevant scientific bodies could also be consulted.

3. The Global Environment Facility of the United Nations Development Programme, the United Nations Environment Programme and the International Bank for Reconstruction and Development shall be the international entity entrusted with the operation of the financial mechanism referred to in Article 11 on an interim basis. In this connection, the Global Environment Facility should be appropriately restructured and its membership made universal to enable it to fulfil the requirements of Article 11.

Article 22

RATIFICATION, ACCEPTANCE, APPROVAL OR ACCESSION

1. The Convention shall be subject to ratification, acceptance, approval or accession by States and by regional economic integration organizations. It shall be open for accession from the day after the date on which the Convention is closed for signature. Instruments of ratification, acceptance, approval or accession shall be deposited with the Depositary.

2. Any regional economic integration organization which becomes a Party to the Convention without any of its member States being a Party shall be bound by all the obligations under the Convention. In the case of such organizations, one or more of whose member States is a Party to the Convention, the organization and its member States shall decide on their respective responsibilities for the performance of their obligations under the Convention. In such cases, the organization and the member States shall not be entitled to exercise rights under the Convention concurrently.

3. In their instruments of ratification, acceptance, approval or accession, regional economic integration organizations shall declare the extent of their competence with respect to the matters governed by the Convention. These organizations shall also inform the Depositary, who shall in turn inform the Parties, of any substantial modification in the extent of their competence.

Article 23

ENTRY INTO FORCE

1. The Convention shall enter into force on the ninetieth day after the date of deposit of the fiftieth instrument of ratification, acceptance, approval or accession.

2. For each State or regional economic integration organization that ratifies, accepts or approves the Convention or accedes thereto after the deposit of the fiftieth instrument of ratification, acceptance, approval or accession, the Convention shall enter into force on the ninetieth day after the date of deposit by such State or regional economic integration organization of its instrument of ratification, acceptance, approval or accession.

3. For the purposes of paragraphs 1 and 2 above, any instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by States members of the organization.

Article 24

RESERVATIONS

No reservations may be made to the Convention.

Article 25

WITHDRAWAL

1. At any time after three years from the date on which the Convention has entered into force for a Party, that Party may withdraw from the Convention by giving written notification to the Depositary.

2. Any such withdrawal shall take effect upon expiry of one year from the date of receipt by the Depositary of the notification of withdrawal, or on such later date as may be specified in the notification of withdrawal.

3. Any Party that withdraws from the Convention shall be considered as also having withdrawn from any protocol to which it is a Party.

Article 26

AUTHENTIC TEXTS

The original of this Convention, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

IN WITNESS WHEREOF the undersigned, being duly authorized to that effect, have signed this Convention.

DONE at New York this ninth day of May one thousand nine hundred and ninety-two.

Annex I

Australia
Austria
Belarus[a]
Belgium
Bulgaria[a]
Canada
Croatia[a] *
Czech Republic[a] *
Denmark
European Economic Community
Estonia[a]
Finland
France
Germany
Greece
Hungary[a]
Iceland
Ireland
Italy
Japan
Latvia[a]
Liechtenstein*
Lithuania[a]
Luxembourg
Monaco*
Netherlands
New Zealand
Norway
Poland[a]
Portugal
Romania[a]
Russian Federation[a]
Slovakia[a] *
Slovenia[a] *
Spain
Sweden
Switzerland
Turkey
Ukraine[a]
United Kingdom of Great Britain and Northern Ireland
United States of America

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[a] Countries that are undergoing the process of transition to a market economy.

* *Publisher's note*: Countries added to Annex I by an amendment that entered into force on 13 August 1998, pursuant to decision 4/CP.3 adopted at COP.3.

Annex II

Australia
Austria
Belgium
Canada
Denmark
European Economic Community
Finland
France
Germany
Greece
Iceland
Ireland
Italy
Japan
Luxembourg
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom of Great Britain and Northern Ireland
United States of America

Publisher's note: Turkey was deleted from Annex II by an amendment that entered into force 28 June 2002, pursuant to decision 26/CP.7 adopted at COP.7.

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ANNEX - B

World Charter for Nature (1982) - UN GA RES 37/7

The General Assembly,

Reaffirming the fundamental purposes of the United Nations, in particular the maintenance of international peace and security, the development of friendly relations among nations and the achievement of international cooperation in solving international problems of an economic, social, cultural, technical, intellectual or humanitarian character,

Aware that:

1. Mankind is a part of nature and life depends on the uninterrupted functioning of natural systems which ensure the supply of energy and nutrients,
2. Civilization is rooted in nature, which has shaped human culture and influenced all artistic and scientific achievements, and living in harmony with nature gives man the best opportunities for the development of his creativity, and for rest and recreation,

Convinced that:

1. Every form of life is unique, warranting respect regardless of its worth to man, and, to accord other organisms such recognition, man must be guided by a moral code of action,
2. Man can alter nature and exhaust natural resources by his action or its consequences and, therefore, must fully recognize the urgency of maintaining the stability and quality of nature and of conserving natural resources,

Persuaded that:

1. Lasting benefits from nature depend upon the maintenance of essential ecological processes and life support systems, and upon the diversity of life forms, which are jeopardized through excessive exploitation and habitat destruction by man,
2. The degradation of natural systems owing to excessive consumption and misuse of natural resources, as well as to failure to establish an appropriate economic order among peoples and among States, leads to the breakdown of the economic, social and political framework of civilization,
3. Competition for scarce resources creates conflicts, whereas the conservation of nature and natural resources contributes to justice and the maintenance of peace and cannot be achieved until mankind learns to live in peace and to forsake war and armaments,

Reaffirming that man must acquire the knowledge to maintain and enhance his ability to use natural resources in a manner which ensures the preservation of the species and ecosystems for the benefit of present and future generations,

Firmly convinced of the need for appropriate measures, at the national and international, individual and collective, and private and public levels, to protect nature and promote international co-operation in this field,

Adopts, to these ends, the present World Charter for Nature, which proclaims the following principles of conservation by which all human conduct affecting nature is to be guided and judged.

I. GENERAL PRINCIPLES

1. Nature shall be respected and its essential processes shall not be impaired.
2. The genetic viability on the earth shall not be compromised; the population levels of all life forms, wild and domesticated, must be at least sufficient for their survival, and to this end necessary habitat shall be safeguarded.
3. All areas of the earth, both land and sea, shall be subject to these principles of conservation; special protection shall be given to unique areas, to representative samples of all the different types of ecosystems and to the habitat of rare or endangered species.
4. Ecosystems and organisms, as well as the land, marine and atmospheric resources that are utilized by man, shall be managed to achieve and maintain optimum sustainable productivity, but not in such a way as to endanger the integrity of those other ecosystems or species with which they coexist.
5. Nature shall be secured against degradation caused by warfare or other hostile activities.

II. FUNCTIONS

6. In the decision-making process it shall be recognized that man's needs can be met only by ensuring the proper functioning of natural systems and by respecting the principles set forth in the present Charter.

7. In the planning and implementation of social and economic development activities, due account shall be taken of the fact that the conservation of nature is an integral part of those activities.
8. In formulating long-term plans for economic development, population growth and the improvement of standards of living, due account shall be taken of the long-term capacity of natural systems to ensure the subsistence and settlement of the populations concerned, recognizing that this capacity may be enhanced through science and technology.
9. The allocation of areas of the earth to various uses shall be planned and due account shall be taken of the physical constraints, the biological productivity and diversity and the natural beauty of the areas concerned.
10. Natural resources shall not be wasted, but used with a restraint appropriate to the principles set forth in the present Charter, in accordance with the following rules:
    1. Living resources shall not be utilized in excess of their natural capacity for regeneration;
    2. The productivity of soils shall be maintained or enhanced through measures which safeguard their long-term fertility and the process of organic decomposition, and prevent erosion and all other forms of degradation;
    3. Resources, including water, which are not consumed as they are used shall be reused or recycled;
    4. Non-renewable resources which are consumed as they are used shall be exploited with restraint, taking into account their abundance, their rational possibilities of converting them for consumption, and the compatibility of their exploitation with the functioning of natural systems.
11. Activities which might have an impact on nature shall be controlled, and the best available technologies that minimize significant risks to nature or other adverse effects shall be used; in particular:
    1. Activities which are likely to cause irreversible damage to nature shall be avoided;
    2. Activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential damage to nature, and where potential adverse effects are not fully understood, the activities should not proceed;
    3. Activities which may disturb nature shall be preceded by assessment of their consequences, and environmental impact studies of development projects shall be

conducted sufficiently in advance, and if they are to be undertaken, such activities shall be planned and carried out so as to minimize potential adverse effects;

4. Agriculture, grazing, forestry and fisheries practices shall be adapted to the natural characteristics and constraints of given areas;
5. Areas degraded by human activities shall be rehabilitated for purposes in accord with their natural potential and compatible with the well-being of affected populations.

12. Discharge of pollutants into natural systems shall be avoided and:
    1. Where this is not feasible, such pollutants shall be treated at the source, using the best practicable means available;
    2. Special precautions shall be taken to prevent discharge of radioactive or toxic wastes.

13. Measures intended to prevent, control or limit natural disasters, infestations and diseases shall be specifically directed to the causes of these scourges and shall avoid averse side-effects on nature.

III. IMPLEMENTATION

14. The principles set forth in the present Charter shall be reflected in the law and practice of each State, as well as at the international level.
15. Knowledge of nature shall be broadly disseminated by all possible means, particularly by ecological education as an integral part of general education.
16. All planning shall include, among its essential elements, the formulation of strategies for the conservation of nature, the establishment of inventories of ecosystems and assessments of the effects on nature of proposed policies and activities; all of these elements shall be disclosed to the public by appropriate means in time to permit effective consultation and participation.
17. Funds, programmes and administrative structures necessary to achieve the objective of the conservation of nature shall be provided.
18. Constant efforts shall be made to increase knowledge of nature by scientific research and to disseminate such knowledge unimpeded by restrictions of any kind.
19. The status of natural processes, ecosystems and species shall be closely monitored to enable early detection of degradation or threat, ensure timely intervention and facilitate the evaluation of conservation policies and methods.
20. Military activities damaging to nature shall be avoided.

21. States and, to the extent they are able, other public authorities, international organizations, individuals, groups and corporations shall:
    1. Co-operate in the task of conserving nature through common activities and other relevant actions, including information exchange and consultations;
    2. Establish standards for products and other manufacturing processes that may have adverse effects on nature, as well as agreed methodologies for assessing these effects;
    3. Implement the applicable international legal provisions for the conservation of nature and the protection of the environment;
    4. Ensure that activities within their jurisdictions or control do not cause damage to the natural systems located within other States or in the areas beyond the limits of national jurisdiction;
    5. Safeguard and conserve nature in areas beyond national jurisdiction.
22. Taking fully into account the sovereignty of States over their natural resources, each State shall give effect to the provisions of the present Charter through its competent organs and in co-operation with other States.
23. All persons, in accordance with their national legislation, shall have the opportunity to participate, individually or with others, in the formulation of decisions of direct concern to their environment, and shall have access to means of redress when their environment has suffered damage or degradation.
24. Each person has a duty to act in accordance with the provisions of the present Charter, acting individually, in association with others or through participation in the political process, each person shall strive to ensure that the objectives and requirements of the present Charter are met.

Browsing Classification: Policy and Law: Mountain Policy Recommendations: Global: United Nations

Loi et Règlementation: Recommandation pour une règlementation Montagne

Políticas y Leyes: Recomendaciones sobre Políticas de Montaña

Citation: World Charter for Nature (1982).UN GA RES 37/7.

ANNEX - C

Country: Pakistan

		1990-92	1995-97	2000-02	2006-08	1990-92 to 1995-97 (%) annual change	1995-97 to 2000-02 (%) annual change	2000-02 to 2006-08 (%) annual change
I. FOOD DEPRIVATION AND CONSUMPTION INDICATORS								
Food Deprivation								
Proportion of undernourishment	percent	25	20	24	25	-4.3	3.6	0.5
Number of undernourished	millions	29.5	26.8	36.3	42.8	-2.0	6.1	2.8
Food deficit of undernourished population	kcal/person/day	280	260	280	280	-1.0	1.2	0.3
Food Needs								
Minimum dietary energy requirement (MDER)	kcal/person/day	1690	1700	1720	1740	0.2	0.2	0.2
Average dietary energy requirement (ADER)	kcal/person/day	2100	2120	2150	2190	0.2	0.3	0.2
Food Supply for Human Consumption								
Dietary energy supply (DES)	kcal/person/day	2210	2340	2270	2280	1.2	-0.6	0.0
Total protein consumption	g/person/day	55.8	60.1	58.6	57.4 *	1.5	-0.5	-0.4 *
Animal protein consumption	g/person/day	17.9	21.3	21.7	22.9 *	3.5	0.4	1.4 *
Fat consumption	g/person/day	55.7	62.6	63.2	67.4 *	2.3	0.2	1.3 *
Diet Composition (Share in DES):								
Carbohydrate	percent	67.1	65.6	64.7	62.9 *	-0.5	-0.3	-0.6 *
Total protein	percent	10.1	10.3	10.3	10.2 *	0.3	0.1	-0.2 *
Animal protein	percent	3.2	3.6	3.8	4.1 *	2.3	0.9	1.3 *
Fat	percent	22.7	24.1	25.0	26.9 *	1.2	0.8	1.5 *
Major food commodities consumed (share in DES) *								
1 - Flour of wheat	percent	44.9	41.5	39.7	36.7 *	-1.6	-0.9	-1.6 *
2 - Sugar, refined	percent	8.8	9.4	10.1	10.7 *	1.4	1.3	1.2 *
3 - Margarine and shortening	percent	6.4	6.8	6.5	7.3 *	1.0	-0.7	2.1 *
4 - Rice, milled	percent	6.1	5.9	6.1	6.1 *	-0.6	0.5	0.1 *
5 - Cow milk, whole (fresh)	percent	2.7	4.0	4.6	5.1 *	7.8	2.9	2.3 *
Share of cereals and roots & tubers in DES	percent	55.4	52.3	51.7	48.2 *	-1.1	-0.2	-1.4 *
Share of oils and fats in DES	percent	13.5	14.0	14.4	16.0 *	0.7	0.7	2.0 *
*ranked on the latest 3-year period								
II. FOOD PRODUCTION INDICATORS								
Role of production to consumption by major commodity**								
1 - Flour of wheat	percent	100.2	100.0	102.4	103.7 *	0.0	0.5	0.3 *
2 - Sugar, refined	percent	94.3	97.1	97.6	82.4 *	0.6	0.1	-3.4 *
3 - Margarine and shortening	percent	100.0	99.9	100.0	100.0 *	0.0	0.0	0.0 *
4 - Rice, milled	percent	192.9	219.3	202.8	229.7 *	2.6	-1.6	2.5 *
5 - Cow milk, whole (fresh)	percent	111.1	111.1	111.1	111.5 *	0.0	0.0	0.1 *
**ratio of production to consumption by major commodity								

Last update: October 2010

Country: Pakistan

		1990-92	1995-97	2000-02	2006-08	1990-92 to 1995-97 (%) annual change	1995-97 to 2000-02 (%) annual change	2000-02 to 2006-08 (%) annual change
III. FOOD TRADE INDICATORS								
Foreign Food Trade								
Exports								
Total merchandise	MLN US$	6051	8095	9393	18365	5.8	3.0	11.2
Share of food (1) in total merchandise value	percent	8.0	8.9	8.8	10.4	2.0	-0.2	2.7
Share in total DES production	percent	6.4	7.7	9.5	9.7	3.6	4.4	0.2
Imports								
Total merchandise	MLN US$	7964	11200	10906	34915	6.8	-0.5	19.4
Share of food (1) in total merchandise value	percent	11.7	14.7	9.7	7.9	4.6	-8.3	-3.5
Share in total DES production	percent	15.5	16.5	13.7	16.9	1.2	-3.8	4.2
Net food trade (Food exp.-Food imp.) in total GDP	percent	-1.0	-1.5	-0.3	-0.6	8.1	-31.1	10.1
Role of imports to consumption by major commodity***								
1 - Flour of wheat	percent	0.0	0.2	0.0	0.2 *		-163.9	162.4 *
2 - Sugar, refined	percent	11.7	7.5	11.9	20.7 *	-9.0	9.2	11.1 *
3 - Margarine and shortening	percent	0.0	0.1	0.0	0.0 *	153.7	-55.4	38.3 *
4 - Rice, milled	percent	0.0	0.0	0.4	0.1 *	60.9	49.6	-31.1 *
5 - Cow milk, whole (fresh)	percent	0.0	0.0	0.0	0.0 *			*
***ratio of imports to consumption by major commodity								
Food Aid Received								
Cereal aid shipments	1000 MT	292.9	72.0	114.3	na	-28.1	9.2	na
Share of food aid in total dietary energy supply (DES)	percent	1.8	0.3	1.0	na	-36.6	18.7	na
IV. MACRO AND SOCIO ECONOMIC INDICATORS								
Population								
Total population	1000	118770	133769	151669	173200	2.4	2.5	2.2
Density	Inh/sq Km	154	174	197	225	2.4	2.5	2.2
Share of urban in total population	percent	30.8	32.1	33.5	35.7	0.8	0.8	1.1
Age dependency ratio (per 100 persons aged 15-64)	ratio	89.2	87.3	79.9	71.2	-0.4	-1.8	-1.9
Macro economic aggregates								
GDP at market prices (constant 2000 US$)	MLN US$	53301	65260	75740	104545	4.0	3.0	5.4
Share of agriculture value added in total GDP	percent	26.0	26.1	24.5	20.4	0.1	-1.3	-3.0
Workers' remittances and compensation of employees, received (in total GDP)	percent	3.9	2.5	2.8	4.2	-8.6	2.0	6.6
Net official development assistance received (in total GDP)	percent	2.6	1.2	2.2	1.4	-15.0	11.3	-7.7
Foreign direct investment, net (BoP, current US$) (in total GDP)	percent	0.6	1.3	0.7	3.5	13.9	-13.2	27.6
Current account balance (in total GDP)	percent	-3.6	-5.1	2.6	-6.9	6.9		
Total reserves in months of imports	no. months	1.2	1.4	4.1	3.5	2.5	21.9	-2.7
Cash surplus/deficit (in total GDP)	percent	-4.6	-6.2	-3.6	-5.3	6.0	-11.1	6.6

		1990-92	1995-97	2000-02	2006-08	1990-92 to 1995-97 (%) annual change	1995-97 to 2000-02 (%) annual change	2000-02 to 2006-08 (%) annual change
Poverty (last year available) (%of population)								
National (Poverty headcount) - 2006	percent				22.3			
Rural (Poverty headcount) - 2006	percent				27.0			
Urban (Poverty headcount) - 2006	percent				13.1			
Inequality in Access to Food and to Income								
Gini of income - 2006	percent				32.7			
Gini of dietary energy consumption - 1988	percent				17.9			
Share of food in total expenditure - 2004	percent				47.6			
Consumer price index (Base=2000)	percent							
Consumer food price index (Base=2000)	percent	45.0	78.7	101.8	158.8	11.2	5.1	7.4
Literacy rate								
Adult female (% of females aged 15 and above) - 2008	percent				55.5			
Adult male (% of males aged 15 and above) - 2008	percent				68.9			
Adult both sexes (% of people aged 15 and above) - 2008	percent				40.1			
V. AGRICULTURE INDICATORS								
Agricultural inputs								
Total labour force	1000	40488	47053	55394	67516	3.0	3.3	3.3
Share of agricultural labour force (2) in total labour force	percent	39.8	36.2	35.5	36.0	-1.9	-0.4	0.2
Share of female in agricultural labour force	percent	18.3	19.8	22.7	27.8	1.5	2.7	3.4
Land								
Arable land & permanent crops	1000 HA	20986.7	21737	22127	21817	0.7	0.4	-0.2
Share of irrigated in total arable land	percent	78.3	80.7	81.2	89.8	1.3	0.5	1.4
Agricultural Production (1) - Major Items *								
1 - Buffalo milk	1000 MT	11267	14789	17462	20374	5.4	3.3	2.6
2 - Cow milk, whole (fresh)	1000 MT	3655	6455	8194	11135	11.4	4.8	5.1
3 - Wheat	1000 MT	14855	16853	19443	21843	2.5	2.9	1.9
4 - Rice, paddy	1000 MT	4810	6302	6582	8977	5.4	0.9	5.2
5 - Cotton lint	1000 MT							
Major Exports (1) (share in Agriculture) *								
1 - Rice, milled	percent	30.7	44.8	49.2	58.1	7.6	1.9	2.8
2 - Hydrogenated oils and fats	percent	0.0	0.0	1.6	4.7		91.4	18.2
3 - Flour of wheat	percent	0.0	0.0	3.4	3.8		129.1	2.0
4 - Cotton lint	percent	42.5	19.1	7.7	2.7	-16.0	-18.2	-17.3
5 - Crude organic materials NES	percent	5.2	6.4	4.5	2.6	4.0	-7.0	-9.1

Country Profile: Food Security Indicators

Country: Pakistan

		1990-92	1995-97	2000-02	2006-08	*1990-92 to 1995-97 (%)*	*1995-97 to 2000-02 (%)*	*2000-02 to 2006-08 (%)*
						annual change		
Major Imports (1) (share in Agriculture) *								
1 - Oil of palm	percent	19.0	31.4	20.5	24.8	10.0	-8.5	3.2
2 - Cotton lint	percent	0.3	7.5	9.7	17.4	64.2	5.2	9.7
3 - Rapeseed	percent	0.0	0.4	6.2	7.8		52.7	3.8
4 - Wheat	percent	22.4	20.5	4.6	7.6	-1.7	-30.1	8.6
5 - Sugar, refined	percent	7.3	3.6	6.7	7.2	-14.1	12.4	1.1
*ranked on the latest 3-year period								
Inputs								
Fertilizer use/Arable land	kg nutr./HA	na	na	137.5	163.6			2.9
Investments in agriculture								
Agricultural support estimate for OECD countries	US$ billion							
External assistance to agriculture	Const.US$/agric.worker	na	na	na	na	na	na	na
Agriculture, value added per worker	Const. 2000US$	764.7	893.1	894.4	895.5	3.1	0.0	0.0

Last update: October 2010

Country Profile: Food Security Indicators

Country: Pakistan

		1990-92	1995-97	2000-02	2006-08	1990-92 to 1995-97 (%) annual change	1995-97 to 2000-02 (%) annual change	2000-02 to 2006-08 (%) annual change
VI. HEALTH, NUTRITIONAL AND SANITATION INDICATORS								
Child Nutritional Status								
Stunting, less than - 2 s.d - 2001	percent				42.0			
Overweight, more than + 2 s.d - 2001	percent				4.8			
Adult Nutritional Status								
Underweight - both sexes - 1990-94	percent				31.2			
Underweight - males - 1990-94	percent				30.8			
Underweight - females - 1990-94	percent				31.6			
Obesity - both sexes - 1990-94	percent				3.4			
Obesity - males - 1990-94	percent				1.6			
Obesity - females - 1990-94	percent				5.2			
Health and Sanitation								
Life expectancy at birth - both sexes	years	61	62	63	65	0.4	0.3	0.3
Life expectancy at birth - males	years	60	62	63	64	0.4	0.3	0.3
Life expectancy at birth - females	years	62	63	64	65	0.4	0.3	0.3
Under-five mortality rate - 2009	per 1000 live births				87			
Infant mortality rate (0-1 year) - 2009	per 1000 live births				71			
Access to safe water - 2009	percent				70.5			
Access to adequate sanitation - 2008	percent				45.0			
Maternal mortality ratio - 2008	per 10^5 live births				260			

Notes: (1) Crops & livestock products; (2) Includes fishing, forestry & hunting; - =Proportion less than 5% of undernourished; na=data Not Available; ns=Not statistically Significant.

* Data refer to 2005-07 instead of 2006-08.

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ANNEX - D

GLASOD CLASSIFICATION OF SOIL DEGRADATION

Classifications

There is a great need for common classifications and methodology to organise existing data and to direct future efforts. In 1991, a first world map on the status of human-induced soil degradation was published by ISRIC, in co-operation with FAO and UNEP (Oldeman *et al*, 1991). In preparation of the map, a general classification was developed, referred to as the GLASOD (**Gl**obal **A**ssessment of **S**oil **D**eterioration) classification. In the Annex, the classification of type, severity and cause has been reproduced. Methodology for storing and processing data into maps is provided by SOTER (Global **so**ils and **ter**rain digital database) (Van Engelen *et al*, 1993).

GLASOD CLASSIFICATIONS (OLDEMAN, 1991)

Table A. Type of soil degradation

TYPE		
W	**Water erosion**	
Wt	Loss of topsoil	
Wd	Terrain deformation/mass movement	
Wo	Off-site effects	
	Wor	Reservoir sedimentation
	Wof	flooding
	Woc	Coral reef and seaweed destruction
E	**Wind erosion**	
Et	Loss of topsoil	
Ed	Terrain deformation	
Eo	Over-blowing	
C	**Chemical deterioration**	
Cn	Loss of nutrients or organic matter	
Cs	Salinisation	
Ca	Acidification	
Cp	Pollution	
Ct	Acid sulphate soils	
Ce	Eutrification	
P	**Physical deterioration**	
Pc	Compaction, sealing and crusting	
Pw	Water-logging	
Pa	Lowering of water table	
Ps	Subsidence of organic soils	
Po	Other physical activities such as mining and urbanisation	
B	**Degradation of biological activity**	

Table B. Degree of degradation

DEGREE OF DEGRADATION	
Light	Somewhat reduced agricultural productivity
Moderate	Greatly reduced agricultural productivity
Strong	Unreclaimable at the farm level
Extreme	Unreclaimable and impossible to restore

Note : Generalised degree of degradation as used for the World map. ISRIC (1988) gives separate classifications for water erosion, wind erosion, salinisation, and nutrient decline.

Table C. Causative factors in soil degradation

CAUSATIVE FACTORS	
f	Deforestation and removal of natural vegetation
g	Overgrazing
a	Agricultural activities
e	Overexploitation of vegetation fore domestic use
i	(Bio)industrial activities

DEFINITIONS OF GLASOD CLASSIFICATIONS

Types of soil degradation are represented in the database by a two-letter code, the first capital letter giving the major degradation type, the second lower case letter giving the subtype. In some cases a third *lower case* letter can be used for further specification (see examples below). Most of the following codes are the same as the ones used on the GLASOD map, but some extra ones have been added, and for others the definition has been changed slightly.

Wt *Definition:* loss of topsoil by sheet erosion/surface wash
Description: a decrease in depth of the topsoil layer (A horizon) due to more or less uniform removal of soil material by run-off water
Possible causes: inappropriate land management especially in agriculture (insufficient soil cover, unobstructed flow of run-off water, deteriorating soil structure) leading to excessive surface run-off and sediment transport
6 Assessment of soil degradation in South and Southeast Asia
Although erosion of upstream areas may lead to pollution (with pesticides etc.), this is considered as an 3 off-site effect of erosion rather than a type of pollution.

Wd *Definition:* "terrain deformation" by gully and/or rill erosion or mass movements
Description: an irregular displacement of soil material (by linear erosion or mass movements) causing clearly visible scars in the terrain
Possible causes: inappropriate land management in agriculture forestry or construction activities, allowing excessive amounts of run-off water to concentrate and flow unobstructed

Wo *Definition:* off-site effects of water erosion in up-stream areas
Description: Three subtypes may be distinguished: sedimentation of reservoirs and waterways (Wos), flooding (Wof), and pollution of water bodies with eroded sediments (Wop)
Possible causes: see Wt and Wd

Et *Definition:* loss of topsoil by wind action
Description: a decrease in depth of the topsoil layer (A horizon) due to more or less uniform removal of soil material by the wind
Possible causes: insufficient protection by vegetation (or otherwise) of the soil against the wind; insufficient soil moisture; destruction of soil structure

Ed *Definition:* "terrain deformation"
Description: an irregular displacement of soil material by wind action, causing deflation hollows, hummocks and dunes
Possible causes: as with Et

Eo *Definition:* off site effects of wind erosion
Description: covering of the terrain with wind borne soil particles from distant sources ("overblowing")
Possible causes: see Et and Ed

Cn *Definition:* Fertility decline and reduced organic matter content
Description: a net decrease of available nutrients and organic matter in the soil
Possible causes: a negative balance between output (through harvesting, burning, leaching, etc.) and input (through manure/fertilizers, returned crop residues, flooding) of nutrients and organic matter

Cp *Definition:* pollution
Description: a distinction is made between "contamination", indicating the mere presence of an alien substance in the soil without significant negative effects, and "pollution", signifying soil degradation as a consequence of location, concentration and adverse biological or toxic effects of a substance. In this context only the latter is relevant. Both local source pollution (waste dumps, spills, factory sites, etc. (Cpl)) and diffuse or airborne pollution (atmospheric deposition of acidifying compounds and/or heavy metals (Cpa)) are considered under this category.
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Possible causes: draining of soils containing pyrite which will produce very acid sulphate soils ("cat-clays" (Cta)). Planting of acidifying vegetation (e.g. fir) may also lower the soil pH (Ctf). NB acidification by airborne components is considered as pollution!

Ce *Definition:* Eutrophication
Description: An excess of certain soil nutrients, impairing plant growth
Possible causes: Imbalanced application of organic and chemical fertilizer resulting in excess Nitrogen, Phosphorus; liming.

Pc *Definition:* compaction
Description: deterioration of soil structure by trampling by cattle or the weight and/or frequent use of machinery
Possible causes: repeated use of heavy machinery, having a cumulative effect. Heavy grazing and overstocking may lead to compaction as well. Factors that influence compaction are ground pressure (by axle/wheel loads of the machinery used); frequency of the passage of heavy machinery; soil texture; soil moisture; climate.

Pk *Definition:* sealing and crusting
Description: clogging of pores with fine soil material and development of a thin impervious layer at the soil surface obstructing the infiltration of rainwater
Possible causes: poor soil cover, allowing a maximum "splash" effect of raindrops; destruction of soil structure and low organic matter.

Pw *Definition:* waterlogging
Description: effects of human induced hydromorphism (i.e. excluding paddy fields)
Possible causes: rising water table (e.g. due to construction of reservoirs/irrigation) and/or increased flooding caused by higher peakflows.

Ps *Definition:* lowering of the soil surface
Description: subsidence of organic soils, settling of soil
Possible causes: oxidation of peat and settling of soils in general due to lowering of the water table (see also Pa); solution of gypsum in the sub-soil (human-induced?) or lowering of soil surface due to extraction of gas or water

Pu *Definition:* loss of productive function
Description: soil (land) being taken out of production for non-bio-productive activities, but *not* the eventual "secondary" degrading effects of these activities.
Possible causes: urbanization and industrial activities; infrastructure; mining; quarrying,etc.

Pa *Definition:* aridification
Description: decrease of average soil moisture content
Possible causes: lowering of groundwater tables for agricultural purposes or drinking water extraction; decreased soil cover and reduced organic matter content

Sn Stable under natural conditions; i.e. (near) absence of human influence on soil stability, and largely undisturbed vegetation. NB: some of these areas may be very vulnerable to even small changes in conditions which may disturb the natural equilibrium.

Sh Stable under human influence; this influence may be passive, i.e. no special measures had or have to be taken to maintain stability, or active: measures have been taken to prevent or reverse degradation.

W "Wasteland": land without vegetation and with (near) absence of human influence on soil stability, e.g. deserts, high mountain zones. Natural soil degradation processes may occur!
Possible causes: bio-industrial sources, dumping, spillage 3

Cs *Definition:* salinisation/alkalinization
Description: a net increase of the salt content of the (top)soil leading to a productivity decline.
Possible causes: a distinction can be made between salinity problems due to intrusion of seawater (which may occur under all climate conditions: Css) and inland salinisation, caused by improper irrigation methods and/or evaporation of saline groundwater (Csi).

Ct *Definition:* Dystrification
Description: the lowering of soil pH through the process of mobilizing or increasing acidic compounds in the soil.