Chapter 1

INTRODUCTION
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*Water through Ages...*

"Whisky is for drinking, water is fighting over", Mark Twain;

"Water, Water Everywhere Not Any Drop to Drink", Samuel Taylor Coleridge;

"Jala Bihune Srusti Nasha, Jala Bahule Srustri Nasha" (Too much or too little water destroys the creation), an Oriya saying, India;

"We never know the worth of water till the well is dry", France;

"Water that has been begged for does not quench the thirst", Uganda;

"Every course of water has its source", Zulu, South Africa;

"Any water in the desert will do", Saudi Arabia;

"Don't spit in the well - you may need to drink from it!" Russia;

"All water flows into the ocean or into the purse of the rich", Denmark;

"You cannot turn blood into water", Albania.

All the above popular sayings, through the ages of human civilisation, give the importance of water for all living beings and termed it as ‘water is life’ (*Jal hi Jeevan*).\(^1\) The freshwater and human civilisations are inseparable twins. The archaeological evidences of artificial irrigation system, number of wells and embankments of water diversion for irrigation were found from the sites of Indus Civilisation. The existence of channel irrigation in the Vedic period is mentioned in the Vedic literature.\(^2\) During the Mauryan Empire canal irrigation and lift irrigation were practiced; dams and embankments were constructed, taxes were levied depending on the nature of irrigation (Rangarajan 1992: 232). From Ancient India to

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\(^1\) Popular sayings are used as proverb since time immemorial. They are part of every culture and society and are an important part of oral tradition. Water being indispensable for life, is a frequent subject of proverbs (UN 2003).

\(^2\) The *Kasyapiyakrishisukti* by Kashyapa (c. 700-800 AD) describes the means of producing certain crops, cattle management, soil properties, laying out gardens, means of irrigation, marketing, ways of support from the government, as well as mining, and even a personal code of conduct for farmers. The *Vrikshayurveda* (The Science of Plant Life) by Surapala was another text dealt with knowledge of raising orchards, seed management, selection of soil, ways of irrigation, finding groundwater, using fertilizers, dealing with plant diseases, and so on (Stephen Knapp).

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Medieval India, while irrigation received kings patronage, smaller water harvesting structures were also built and used by local people in India (Bagchi 1995: 113-112; Agrawal and Narain 1999: 20-35). Colonial India under the British rule witnessed massive expansion of irrigation work and large water infrastructures. However, these water related infrastructure faced some kind of resistances related to water intervention from people. In the northern part of India the Eastern Yamuna Canal irrigation systems, which caused disaffection, created swamped and saline tracks in villages in Karnal and Muzaffarnagar, contributed to the revolt of 1857-58 which also involved attacks on canal installations (Whitcombe 1982: 692). The Sarada Canal project generated resistance in Uttar Pradesh in the early Twentieth century. The Musli Dam on the Sahadri Hills near Pune, Maharasthra built by Tatas in the 1920s got resistance from the affected villages led by Senapati Bapat (Singh 1997: 51). The Damodar Canal Tax Movement occurred in the late 1930s in Bengal. During post-Independence period the awareness on water related issue and movement against large water infrastructure increased in 1980s with the advent of the Narmada Bachao Andolan (NBA).

Although, protecting nature and natural resources dates back to Ancient Greece, Ancient Egypt and Ancient India (Eckholm 1982: 3; Lyster 1985: xxi and Thapper 1963: 251-264), internationally the surge in concern about environmental quality has been uniquely widespread since early 1970s. The international ‘environmental concern’ has a long history and no sharp beginning. In part, it is the successor to the great voyages of discovery and exploration that made people aware of the shape of the world and the diversity of land and waters, rocks, vegetation, flora, fauna and

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3 The small traditional water harvesting structures such as Jhad, Khadin, Tanka, Kund and Rapats in Rajasthan; Pats in Madhya Pradesh; Guhl or Kuhl in Garhwal and Gata in Maharashtra; Himachal Pradesh; Ahar and Pynes in Bihar; Talaos, Jhils and Pukurs in West Bengal; Kaja, Bandha and Munda in Orissa; Arakere, Volagere, Katte, Kolla and Koldore in Karnataka; and Surangam in the Malabar region.

4 Greek philosopher lamented the destruction of soils and forests in ancient Greece (Eckholm 1982). Forestry conservation laws in Babylon date back to 1900 BC. Akhenton, king of Egypt set aside land as a nature reserve in 1370 BC (Lyster 1985). The earliest codified laws related to environment in India can be traced to the third century B.C. when king Ashoka made laws in the matter of preservation of wildlife and environment. In the Ist Major Rock Edict, Ashoka decreed that no living thing was to be sacrificed for festival (Thapper 1963).
cultures. Another of its roots is in international science, which gained strength during the 1960s and 1970s (UNEP 1982: 5-6).

Internationally, a conservation movement appeared in the last decade of the 19th and first decade of 20th century (The Library of Congress: US). Philanthropic institutions like the Moscow Society of Nature Investigators, the National Audubon Society, Wilderness Society of Sierra Club, the National Trust and the Societies like, Federation Francis des Societies de Protection de la Nature and its Germany, Netherlands, Swedish and Swiss counterparts emerged as the guardians of environment. But the widening of the ‘environment movement’ in the second half of the twentieth century brought three developments of major importance: the scientific and nature protection components grew together; appreciation of the environment grew in many countries outside Europe and North America and most important, the character of the approach changed from safeguarding certain grounds of prudence or aesthetics to precautionary approach to save the human life for future sustenance (UNEP 1982: 5).

These concerns were strengthened during the 1950s and 1960s by a number of demonstrations of the damage caused by the human activities – the air pollution episodes in London and New York between 1952 and 1966, the fatal instances of mercury poisoning at Minimata and Niigata between 1953 and 1965, the reductions in aquatic life in some of the North American Great Lakes, the deaths of birds caused by the unexpected side effects of dichloro-diphenyl-trichloro-ethane (DDT) and other organochlorine pesticides and the massive oil pollution from the wreck of the ‘Torrey Canyon’ in 1966. Representative of a much larger literature were Aldo Leopold’s Sand County Almanac (1949), Rachel Carson’s Silent Spring (1962), Stewart Udall’s The Quiet Crisis (1963), Jean Dorst’s Before Nature Dies (1965) and Rolf Edberg’s On the Shred of A Cloud (1966), Garret Hardin’s The Tragedy of the Commons (1969) and Club of Rome’s The Limits to Growth (1972) aroused both public and official apprehension (Caldwell 1990: 29) and galvanised individual countries and

5 The International Geophysical Year (IGY) of 1957 / 1958 demonstrated conclusively that world wide scientific problems could be tackled successfully in international cooperation. The IGY was also the direct inspiration of the ‘International Biological Programme’ (IBP), 1964-74, which had its central theme ‘biological productivity and human welfare’.

6 It was concerned with both the efficient management of natural resources and the preservation of natural habitats and historic monuments.
the international community into action. A series of catastrophes added fuel to the environmental concerns: Santa Barbara Oil Spill in 1969, the Three Mile Island incident in 1979, Chernobyl disaster in 1986 and Bhopal Gas tragedy in 1986 which had forced the decision makers to look into the environmental issues. However, during this period the issue of water got a very negligible focus.

**Environment and Global Concern**

The unexpected and accidental developments around the world had changed the perception, which established in 1972 United Nations Conference on Human Environment (UNCHE) at Stockholm, Sweden. At the Stockholm Conference, the environmental issues had been proposed, discussed and accepted for the first time as a global apprehension. Although both developed and developing countries approached Stockholm in different perspectives, the Conference was a beginning of a sense of shared stewardship for this common planetary home, i.e., ‘Only One Earth’ - the Conference slogan (UNEP 2000: 2). The Conference was however, a focus for, rather than the start of action on environmental problems (Caldwell 1990: 60). Besides establishment of United Nations Environment Programme (UNEP), the principal accomplishment of the Stockholm Conference was official recognition of the environment as a subject of general international concern.

The conservation movement in South Asia had started in India in the form of ‘Chipko Movement’ that broke out a year after the Stockholm. The decade of the 1970s was marked by a series of forest movements in different parts of the country. The conservation movement such as ‘Silent Valley’ and India’s formulation of several conservation initiatives such as Indian Wildlife (Protection) Act, Project Tiger, entry into international treaty and inserting wildlife provisions in the Constitution of India were the beginning phase of environmental concerns in India which can be termed as the beginning in South Asia as well (Mishra 1978: 10).

However, post-Stockholm period witnessed the ‘information explosion’ through various scientific journals, satellite installation, computer analysis, chemical analysis and so on. This exchange of information triggered the public opinion, which pressurized the respective governments to make sound environmental policies. In the
early 1970s there were only ten countries that had national environmental bodies, by the end of the decade there were hundred. India also set up its independent environment ministry, which is the nodal agency in the UNEP. The post Stockholm saw a burst of legislation dealing with environmental issues both in developing countries and developed countries around the world. The South Asian countries also enacted national laws to protect environment.

Ten years later from Stockholm, on 28 October 1982, the UN General Assembly adopted and solemnly proclaimed a ‘World Charter for Nature’. The Charter proclaims principle of conservation ‘by which all human conduct affecting nature is to be guided and judged’ and incorporates Stockholm principles. Since Stockholm Conference, two major works had been published for the conservation of natural resources and nature- World Conservation Strategy and Our Common Future. While the Strategy put the objectives, requirements and actions of conservation (IUCN 1980 and Caldwell 1990: 323), the World Commission on Environment and Development (WCED) known as Our Common Future established by United Nations General Assembly in 1983 to examine the environmental problems faced by the world (WCED 1987). The WCED emphasises ‘sustainable development’, guides nations that “Collective responsibility for the common heritage would not mean collective international rights to particular resources within nations... need to be supported by financial arrangements that would have the active banking of the community of nations” (WCED 1987: 9).

The Hague Declaration on Environment
In early 1989, the world leaders met to call for a new global decision-making body to protect the atmosphere. The Hague Declaration on Environment was signed by representative of twenty four countries at The Hague. India was among the signatory countries of the Declaration. As the global environmental problem increased manifold, the representatives accepted a mechanism at global level. The Representatives agreed to develop and strengthen institutions, undertake necessary studies, and to negotiate and to promote the effective implementation of and compliance with the decisions of the new institutional authority. The Heads of State and Government and their representatives, resolved to promote the development of
their initiative within the UN and in close coordination and collaboration with existing agencies set up under the UN. In its 85th Plenary, the General Assembly also took note of the Declaration on environment.

The Earth Summit
The United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro between 3rd and 14th June 1992, the biggest intergovernmental conference ever held till that date. On 22 December 1989, the General Assembly accepted the invitation from the Brazil to hold UNCED in 1992. The theme and focus of this Conference had already been set by the report of WCED or Bruntland Commission. The Rio Summit is often thought of simply as being the direct successor of the 1972 Stockholm Conference. But it was much more than that, certainly in terms of tangible results: two legally binding agreements were concluded at the Summit together with a detailed agenda for sustainable development in the twenty first century. However, the Rio Summit produced two legally binding conventions- on climate change and on biodiversity; two non-binding declaration- Declaration of Forest Principles and the Rio Declaration and Agenda 21.

A Literature Review of Environment and International Politics: Search for Codifying Water Security

Though there is no sharp beginning of the implantation of environment in international politics, it is commonly accepted that during the preparation of World Commission on Environment and Development (1983-87), the environmental issue already found a vent into the international politics. It is, therefore, pertinent to prescribe, search and review the conceptualization of water security in the present study context.

It is commonly perceived that after the end of the Cold War, disintegration of Soviet Union and addition of environmental issues to the ‘National Security Strategy of the United States in 1991’ (Global Security 1991),7 there are hardly any issue for the academic rigour and policy debates than environment (terrorism is another issue),

7 The 1991 National Security Strategy states: "We must manage the earth’s natural resources in ways which protect the potential for growth and opportunity for present and future generation...Global Environmental concerns respect no international boundaries."
which started grappling the foreign policy of the developed countries. The immediate surge due to scientific investigations and various field researches by the non-governmental organisations, although didn’t welcome so easily by the status quo, led to various discussion and harsh debate on the environment and international politics in the guise of ‘environmental security’, ‘ecological security’, ‘environment and conflict’ or ‘securitization of environment’ or ‘militarization of environment’, ‘ecological warfare’, ‘eco-terrorism’ or ‘environmental terrorism’; ‘eco-violence’; ‘resource war’ or ‘resource conflict’ and so on.

However, since late 1980s these academic debates have been unable to find a commonly accepted comprehensive definition for the concept, environment and security, backed by a prescribed theory. Despite this uncertainty, the foreign policy in multilateral environmental negotiations and the foreign aids to address the environmental issues have all been geared up with the introduction of new actors, methods and outcomes. Ironically, the debate and discussion to find a conceptual clarity has not corresponded to the international or national actions, which at best can be termed as inversely proportionate to the debate. There are nearly 50 international protocols, treaties and conventions related to environmental security, which have already been inked (American Council and UNU 2002). All these efforts to highlight the ever-pressing environmental problems are to make it high politics in the decision making, which culminated in the April 17, 2007 at the United Nations Security Council (UN 2007).

Environment and Security
To review the existing literature on environment and security is beyond the scope of this study due to the size of the literature. However, it is pertinent to focus on the major propositions of the concept for the understanding of the study of water security. The notion of environmental security conceived in a multitude of ways, represents an alternative paradigm for ordering and addressing threats in an increasingly interdependent and environmentally-degraded post-Cold War world. Despite increasing importance of environmental security, there is little coherence around the world about its definition, threats, and policy responsibilities.
Since the early 1990s, a great deal of research has tried to elaborate the understanding of the relationship between environment and security. This body of work can be simplified into four discernible but interconnected approaches. First is the Toronto School approach, which focuses on resource scarcity as a cause for insecurity and conflict (Homer-Dixon 1991). The Swiss Environment and Conflicts Project (ENCOP), which links environmental conflict, propose a second approach more directly to a society’s transition from subsistence to a market economy (Spillmann and Bachler 1995). A third approach, linked to the International Peace Research Institute in Oslo (PRIO) amongst others, suggests that violence in many developing countries occurs when different groups attempt to gain control of abundant resources (Graeger 1996). A fourth approach argues that environmental degradation is one of the many ‘network threats’ that the world faces such as climate change, epidemic disease or international terrorism.

However, the development of environment and security debate can be seen in three phases. The early phase can be termed as the introduction of the terms by the environmental researchers and experts to make it a high political issue (Brown 1977; Westing 1986: 25-38; Byres 1991; Holst 1989; Libiszewski 1992; Ulleman 1983; Mathews 1989 and Starr 1991). The second Phase is research and theory building in the context of international relations, which unnecessarily dragged the debate almost into void. A report on world security from the Rockefeller Brothers Fund asserts that even a general definition of security in the post-Cold War has ‘proven elusive despite massive efforts’ (Florini and Simmons 1998). The final phase is again taken over by the research findings by the scientific community under the inter-governmental institutions and seeks to find a working definition.

The narrowly defined security that is carried out by the traditionalists is closely tied to a state’s defence of sovereign interests by military means. Security is a rather vague term without a generally-agreed definition. Traditionally, it is seen as closely related to the threat or use of violence, and military means are regarded as central to the provision of security. However, the new surge of ‘ecological awareness’ has developed a range of innovative concepts refining and redefining security - by including social, economic, and environmental dimensions. These became known under headings such as ‘common security’, ‘comprehensive security’, and
'environmental security'. The proposed conceptions of security range from viewing environmental stress as an additional threat within the conflictual statist framework to placing environmental change at the centre of cooperative models of global security. Thus, the concept of security has advanced in three major dimensions: a) whether it assumes that security is based primarily on conflict or cooperation; b) the unit of analysis (individual, national, regional or global); and finally, the threats with which it is concerned (Porter 1995). The influential arguments have been advanced to redefine security by broadening the definition of national security to include resource, environmental and demographic issues (Mathews 1989).

The WCED states, "Environmental stress is both a cause and effect of political tension and military conflict. Nations have often fought to assert or resist control over raw materials, energy supplies, land, river basin, sea passages and other key environmental resources. Such conflicts are likely to increase as these resources become scarce and competition for them will increase" (WCED 1987: 290). The Commission called for an international cooperation to address the issue of environmental threat.

A number of analysts asserted that large scale human induced environmental pressures may seriously affect national and international security by establishing the causal linkage between environmental degradation and conflict (Homer-Dixon 1991; Brown 1989; Gleick 1989; Mathews 1989; Myers 1989; Renner 1989). Environmental threats are real, and the human ability to manipulate the global environment will cause international tension (Gleick 1991). The Toronto Group has attempted to identify links between environmental scarcity and acute conflict through studying cases from developing countries (Homer-Dixon 1991). The Groups postulated an initial conception of the links between environmental degradation and conflict as environmental change precipitating social change. This social change would be the cause of international conflict. Environmental change presented a possible but not necessary antecedent for acute conflict. Factors like, ethnicity, class, religious structures, and regime legitimacy also affect this causal relationship. This group

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8 These included the Brandt Commission on North-South issues (1980), the Palme Commission on disarmament and security (1982), the Brundtland Commission on Environment and Development (1987), and the Commission on Global Governance (1995). The Brandt Commission reports, North-South (1980) and Common Crisis (1983) offered the international community a forward-looking plan for balancing the creation of wealth with the provision of public goods and the preservation of the environment.
defines environmental scarcity as including three elements: qualitative or quantitative reduction in resources, population growth and unequal resource distribution. The investigation found evidence of environmental scarcity serving as an underlying yet strong cause of intrastate conflict. While the scarcities of environmental resources do not cause wars between countries, they do sometimes sharply aggravate stresses within countries, helping stimulate ethnic clashes, urban unrest and insurgencies (Homer-Dixon 1996).

As a departure from the traditional threat perception, which has been territorial centric, the environmental problems have some unmatched characteristics. First, environmental problems are transboundary that needs regional or international cooperation leaving behind unilateral solutions only. Secondly, the nature of territorial protection from perceived threat is within or outside of the sovereign nations in the form of ecological degradation. Third, the actors involved in addressing environmental threats are diffused ranging from NGOs both national and international, epistemic community to government and inter-governmental institutions. But, in traditional security, the participation is limited and only vested in the government agencies.

Critics of Environment and Security
The critics argued that the literature on ‘environmental security’ struggles with conceptual and methodological shortcomings (Graeger 1996). Some observers favour keeping a narrow definition of security focused on military threats. Experts strongly feel that widening the scope of security might undercut the ability to conduct traditional missions that counters explicitly military threats. The traditional security community feared to loose the state-centric security thereat and its state-centric solution albeit through military means. According to that traditional idea, the state would monopolize the rights and means to protect its citizens. State power and state security would be established and expanded to sustain order and peace. The opponent to the extension of security concept argued that the expanded view of security has at least four substantive and methodological flaws which include overstatement of realities outside the state, poor analytic utility and explanatory value, lack of
distinction between guns and butter, and confusion between liberal-idealistic advocacy and empirical analysis (Miller 2001).

Also, some environmentalists argue that positing environmental issues into the security ambit will only reinforce the state-centric agencies. Others oppose a redefinition of security but fully support the identification of environmental degradation as a major concern (Deudney 1990 and Dalby 1992). The causal links between environmental change and interstate conflict were being questioned and therefore challenged the utility of using traditional security responses for pressing environmental problems. First, it is analytically misleading to think of environmental degradation as a national security threat, because the traditional focus on national security and interstate violence has little in common with either environmental problems or solutions. Second, the effort to harness the emotive power of nationalism to help mobilize environmental awareness and action may prove counterproductive by undermining globalist political sensibility. And third, environmental degradation is not very likely to cause interstate wars. So, the group of sceptics typically concludes that national security thinking should not be appropriated for what is viewed as the necessary and critical effort to address environmental degradation (Deudney 1991; Dalby 1992 and Conca 1994).

The fundamental issue in the debates between those who wish to re-define security to incorporate environmental issues and many of those who are sceptical of such efforts is primarily a question of means to achieve environmental goals (Dabelko and Dabelko 1995: 3-13). However, the best possible understanding of the environmental security is that as the condition which exists when governments are able to mitigate the social and political impacts of environmental scarcity of resources, drawing on their own capabilities as well as the capabilities of inter-governmental organizations and non governmental organizations (Moss 1993: 27-36).

With the advent of more scientific research with policy options, the issue of environmental concern has entered into mainstream policy formulations. This all started with the Intergovernmental Panel on Climate Change (IPCC)'s Third Assessment Review (TAR) in 2001 (IPCC 2001) and Fourth Assessment Review (AR4) in 2007 (IPCC 2007), and Millennium Ecosystem Assessment Project with
various scientific research reports from high profile international institutions and last, but not the least including the climate change agenda in the UN Security Council in 2007. During this period, it is commonly accepted or used the term environmental security in various academic papers without the harsh feeling of 1990s.

Few countries have an official definition of environmental security that unifies thought and action. Among the countries that do have definitions are: the Russian Federation and the Commonwealth of Independent States (CIS); the US has several working definitions which include the Department of Defense Directive’s programmatic definition. While Argentina and India have already used an official definition as per the Millennium Project, it has not been mentioned anywhere. China, Australia, and Hungary are in the process of creating a definition as China considers environmental security under the umbrella of ‘environmental protection.’

The Millennium Project of the American Council for the United Nations University is a global participatory future research think tank of futurists, scholars, business planners, and policy makers who work for international organizations, governments, corporations, NGOs, and universities. The Millennium Project manages a coherent and cumulative process of defining environmental security. The elements of the definition clustered around two central concepts: Repairing damage to environment (a) for human life support and (b) for the moral value of the environment itself; and preventing damage to the environment from attacks and other forms of human abuse.\(^9\)

A high level panel appointed by the UN Secretary General found new challenges and threats to the world. The 16-member panel Report on Threats, Challenges and Change - “A More Secure World: Our Shared Responsibility” - contains 101 recommendations for dealing with the six areas identified by the Panel including ‘environmental degradation’ as being the greatest threats to worldwide security in the twenty-first century. The Report says, “Rarely are environmental concerns factored into security, development or humanitarian strategies. Nor is there coherence in environmental protection efforts at the global level. Most attempts to create governance structures to

\(^9\) Till now, there are 16 definitions of environmental security in the Millennium Project.
tackle the problems of global environmental degradation have not effectively addressed climate change, deforestation and desertification" (UN 2004: 44-45).

**Human Security and Human Development**

During the same period of discussion on environment security, another concept was also introduced as Human Security to broaden the ambit of traditional security concept. The phrase ‘human security’ surfaced occasionally in the first nine decades of the 20th century but only after its formulation in the UNDP’s Human Development Report (HDR) in 1994 and 1999 did it begin to penetrate academic and policy discourse (Capie and Evans 2002: 139-147). Like environmental security, there is no unanimously accepted definition of this concept. It is easy to explain the human security than prescribe a straightjacket definition. Ideas about what consists human security are as diverse as the proponents of the concept (Khosla 2003: 22-34). Much less a product of theoretical reflection than changing ground-level realities, its main advocates have until recently been politicians, diplomats and NGOs, not academics who have tended to be critical or dismissive (Evans 2003). The idea of ‘putting people first’ model of ‘development diplomacy’ has taken the centre stage in international policy goals. While traditionalist security studies and international relations scholars remain sceptical about the idea of human security, arguing that it is too vague and broad a concept to be useful either analytically or practically, decision makers increasingly recognize the importance of human security as a policy framework (Hadiwinata 2004).

The basic idea of human security can be summed up as ‘the absence of threat to human life, life styles and culture through the fulfilment of basic needs’, which was issued by the European Parliamentarians Conference on Human Security in Bonn in 1991. To supplement this call, in 1992, the UN Security Council issued a declaration recognizing that economic, social, humanitarian and ecological sources of instability have become threats to peace and security. However, an important step in the evolution of human security concept was taken in 1994 when the UNDP linked development and security by including it in its flagship annual report- Human Development Report (HDR). The Commission on Global Governance issued a report in 1995 called ‘Our Global Neighbourhood’, which stated, “global security must be
broadened from the traditional focus on the security of states to include the security of people and the security of the planet through cooperation' (Commission of Global Governance 1995).

Though human security revolves around the human centric development, there is no unanimously accepted definition of human security. There are several approaches to understand human security; the important are UNDP approach, Canadian School of approach, Japan, Norwegian and Copenhagen School. The Copenhagen School proposed five extended categories of security (military, environmental, economic, societal, and political security). This has enabled them to bring together traditional as well as non-traditional security issues.

**UNDP and Human Security**

Human security was defined by HDR (1994) as the summation of seven distinct dimensions of security including: (a) environmental security (degradation of air, water, soil, and forests); (b) food security (inadequacies in terms of food availabilities and food entitlements), (c) health security (infectious and parasitic diseases, new viruses, respiratory infections, and so on) (UNDP 1994). Human security is people centred while being tuned to two different aspects: first safety from such chronic threats as hunger, disease and repression. And second, it means protection from sudden and hurtful disruption in the patterns of daily life. It means 'freedom from want' and 'freedom from fear'. The Report seeks to deal with these concerns through a new paradigm of sustainable human development, capturing the potential peace dividend, a new form of development co-operation and a restructured system of global institutions. For the first time, the UNDP’s 2006 annual report makes an explicit link between water and the improvement of the human condition (UNDP 2006).

**Foreign Policy and Human Security**

The government of Canada has defined human security as safety for people from both violent and non-violent threats. It is a condition or state of being characterized by freedom from pervasive threats to people’s rights, their safety, or even their lives

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10 Other categories are (1) economic security (the threats to which include unemployment, insecure jobs, income inequalities, poverty, homelessness); (2) personal security (discrimination, exploitation, crimes, terrorism, and so on); (6) community security (ethnic and communal conflicts); and (7) political security (violation of human rights)
The Human Security Program of Canada's Department of Foreign Affairs and International Trade approach led by Canadian Consortium of Human Security (CCHS) which believes that human security is a people-centered approach to foreign policy that recognizes that lasting stability cannot be achieved until people are protected from violent threats to their rights, safety or lives. The Canadian approach on human security is based on five premises: a) protection of civilians, b) conflict prevention, c) peace operations, d) governance and accountability and public safety. However, the environmental issue has not been taken under these measures. As Canada's foreign office defines human security as the freedom from fear, but not freedom from want, which come under the purview of development.

Japan has made the concept into the focal point of its foreign policy. The Japanese approach is like UNDP approach as human security comprehensively covers all the menaces that threaten human survival like environmental degradation and strengthened efforts to confront these threats (Ministry of Foreign Affairs, Japan 1999). While the Japanese approach is in agreement with the UNDP approach by emphasizing on economic development, the Canadian approach is focusing on political development.

The Human Security Network (HSN), consisting of various foreign offices, commits to human rights and humanitarian law, which is the foundation for building human security. Promoting sustainable human development, through the alleviation of absolute poverty, providing basic social services for all, and pursuing the goals of people-centred development, is necessary for building human security.

When the idea of an independent Commission for Human Security (CHS) was launched at the 2000 UN Millennium Summit, there was general agreement on the importance of “freedom from want” and “freedom from fear”. In 2007, the fears are larger and the apprehensions are even greater. The Report on Commission for Human Security-Human Security Now - prescribes the human security concern with safeguarding and expanding people's vital freedoms (UN Commission for Human

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Security 2003: 1-19). It requires both shielding people from acute threats and empowering people to take charge of their own lives. There is a need of integrated policies that focus on people's survival, livelihood and dignity. According to the Report, human security complements state security, enhance human rights and strengthen human development.

The CHS defines human security as to protect the vital core of all human lives in ways that enhance human freedoms and human fulfilments. Human security means protecting fundamental freedoms—freedoms that are the essence of life. 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, livelihood and dignity.

Various Actors and Human Security

Although the primary referent of human security is the individual, the proponents of this new approach do not discount the importance of the state. With regard to the question of who is the principal provider of human security, it is often argued that the state bears the main responsibility to guarantee the security of its citizens. There are at least three explanations on why the state should take full responsibility in providing human security. First, the fact that state security and individual security are interrelated as the security of the individual depends amongst other things on the security of the state (Bajpai 2000: 35). If the state failed to maintain a minimum security, the security of all individuals within its boundaries is also threatened. Second, the attainment of human security for many different human collectivities covering the whole citizens will require governance with the capacity to produce coherent policies in sectors such as employment, education, health, social security, and so on (Colletta 2003: 17). Third, the fact that human security enters into the category of public goods (Hampson and Zacher 2003). Because public goods tend to be under-produced, it is therefore the state's principal obligation to ensure that every individual receives them.

12 'Public goods' are commonly accepted as goods that can be consumed by all actors or from which no actor can be excluded and whose cost is not increased by the addition of more consumers (Hampson and Zacher 2003).
However, the argument given for the state obligation to protect and provide human security has been strongly opposed by the NGOs, especially in water issues. The above discussion on environment and human security empowers this study to look into the water security, the main objective of the study. By introducing environment and human security, it is not only the state but various actors ranging from MDBs to the grassroot NGOs are involved in providing and protecting water resources for the needs of present and future generation.

Civil Society Views: Ecological Security or Environmental Security

While the environmental security literature deals at macro level of analysis as state is the unit of analysis, it is poorly equipped with analyzing at the micro level. The discernible gap is due to the approach of analysis by the North (western) and South at both policy level (Government) as well as at non-governmental organization level. Accepting the 2006 Nobel Peace Prize, laureate Muhammad Yunus said: “Poverty is a threat to peace. The frustrations, hostility and anger generated by abject poverty cannot sustain peace in any society” (Yunus 2006). Poverty has been identified as the causal link between environmental stress and conflict, leading to human insecurity (Najam 2003: 248 and 15-18). A recent study by the IUCN on rights to forest resources in India, Pakistan, Nepal and Bangladesh has found the clear link of rights to natural resources and its impact on the livelihood security (IUCN 2004). The grassroot NGOs in South especially in India are more intended to advocate or provide for ecological security to the livelihood of poor people who depends on natural resources. “Ecological security is life to a poor”, says Ranjan Panda, Convener, Water Initiative Orissa, Orissa. The conflict over resources is normally at two levels. Mostly in the larger context the resource conflict occurs between the people and power. To resolve this conflict it is imperative to provide ecological security and sovereignty to the poor (public) over natural resources. To endorse this point of argument of ecological security, the Indian government has announced historical National Rural Employment Guarantee (NREG) Act in 2005, where among types of programs it includes, the ecological regeneration programs like renovation of traditional water harvesting structure, preservation of soil moisture and rejuvenate forest resources for long time ecological security to the poorest in now 400 districts of India. Thus, the emergence of
new concepts such as ecological footprint, carbon footprint, water footprint/water development Index, progressive index and so on have redirected the focus on ecological need of human beings.

**Water Security: An Assessment**

The concept of ‘environmental security’ has moved beyond the causal relationship between environmental degradation and conflict to a more inclusive concept focusing on the intricate relationship between environment and society or environment and livelihood—‘human security’ or ‘ecological security’. As water ignores political boundaries, evades institutional classification, and eludes legal generalizations, water resources – their scarcity, distribution, and quality – have been an important issue to be addressed immediately. So far, the concept of security and water is restricted in terms of hydropolitics which talks about politics over shared water between riparian countries (Dinar 2000: 375-407). Also, most of the literature on water and security in international politics comes from western part of the world.

Water has been considered to be an essential ingredient for human survival and development throughout history. More than 2½ millennia ago, the Greek philosopher Thales of Miletus said, “Best of everything is water” (Quotations by Thales). Since then dramatic change has occurred but the fact still remains that human survival and well being continues to depend on water. Currently water resources are facing tremendous and ever-increasing pressures throughout the globe, particularly daunting to developing countries because the rates of population growth and urbanization both are high, and per capita water availability is already low. Global freshwater consumption increased six fold between 1900 and 1995 - more than twice the rate of population growth. About one third of the world's population already lives in countries considered to be ‘water stressed’ - that is, where consumption exceeds 10 percent of total supply. If present trends continue, two out of every three people on Earth will live in that condition by 2025 (Anan 2000).

Issues related to international waters are becoming increasingly apparent at, and indeed, intertwined with domestic uses and needs. And even, the global water crisis is likely to witness in the next 25 years far-ranging and far-reaching consequences of
several orders of magnitude higher and more complex than what have witnessed during the past 25 years (Biswas 2005). The fact that water is a scarce resource, characterized by its spatial and seasonal variations, with no substitute, and over which there is total dependency, has heightened both conflict and cooperation over a large number of international rivers. Water is being perceived as a strategic resource as well as a value commodity. It is being categorised as the ‘oil of the 21st century’ or ‘liquid gold’ or ‘blue gold’.

Status of Fresh Water

In the world of natural resources, the most sensational headlines are being dedicated to the scarcity of fresh water in all over the world. During the last decade media reports are being written in bold and loud in the lines of ‘water wars’ regarding water disputes between inter-state or intra-state and among the various stakeholders within the country. Such striking news has attracted attention of not only environmentalists and water mangers but researchers, hydrologists and international relation theorists regarding fresh water and politics over it- ‘hydropolitics’ (Alam 1998: 1).13 The conceptualization of ‘hydropolitics’ is being sought in the western literature mostly on the West Asia and Middle East situation, to deal with interaction of politics with the use and management of fresh water, at a national and international level. When the hydropolitics within intrastate spill over to neighbouring countries, it then becomes ‘hydro-diplomacy.’ However, in South Asia, the politics of water has been contested among the various actors including national, international, non-state entities on the issue of demand and supply, management, ownership and distribution.

Koichiro Matsura, Director General of UNESCO, best presents the various aspect of water as “Water is probably the only natural resource which touches every aspect of human civilisation – from agricultural and industrial development to cultural and religious values embedded in Society” (UNESCO 2006). The freshwater is finite but a scarce resource, primarily because it is usually in the wrong place or available at the wrong time relative to demand. The total amount of water on earth is approximately 1.4 billion cubic kilometres (Barlow and Clarke, 2004: 5). However, the world’s

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13 As such there is no exact definition that can be applied to the field, other than that it deals with the interaction of politics with the use and management of fresh water, at a national and international level throughout the world. Hydropolitics is largely concerned with the availability of fresh water for human use and consumption.
Freshwater systems are so degraded that its ability to support human, plant and animal life is greatly in peril (WRI 2000; UNEP 2002: 1; Gleick 1993: 3-12 and UN 1997). The fresh water is available in the Planet in the form of glaciers, ice caps, aquifers (ground water), rivers, wetlands, lakes, and reservoirs. Glaciers and icecaps cover about 10 percent of the world’s landmass and contain 70 percent of the world’s freshwater but mostly inaccessible. Groundwater represents over 90 percent of the world’s readily available freshwater resource as about 1.5 billion people depend upon groundwater for their drinking water supply. Most freshwater lakes are located at high altitudes, with nearly 50 percent of the world’s lakes in Canada alone. Many lakes, especially those in arid regions, become salty through evaporation, which concentrates the inflowing salts. Reservoirs are artificial lakes, produced by constructing physical barriers across flowing rivers, which allow the water to pool and be used for various purposes. The countries with least freshwater are Egypt and United Arab Emirates, and countries with most are Surinam and Iceland.

Map 1: Availability of Freshwater in 2000
(Average River flows and groundwater recharge)


Transboundary Water: Conflict or Cooperation

Besides ground water, the rivers are the major source of freshwater in the world. Glaciers generally feed the perennial rivers and precipitations and seasonal rivers depend only on precipitation. The total volume of water in the world’s rivers is
estimated at 2115 cubic km. Most of the major rivers in the world are transboundary disobeying the international boundary. From the hydrological perspective, there are 263 international rivers flowing across one or more international boundary.\footnote{An international river is one either flowing through the territory of two or more states (also referred to as a successive river), or one separating the territory of two states from one another, also referred to as a boundary river or a contiguous river (Garretson et al. 1967: 16-17). The use of the terms 'international river' and 'international waterway' has gradually, over the years, given way to the more appropriate and inclusive term 'international watercourse' (World Bank), and the definition has been expanded to include any tributary of such a river. In 1977 the UN reported that there were 214 river basins shared between two or more states. However, since then many countries got independent state for example in former USSR. The UNEP estimates that there are 263 international rivers (UNEP 2002). Peter H Gleick estimates that there are 261 international river basins shared by two or more countries (Gleick 2000: 219 and 220-238). This number increases to 268 (Hamner and Wolf 1998). The inconsistencies in the numbers of international rivers are due to adopting different methodology to categories the rivers.} This geographical compulsion fuels the fierce competition between the riparian countries to meet the demand to harness the waters for various human consumption or national need. Then, the water issue becomes the national issue to be dealt with the riparian country. Since water in unstable regions may be a catalyst for further instability and intense conflict, fostering negotiation and cooperation over water disputes between parties should become a priority (Dinar and Dinar 2000: 193). However, it is not only the unstable region which is also very subjective to the indicators of instability; the stable region also should cooperate on the sharing of water.

In fact, it is no small coincidence that the Latin word ‘rivalis’, from which the word rival comes, originally referred to a person living on the opposite bank of a river. Thus, the growing number of rivalries over international river water is among the signature features of geopolitics of the 21st century. International water disputes of varying intensity among countries between early 1980s and mid-1990s were on water diversion, flooding, siltation, salinisation, reduced water flow, water allocations and aquifer water rights, irrigation, water scarcity, dam, land inundation, pollution, industrial pollution etc. Legally speaking, the competing demands of states over the waters of the shared rivers have escalated into tensions and disputes due, in part, to the mistaken notion of absolute national sovereignty over natural resources, including shared water resources.

**Water War Hypothesis: Myth or Reality**

‘Water Wars’ are, unfortunately, likely to be of more and more common occurrence in the future (Young, et al. 1994: 20). The catchy-headlines of water war in several
media reports and research articles have been the object of numerous arguments and counter-arguments and much effort has been devoted either to proving or disproving the causality between water scarcity and wars. A featured article on preventing conflict in the next century (The Economist 2000: 52) argues that “water shortages will grow even more serious; ... with 3.5 billion people affected by water shortages by 2050, conditions are ripe for a century of water conflicts.” The ‘water war syndrome’ is capturing the moods as a ‘hegemonic’ concept (Trottier 2003).15 Interesting headings are dedicated to water and its causal linkages to war such as ‘dehydrating conflict’ (Postel & Wolf 2001), ‘hydro-paranoia’ (Hoffmann 1998), ‘water war’ (Starr 1988), ‘hydrological warfare’ (Watkins and Bernell 2006),16 ‘hydro-diplomacy, ‘hydro-solidarity’, ‘hydro-politics’, ‘troubled water’ and so on either to support or discard the hypothesis. Two distinct views are emerging out of this water war debate: one view is endorsed by the heads of international institutions and high level political leader supported by some environmentalists and environmental practitioners, which are being levelled as alarmist. Another view led by international theorists and academicians who out rightly rejected the theory. The possible argument is that as water is scarce, vital, expensive, a security issue, and demand is outstripping supply that states are expected to go to war with their competitors to secure supplies. One distinct feature of this hypothesis is that most of the literature has focused on the Middle East as the common perception of the Middle East is of a region that is fragile and temperamental, with little needed to trigger conflict (Benvenisti and Gvirtzman 1993; Caizzleigh 1983; Gleick 1993 and Beaumont 1994).17 Some even argued that the water war theory has been constructed and propagated in Israel and in the Palestinian Territories as a case study (Trottier 2002).

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15 The concept of hegemony was developed by Gramsci in order to explain how a state managed to assert its power over a population living in a given territory. Besides coercion as the State power, the other fundamental element of state power, and probably the most important one, is persuasion. Ideologically hegemonic conceptions provide stabilizing distortions and rationalizations of complex realities, inconsistent desires, and arbitrary distributions of valued resources. They are presumptions that exclude outcomes, options, or questions from public consideration; thus they advantage those elites well positioned to profit from prevailing cleavage patterns and issue definitions. Hegemonic concepts are not created in a vacuum. They emerge within a context where other hegemonic concepts have already taken hold and where other wars of position are being waged.

16 Hydrological warfare means, as the author says, rivers, lakes and aquifers become national security assets to be fought over, or controlled through proxy armies and client states.

17 Even the Six-Day War between Israel and its Arab neighbours in 1967, is often cited as an example of a modern day water war (Gleick 1993: 105-135). Another example cited is the invasion by Israel of Lebanon in 1982, and the subsequent annexation of southern Lebanon (Beaumont 1994).
Political Heads: Warning on Water War

In the late 1970s, Ethiopia’s wish to build dams on the headwaters of the Blue Nile led to a furious reaction from Egypt. “The only matter that could take Egypt to war again is water,” said Mohamed Anwar al-Sadat, the Egyptian president. Boutros Boutros-Ghali, the Egyptian diplomat who became UN secretary-general, said in 1988: “The next war in our region will be over the waters of the Nile, not politics.” In February 1992, at the opening of the Ataturk Dam, Turkey’s former President Suleyman Demirel said, “Neither Syria nor Iraq can lay claim to Turkey’s rivers any more than Ankara could claim their oil. This is a matter of sovereignty. We have a right to do anything we like. The water resources are Turkey’s…” (IRIN 2005).

Ismail Serageldin, the former World Bank vice president and presently heading Global Water Partnership, said in 1995, that “the wars of the next century will be about water” (Crossette 1995). “If current trends continue, we could be faced with a very grave situation,” said former Soviet Union President Mikhail Gorbachev, who is now president of the Green Cross International. In March 2001, even Kofi Annan was declaring “and if we are not careful, future wars are going to be about water and not about oil”. These statements of warning had sent one clear message that freshwater resources in the world had not been given the priority it supposed to receive. The UN Secretary General or the World Bank vice president’s statement was to take international action on freshwater, as the post-statement activities shown a massive investment in freshwater related issue from World Bank and a high priority agenda in UN’s activities. The statement, which has become the hypothesis of water war used in various literature and academic rigour, was not supposed to mean any war strategy or its military remedies.
Water: The Potential ‘casus belli’ for War

Despite the growing literature on water and conflict, there is little empirical work being done to strengthen any of the common conclusions being so widely reported. One school is taking a more cautious position by suggesting that, “competition for limited ... freshwater ...leads to severe political tensions and even to war” (Westing 1986: 85-113). Citing the Jordan and other water disputes, another school comes to the conclusion that “the renewable resource most likely to stimulate interstate resource war is river water” (Homer-Dixon 1994). The argument is toned down as disputes over water use do exist at an international level but they are more common at the national or local level. Another school is taking Jordan and Nile as examples, which describes water resources as military and political goals (Gleick 1993). While some argue that water as a cause of armed conflict by using case studies from the Middle East, South Asia, and South America as “well-known examples” and suggests that, “history is replete with examples of violent conflict over water” (Butts 1997).
There is even one school of thought, which is creating a framework to identify and evaluate international river basins at potential risk for future conflict; even they oppose the water war theory (Wolf, Yoffe and Giordano 2003).

In an effort to understand the connections between water resources, water systems, and international security and conflict, the Pacific Institute led by Peter H Gleick initiated a ‘Water Conflict Chronology’ project in the late 1980s to track and categorize events related to water and conflict. Presently the data base has been improvised after suggestions, recommendations and corrections, which include new categories on water and conflict. The current categories, or types of conflict, now include (Gleick 2006 and Gleick 1998):

- Control of Water Resources (state and non-state actors): where water supplies or access to water is at the root of tensions;
- Military Tool (state actors): where water resources, or water systems themselves, are used by a nation or state as a weapon during a military action;
- Political Tool (state and non-state actors): where water resources, or water systems themselves, are used by a nation, state, or non-state actor for a political goal;
- Terrorism (non-state actors): where water resources, or water systems, are either targets or tools of violence or coercion by non-state actors;
- Military Target (state actors): where water resource systems are targets of military actions by nations or states;
- Development Disputes (state and non-state actors): where water resources or water systems are a major source of contention and dispute in the context of economic and social development.

South Asia and Water: An Overview

South Asia region is facing the twin problem of too much and too little water. The source of freshwater comes from mostly beyond control of the countries as from the seasonal monsoon rainfall, glaciers placed in High Himalayas beyond the boundary

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18 By taking parameters of rapid change as indicators – internationalized basins and major planned projects in hostile and/or institution-less basins – authors have identified the basins with settings which suggest the potential for dispute in the coming five to ten years. These basins include the Ganges-Brahmaputra, Han, Incomati, Kunene, Kura-Araks, Lake Chad, La Plata, Lempa, Limpopo, Mekong, Ob (Ertis), Okavango, Orange, Salween, Senegal, Tumen, and Zambezi (Wolf, Yoffe and Giordano 2003).
and the ground water. In addition, the seasonal variations and climatic variability contributes to management challenges of freshwater. The average annual rainfall varies from country to country as well as within the country. While Pakistan as world’s most arid countries receives 240 millimetre (mm) annual rainfall, Bangladesh receives 2320 mm rainfall. Out of 5.1 million sq. km. land area of South Asia, the agricultural land is 54.4 percent in 2005. Nearly one billion people live in rural areas depending on agriculture. While the average GDP growth has doubled since 2000 from 4.3 percent to 8.7 percent in 2005, South Asia is home to 47 percent of the world’s poor living on less than $1 a day. As access to water is central to sustain the recent high economic growth and in reducing poverty, about 20 percent of South Asian population lacks access to water services (World Bank 2007). The South Asia has made excellent progress in providing water, but progress has been slower in providing sanitation (See Table-1). The improved sanitation facilities have gone up to 38 percent in 2005 from 21 percent in 1990 (WHO 2000). On the other hand access to water has increased from 64 percent in 1990 to 75 percent in 2005.

Freshwater is the ‘national asset’ for India or ‘important national resource’ for Nepal or ‘central to the way of life’ in Bangladesh and the single most important resource for the well-being of its people for Pakistan (GOI 1987; HMG Nepal 2002; GOB 1999 and Anon 2005). The most important and major source of freshwater in South Asia comes from annual precipitation and melting of glaciers through rivers from high Himalayan mountains. However, the major river systems originate from outside South Asia i.e., China’s Tibetan Autonomous Region (TAR).

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19 Access to improved sanitation facilities refers to the percentage of the population with at least adequate excreta disposal facilities (private or shared, but not public) that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection (WHO 2000).

20 Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometre of the dwelling.
### Table 1 Water Development Index (WDI): Water availability per person in South Asia

<table>
<thead>
<tr>
<th>World Rank</th>
<th>Country</th>
<th>Total internal renewable water resources (km$^3$/yr)</th>
<th>Groundwater produced internally (km$^3$/yr)</th>
<th>Surface water produced internally</th>
<th>Water resources total renewable (km$^3$/year)</th>
<th>Water resources total renewable per capita (km$^3$/capita yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Bhutan</td>
<td>95.00</td>
<td>NA</td>
<td>95.00</td>
<td>95.00</td>
<td>45,564</td>
</tr>
<tr>
<td>74</td>
<td>Nepal</td>
<td>198.20</td>
<td>20.00</td>
<td>198.20</td>
<td>210.20</td>
<td>9,122</td>
</tr>
<tr>
<td>76</td>
<td>Bangladesh</td>
<td>105.00</td>
<td>21.09</td>
<td>83.91</td>
<td>1,210.64</td>
<td>8,809</td>
</tr>
<tr>
<td>114</td>
<td>Pakistan</td>
<td>248.00</td>
<td>55.00</td>
<td>243.00</td>
<td>418.27</td>
<td>2,961</td>
</tr>
<tr>
<td>122</td>
<td>Sri Lanka</td>
<td>50.00</td>
<td>7.80</td>
<td>49.20</td>
<td>50.00</td>
<td>2642</td>
</tr>
<tr>
<td>133</td>
<td>India</td>
<td>1,260.54</td>
<td>418.54</td>
<td>1,222.00</td>
<td>1,896.66</td>
<td>1,880</td>
</tr>
<tr>
<td>175</td>
<td>Maldives</td>
<td>0.03</td>
<td>0.03</td>
<td>0.00</td>
<td>0.03</td>
<td>103</td>
</tr>
</tbody>
</table>


The natural topography in South Asia, especially the network of major river systems that doesn’t obey the political demarcation creates much friction between or among the countries for the sustainable utilization of resources. In fact, Indian sub continent, formed due to geophysical violence (plate tectonic), has later on disintegrated into number of independent countries through violence/war. In his Book, Defending India, former Indian Foreign and Finance Minister Jaswant Singh writes: “In respect of the Ganga, the difficulties with Farakka and Bangladesh are only illustrative....If in this kind dependence problems were to arise, what then would be the consequences to national security” (Singh 1999: 1).

**India:** India receives an annual precipitation of 4,000 billion cubic meter (bcm) of which 75 percent occurs just in the four months of the monsoon period (MoWR). Rainfall in India is erratic and uneven that ranges from 11,000 millimetres (mm) annually in some parts of North Eastern India to 100 mm in Western India. Out of 12 major and 48 medium river basins in India, the government predicts that by 2025 the deficit river basins will be Ganga, Subernarekha, Krishna, Mahi, Tapi, Cauvery, Pennar and Sabarmati (NWDA 2003). The surplus basins would be Brhamaputra, Barak, Narmada, Brahmani-Baitaran, Mahanadi, Godavari and Indus. The catchment area of the twelve major rivers is 252.8 million hectare (m ha); medium rivers is about
25 m ha and total water bodies including reservoirs; tanks and ponds; beels, oxbow lakes, derelict water; and brackish water covers area of about 7 m ha.

**Pakistan:** Pakistan is one of the world’s most arid countries, with an average rainfall of under 240 mm a year. The population and the economy are heavily dependent on an annual influx into the Indus river system (including the Indus, Jhelum, Chenab Ravi, Beas and Sutlej rivers) of about 180 bcm of water, mostly derived from snow-melt in the Himalayas. Pakistan is already one of the most water-stressed countries in the world, a situation which is going to degrade into outright water scarcity due to high population growth (UNEP 2000; World Bank 2005: 10). The per capita water availability will be near 1000 cubic metre by 2025 in Pakistan. However, due to spatial limitation, Pakistan has been depending on a single river system, unlike Nepal, India and Bangladesh.

There is abundant evidence of wide-scale degradation of the natural resource base in Pakistan. Salinity remains a major problem, approximately 15 million tons of salt are accumulating in the Indus Basin every year, and the ingress of saline water into over-pumped freshwater aquifers – remain a major threat to freshwater. Simultaneously, there is large-scale uncontrolled pollution of surface and groundwater from the increasing quantities of pesticides and fertilizers used in agriculture and by rapidly growing cities and industries. Now, although, there is clear evidence that groundwater is being over-exploited, yet tens of thousands of additional wells are being put into service every year. Flooding and drainage problems are going to get worse, especially in the lower Indus Basin.

The Pakistan federal government plays an important role in establishing the overall framework and guidelines for the provincial-level operation in the sector, and has made attempts at promoting better water allocation, planning and management. The most recent comprehensive statements on water are: National Water Policy (Ministry of Water and Power, 2003); Water Sector Strategy (Ministry of Water and Power, 2002) and Vision 2025 (Water and Power Development Authority, 2001).

**Bangladesh:** The most influential single natural phenomenon to have a deep impact on Bangladesh’s culture, economy and politics is its river system. Water is central to
the way of life in Bangladesh and the single-most important resource for the well-being of its people. It sustains an extremely fragile natural environment and provides livelihood for millions of people (GOB 1999). The water ecosystem comprises the tributaries and distributaries of three major river systems: the Ganges-Padma, the Brahmaputra-Jamuna, and the Meghna, and numerous perennial seasonal wetlands locally called haors, baors and beels. The three rivers systems drain a total catchment area of about 1.75 million square kms, of which eight percent lies within Bangladesh.

Water resources management in Bangladesh faces immense challenge for resolving many diverse problems and issues. The most critical of these are alternating flood and water scarcity during the dry seasons, ever-expanding water needs of a large population, growing economy, and massive river sedimentation and bank erosion.

Nepal: Approximately 6,000 rivers and rivulets, with a total drainage area of about 194,471 sq. km, flow through Nepal. Out of which 76 percent of this drainage area is within Nepal's territory. Surface water is estimated to occupy 2.7 percent of the country's area. Annual precipitations in the form of rain and snowfall are the sources of all waters in Nepal. Rivers, lakes, ponds and springs are the sources of surface water in Nepal. Groundwater sources are known to exist in most part of the country.

It is popularly recognized that water resources is one of the principal natural resources of Nepal. The annual average run-off of water is estimated at between 220-230 bcm. The per capita water availability exceeds 8,800 cubic meters, which does indicate the abundance of available water at the present time. But despite of this situation, only about 72 percent of the population has access to clean and potable water; only 25 percent of the population has basic sanitation facilities; only 500,000 ha of irrigable agricultural land out of existing 1.76 million ha, has round the year irrigation facilities (1.13 million ha of agricultural land has some form of irrigation facilities) and has 552 MW of installed hydropower capacity as against the potential of 83,000 MW hydropower, serving about 40 percent of the population.

Major River Basins in South Asia

Ganga Basin: Ganga Basin is a part of the composite Ganga-Brahmaputra-Meghna basin. The basin lies in China, Nepal, India and Bangladesh and drains an area of
The basin has a population of 356.8 million. The annual surface water potential of the basin has been assessed as 525.0 cu km. Out of this, 250.0 cu km is utilisable water. The arable area of the basin is about 58.0 m.ha, which is 29.5 percent of the total culturable area of the country. From just about 4.2 cubic km in the pre-plan period the live storage capacity in the basin has increased to 37.8 cu km. The hydropower potential of the basin has been assessed as 10,715 MW at 60 percent load factor.

**Brahmaputra-Barak Basin:** Brahmaputra Basin, a part of the composite Ganga-Brahmaputra - Meghna basin extends over an area of 5,80,000 sq. km (MoWR). The basin lies in Tibet (China), Bhutan, India and Bangladesh. In India it drains an area of 1,94,413 sq. km. in the states of Arunachal Pradesh, Assam, Nagaland, Meghalaya and West Bengal and Sikkim. The basin has a population of 29.1 million.

The Brahmaputra River known as the Tsangpo in Tibet, the Siang or Dihang in Arunachal Pradesh and the Jammu in Bangladesh is one of the largest rivers of the world. The 2880-km long Brahmaputra traverses its first 1,625 km in Tibet, the next 918 km in India and the remaining 337 km in Bangladesh. The average width of the Brahmaputra valley is about 86 km of which the river itself occupies 15-19 km. The river forms almost a trough receiving the flows of its tributaries both from north and south. Some of the important tributaries of the river in India are the Dibang, the Luhit, the Subansiri, the Manas, the Sankosh, the Teesta, the Dhansiri and the Champamati. The annual rainfall in the Indian portion of the basin varies from 100 cm to 400 cm, most of which occurs during the monsoon months of June to September.

The Barak basin lies in India, Myanmar and Bangladesh and drains an area of 41,723 sq. km in India (MoWR). The basin is bounded on the north by the Barail range, on the east by the Naga and Lushai hills and on the south and west by Bangladesh. In India the basin lies in the states of Meghalaya, Manipur, Mizoram, Assam, Tripura and Nagaland with a total population of 6.2 million. The major portion of the basin is in the hilly terrain with thick tropical vegetation and only small portion of it is in the plain area. An average annual surface water potential of 585.6 cu km has been assessed in this basin. Out of this, 24.0 cu km is utilisable water. The arable area of the
basin is about 13.04 m. ha, which is 7.1 percent of the total culturable area of the country.

Live storage capacity in the basin has increased significantly since independence. From just about 0.1 cu km in the Third-plan period, the total live storage capacity of the completed projects has increased to 1.1 cu km. The hydropower potential of the basin has been assessed as 33,054 MW at 60 percent load factor.

**Indus Basin:** From their origin in the Himalayan foothills, the aggregate mean annual flow of the Indus River and its tributaries is about 170 million acre feet (In India up to the international boundary, the average annual run-off availability is 73.31 cubic km per year) (MOWR). Most of the Indus Basin lies in Pakistan and India, with about 13 percent of the total catchments area of the basin situated in Tibet and Afghanistan. The total Indus Basin area is 1,081,718 sq. km. Within India, the Indus Basin lies in Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana and Rajasthan. Most of the basin in Pakistan lies in North-West Frontier Province (N.W.F.P), Punjab and Sindh. With predominantly agricultural, the strong 46 million people were lived in the basin in 1947. In 2003, the population around the Indus Basin was 178 million people (WRI 2003).

**Contextualisation of water war in South Asia**

The water related treaties or agreement between riparian countries in South Asia dates back to 1920. Since then several temporary agreements and three major bilateral water treaties have agreed upon. Although some may argue to corroborate war-like situation over water in several occasions in South Asia, but bilateral cooperation prevails over the difficult situations. After the Indian Parliament attack in 2001 Indian security analysts never hesitated to recommend for cutting off Indus water flow to Pakistan. While the sharing of international water treaties had been inked in South Asia between India and Nepal and India and Bangladesh, some new concepts as water conflict, environmental refugees, and environmental conflict and so on were introduced. Most

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21 According to pre-1947 political sub-divisions, the Indus Basin is India comprised the British Provinces of the Punjab, N.W.F.P and Sindh; the then princely states of Jammu and Kashmir, Patiala, Nabha, Faridkot, Jind Kapurthala, Bikaner, Bahawlpur, Jaisalmer, Khairpur, Bilashpur, Mandi, Chamba and several other small states in the Punjab hills, the North-West Frontier States and tribal areas, together with parts of the British Provinces of Baluchistan and of the Indian States of Jodhpur and Jaipur.
of the existing literatures on environmental conflict are profoundly influenced by the western literature. As the western literature infrequently mentioned the Ganges water stress between India and Bangladesh as the potential *casus belli* of water conflict, similarly the South Asian literature followed the same case as the example of conflicts (Gaan 1998; Gaan 2000; Gaan 2002; Swain 1993 and Swain 1996). Although the argument put forward by authors was not direct water war but the human induced environmental destruction by diverting Ganges water caused ethnic conflicts.

Some possible hypothesis on water war between upper riparian and lower riparian is being demonstrated. The wars over water between neighbours are likely only in a narrow set of circumstances: the lower riparian country must be highly dependent on the water for its national requirements; upper riparian must be able to restrict the river’s flow; there must be a history of antagonism between the two countries; and most important, the lower riparian must be much stronger militarily than the upper riparian country (Homer-Dixon 1996). To satisfy these criteria, very few international river basins exist as one of them is the Nile basins. As the lower riparian country Egypt is fully dependent on Nile water and militarily strong enough than the belligerent upper riparian neighbours-Sudan and Ethiopia. However after several verbal threats to go to war, Egypt has never gone to war rather involved in the Nile Basin Initiatives. Similarly, the Ganges and the Indus basin usually put to water war situation by several western thinkers. But, in all probability the possible of water war criteria does not satisfy to argue for a full scale war (See Table-2).

### Table-2: South Asia Water War: The Myth

<table>
<thead>
<tr>
<th>Country</th>
<th>Status (as Riparian)</th>
<th>Water Need (transboundary river)</th>
<th>Military Strength</th>
<th>History of animosity</th>
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<td>India</td>
<td>Lower/Upper</td>
<td>Mostly</td>
<td>Less powerful to China</td>
<td>Three war With Pakistan; One war with China</td>
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<td>and more powerful than Pakistan and Bangladesh, Nepal</td>
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<td>Pakistan</td>
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<td>Nepal</td>
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<td>Less Powerful to India</td>
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<td>China</td>
<td>Upper</td>
<td>Mostly</td>
<td>Powerful</td>
<td>One full scale war with India</td>
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Water as life line for dialogue

There are several problems with the approaches of causal relation between water and inter state conflict so far. First is usage of loose definitions of conflict, dispute, tensions and war embedded in the literatures. Second, most of the literatures exclude cooperative efforts which are being already entered or make prescriptions for innovative methods for cooperation. The variability of spatially diverse parameters such as population, climate, water availability, and national groups are either ignored or their significance is generalized. Even, the selected basins studies have failed to make general conclusions concerning international basins as a whole.

‘Water for peace’ school of thought emerged throughout the 1990s, denying the causality between water scarcity and international war. The leading advocates are ‘Oregon State University Transboundary Freshwater Dispute Database’, ‘Adelphi Research’, ‘University of Maryland Harrison Program on the Future Global Agenda’ and ‘Woodrow Wilson Centre’s Environmental Change and Security Project’. “When countries are in conflict over non-water issues, water can in fact serve as a lifeline for dialogue. Water is rarely the cause of major conflict between countries” (Worldwatch Institute 2005). In fact the history is against the water war hypothesis. The records of cooperation in international waters are more than incident of acute conflict. The history speaks that between the years 805 and 1984, countries signed more than 3,600 water-related treaties (Wolf 1998; Wolf 1995 and Wolf 1999: 251-265). An analysis of 1,831 international water related events over the past 50 years reveals that two thirds of these encounters of were of a cooperative nature.

The other argument advocated by the same school that states face water scarcity rationally and cooperate in order to solve these problems, simply because that is the most rational thing to do (Salman et al 1998: 127-154 and Libiszewski 1995). The UNESCO launched a PCCP program in 2000, “From Potential Conflict to Cooperation Potential,” in the hope of reversing the growth of the first school of thought and of persuading educators, decision makers, politicians, and diplomats that water generated cooperation much more frequently than war (UNESCO).
Where is the actual flashpoint of water conflict?
The competing needs from agriculture, industry, recreational users, domestic consumption and ecosystems have generated more acute intra-state conflict. While much of the water war literature served the purpose of inter-state war or not, it has ignored or less focused on the intra-state potential provider of water conflict among various users. The world is witnessing a spiral increase of numerous instances of such conflicts within countries especially in South Asia. The absence of proper democratic, legal and administrative mechanism to handle issues at the root of water conflicts has set the record straight of numerous water conflicts across every segment of society.

The anti water privatisation movement in Cochabamba, Bolivia was being categorised as the ‘civil war ’or water war by the Oscar Olivera and others. The Cochabamba case is not an extreme and isolated case as some believe (Postel and Wolf 2001). The movement against water privatisation around the world has been getting stronger day by day. In South Asia, the Delhi Jal Board privatisation, Coca-cola water ownership in Plachimeda (Kerala), privatisation of Seonath River in Chhattisgarh and more recently Kathmandu Water Supply privatisation cannot be isolated cases. The privatisation of water created fertile ground for social conflicts, which could not be handled by the State in a democratic way (Holland 2006).

Few examples of such water conflicts are mentioned above since 2000. In early 2005, Kikuyu and Maasai tribes fought over scarce water supplies in central Kenya, killing at least 14 people in two days of fighting. The fighting started when Maasai herders destroyed pipes used to pump water from a river into farms belonging to Kikuyu. A drought in previous year in Kenya dried up seasonal rivers important to cattle, goat and sheep herders, such as the Maasai. The drought also led to food shortages in parts of the country. On July 6, 2000, thousands of farmers in the Yellow River basin in China clashed with police over a government plan to relocate excess water from a local reservoir to cities and industries. In the same year, water disputes also occurred

22 Oscar Olivera who led the anti-water privatization struggle against Aguas del Tunari in now famous Cochabamba in Bolivia said that the 2000 protest was like a civil war (Holland 2006: 27). On April 8, strong 100000 people protested against the government’s bid to privatize the public water utility. The clash between police and military forces and people ended in one 17 year boy’s death and 100 people wounded.

23 A number of field visits to Kerala (India), Chhattisgarh (India), Nepal and Bangladesh and Personal communications with affected communities, campaigners, CSOs during 2003-2006 were executed.
between northern and southern provinces in Thailand, where the water level of the Chao Phraya River had markedly decreased.

Tensions have also simmered for years in the downstream areas of the Indus River, where Pakistan’s Punjab and Sind provinces fight over water use. In April 2001, desperate demonstrators shouting, ‘Give us water!’ clashed violently with police in Karachi. In Nepal, the Khumbuwan Liberation Front (KLF) blew up a hydroelectric powerhouse of 250 kilowatts in Bhojpur District in January 26, 2002 (Anon 2002). In late 2004, four people were killed and more than 30 injured during a protests by farmers over allocations of water from the Indira Gandhi Irrigation Canal in Sriganganagar district in India (Hindustan Times 2004). In 2006, at least 12 people died and over 20 were wounded in clashes over competition for water and pasture in the Somali border region (BBC News 2006). In late July 2006, a headline from one newspaper in Sri Lanka shouted, ‘Water War Has Begun!’ The government accused the Liberation Tigers of Tamil Eelam (LTTE) of shutting the Maavilaru sluice gate in northeast Sri Lanka. The Tigers defended themselves by saying they had closed the gate in protest over government delays in improving the water system in the region. In Orissa, India the State government’s plan for water diversion on Brahmin River to booming mining industry has been opposed by the environmentalists as well as farmers in a protest rally Kendrapara District in early 2006. On 6 November 2007, the farmers clashed with state police officials on the diversion of water for industrial use from Hirakud Reservoir in Orissa.

Although documentation of such type of conflict is going on in several parts of the world, it lacks a comprehensive analysis as some instances at micro-level which are not reported at all, are missing in the documentation. The Pacific Institute led by Peter H Gleick has been documenting the water conflict chronology around the world. In South Asia, the World Wide Fund India (WWF) with other 11 institutions has initiated documentation on water and conflict in India (Doraiswamy and Guja 2004). These

24 Field visit was made and met with officials and people in Kendrapara District in January 2006.
25 Personal communication with Engineer-in-Chief, Ministry of water resources (Government of Orissa), on November 10, 2007.
26 First of its kind in South Asia, the process brings together different types of water conflicts in India in all their complexity through an impressive sixty three case studies, summarized accounts of the conflicts written by grassroots-level workers, activists and organisations, illustrating the issues involved, and their current status (Joy et al 2007, and Pangare 2006).
conflicts, scale and nature, range over contending uses for water, issues of ensuring equity and allocation, water quality, problems of sand mining, dams and the displacement, transboundary conflicts, water privatisation, participatory irrigation in micro-levels conflicts are raging in India as well as in South Asia (Guja et al. 2006).

**Emerging multiple threats and challenges on Freshwater**

The international river basins which are the major source of water requirements for agriculture, industry and drinking water of the riparian country are facing multiple threats and challenges. Steep increase in population, consumption, and the desire for better living has placed a greater strain on the security of fresh water supply. As demand for water approaches the limit of the available supply, nations in shared river basins can fall into a zero-sum-game in which increasing the water supply to one user means taking some away from another (Postel 1997).

**A) Population Growth and Urbanisation**

Population growth has the dual implication of increased direct household consumption, and increased freshwater needs for irrigation to produce the additional food requirement. The UN estimates that up to 40 percent of the world’s population could live in water scarce regions. It is estimated that water use for human purposes has multiplied six-fold in the past 100 years (UN/WWAP 2003). These projections translate into doubling of global water consumption every 20 years, more than twice the rate of human population growth (WMO 1997: 9). In some areas, water withdrawals are so high, relative to supply that surface water supplies are literally shrinking and groundwater reserves are being depleted faster than they can be replenished by precipitation.

In addition to general population growth, the changing demographics are affecting how water resources are managed. According to UN Population Fund (UNPF) the urban population rose greatly throughout the Twentieth century and is projected to reach 58 percent of the world population by 2025 (UNPF 2004: 2-15). In the next thirty years, the greatest urban growth will occur in Asia. Among the consequences of this urban influx are the overloading of water supply and sanitation infrastructure—a situation made worse by the geographical location of some of these cities.
B) Access to Safe Drinking Water and Sanitation

The basic problem in the world is the failure to provide even the most basic water services for billions of people and the devastating human health problems associated with that failure. At present many developing countries have difficulty in supplying the minimum annual per capita water requirement of 1,700 cubic m of drinking water necessary for active and healthy life for their people. According to one of the most complete assessment on water sanitation and drinking by WHO revealed that 1.1 billion people around the world lacked access to ‘improved water supply’ and more than 2.4 billion lacked access to ‘improved sanitation’ (WHO/UNICEF 2000: vi). If no action is taken to address unmet basic human needs for water, as many as 135 million people will die from water related diseases by 2020 (Gleick 2002). After the announcement of MDGs in 2000, to meet this objective countries try to harness water from the international water as the ground water is fast depleting.

C) Agriculture Demand for Food Security

Water for agriculture is critical for food security. Most arid and semi-arid regions in the world, which are facing severe food insecurity, are trying to maximise their food production by irrigating more arable lands (Postel 1999). The total irrigated land in the world has increased from 138,832 thousand hectares in 1961 to 277,098 thousand hectares in 2003 (FAO 2006). Although irrigated area has continued to increase, it is now increasing at a rate slower than population. As a result, per capita irrigated area is declining. It has been estimated that Asian countries will need to increase rice production by 50 percent between 1997 and 2025 simply to keep pace with population growth (ADB 2005: 1). To meet this demand, rice production will need to grow by at least 1.5 percent per annum in the next two decades, but annual rice production growth in the region since 1997 has been only 1 percent. Water usage in the current rice production agriculture system is extremely high. It takes about 3,000 liters of water to produce 1 kilogram of rice. Irrigated non-agriculture areas, which provide 75 percent of total Asian rice production, consume 50 percent of all freshwater diversions.

The pressure is mounting on the river waters as the food insecurity is increasing. Although enough food is being produced to feed the world’s population, there are still some 840 million undernourished people in the world, 799 million of whom live in developing countries. One FAO estimate suggests that 80 percent of additional food
supplies required to feed the world will depend on irrigation and will to a large extent, use transboundary water resources (FAO 1996). Conflict is an ever-present risk and one of the most common causes of food insecurity. The displacement of people and the disruption of agricultural production and food distribution leave tens of millions of people at risk of hunger and famine. Conversely, food insecurity may lead to or exacerbate conflict. This situation led the World Food Summit in 1996 to set a goal of halving the number of hungry people by 2015 (FAO 2002). Though there have been several innovative technologies are being experimented like food grain trade from water rich region to water stress region, use of drip irrigation, drought proof grains and so on. While international institutions are engaging in those innovative technologies, the countries are looking for large diversion of river waters for the irrigation as to meet the food security.

**D) Industrial Use**

Industry claims a big chunk of the world’s fresh water supplies, at 20 to 25 percent, and its demands are dramatically increasing. Massive industrialisation process, mainly in developing countries, has offset the balance between the agricultural demands and other consumptive uses. According to United Nations Industrial Development Organisation (UNIDO), industrial activity is likely to consume twice as much as water by the year 2025. Between 1950 and 2000, world industrial water withdrawals climbed from 200 cu km per year to almost 800 cu km per year. This now represents around 20 percent of global water withdrawals (UNIDO 2007). In the fast growing economy like India and China, the Industry consumption of water is fast increasing.

**E) Climate Change and Vulnerability:**

After the release of Fourth Assessment Report of IPCC in 2007, there should be no disagreement on the impacts on climate change on the fresh water. The climate change is affecting the run off the river flow with unexpected precipitation and early melting of the glaciers—the major source of international waters. The problem involves are that the water is unavailable in the lean or dry season. The changing climate is profoundly affecting temporal and spatial distributions of surface water availability. The climate change actually accounts for about 20 percent of the global increase in water scarcity, the remaining 80 percent accounted for by population growth and economic development.
The number of people worldwide vulnerable to a devastating flood is expected to mushroom to 2 billion by 2050 due to climate change, deforestation, rising sea levels and population growth in flood-prone lands. One billion people – the majority of them among the world’s poorest inhabitants – are estimated to live today in the potential path of a 100-year flood and, unless preventative efforts are stepped up worldwide, that number could double or more in two generations. The drought prone areas and flood areas are increasing every year around the world due to climate change. Climate change is also likely to lead to increased magnitude and frequency of precipitation-related disasters – floods, droughts, mudslides, typhoons and cyclones.

Between 1991 and 2000 over 665,000 people died in 2,557 natural disasters, of which 90 percent were water-related events. The vast majority of victims (97 percent) were from developing countries (IFRC 2001). Growing concentrations of people and increased infrastructure in vulnerable areas such as coasts and floodplains and on marginal lands mean that more people are at risk. In South Asia, the floods have affected nearly 70 percent of population (NIDM).

F) Energy Security: Harnessing Hydropower

The climate change is become the double edge sword for the water stress region, mostly in developing world who shares international basins. With depleting major energy base like coal, securing independent energy source by minimizing the dependence on imported petroleum and natural gas, and sense of reducing greenhouse gases, countries are accelerating their effort to renewable energy through harnessing hydropower. Thus, there are several preliminary assessment of hydropower has been done around the world, mostly on the international water without any joint efforts. These will create a longstanding dispute between the riparian unless resolved at the early stage.

The hydropower is now disputed among the stakeholders as renewable or not. Large hydropower (dams) usually emits methane (one of the greenhouse gases) that contributes to climate change (IRN 2006, and Lima et al. 2007). However, the emission from dams varies from place to place; the debate on methane emission from
hydropower structures is being geared up especially in India and Brazil. Although India is depending on mostly on hydropower for its energy security till Fifteenth Five Year Plan after thermal power, the contested domain remains on the international rivers (Roul 2007).

G) Unilateral Initiatives:
The pressure on the international basins is becoming more acute when the riparian countries resort to unilateral measures to feed the demand of their respective countries. The water diversion from the depleted rivers in the form of barrages, hydropower structures and storage structures for irrigation, flood control and energy requirements have already put the strain on international rivers. The riparian disputes have been emerging from these unilateral actions as there is no institutional mechanism to address such issues.

H) Water Pollution
The river basins are threatened by pollution from both point and non-point, or diffuse, sources. Point sources include selected industries, municipal wastewater plants, and agriculture; diffuse sources also include agriculture (pesticides, fertiliser, sediment), paved surfaces (oil and other contaminants) and atmospheric sources (power plants, vehicle emissions, etc) (UNDP/GEF 2004: 7-9). The most frequent sources of pollution are human waste (with 2 million tons a day disposed of in watercourses. The quality of groundwater in industrialised countries has deteriorated due to nitrogen leaching from over-intensive agriculture (Figueroes et al. 2003: 71). The state of affairs in developing countries is even more pressing. Close to 75 percent of all industrial waste and 90-95 percent of sewage in the developing world is discharged into surface waters without any treatment (Hinrichsen et al. 1997). Levels of suspended solids in rivers in Asia have risen by a factor of four over the last three decades. Asian rivers also have a biological oxygen demand (BOD) some 1.4 times the global average, as well as three times as many bacteria from human waste as the global average. The UNIDO says the industrial pollution can be increased by four fold by 2025.

27 Personal Communication with Dr Peter Gleick of Pacific Institute on October 2, 2007.
28 The industrial sector such as Iron and steel, Textiles and leather, Pulp and paper, Petrochemicals and refineries, Non-ferrous metals, Micro-electronics, Mining and chemicals leave their pollutants like organic residues, oil, metals, acids, phenols, cyanide, suspended solids, sulphates, chromium, chlorinated organic compounds, mineral oils, phenols, heavy metals, fluorine, salts and so on.
I) Over-exploitation of Water or Depleted Rivers
In the high population growth regions, the overexploitation of major rivers is threatening the source of water. The Nile in Egypt, the Ganges and the Indus in South Asia, the Yellow River in China, and the Colorado River in the US are among the major rivers that are so dammed, diverted or over tapped that little or no fresh water reaches its destination for a significant time (Postel et al. 2001; Panos 2004; Eckholm 2003 and WWF/WRI 2006).

J) Downstream Impact and River Ecology
The natural flow of all the rivers around the world has been altered so much that to maintain it is now very difficult. The biodiversity rich river basins and wetlands are threatened by the pollution, agricultural expansion, over-exploitation of river water, dredging and channelisation, invasive species and so on. Excessive erosion and siltation of transboundary rivers can severely hamper the reproductive success river ecology and thus threatened the base of the aquatic food chain (UNDP/GEF 2004: 7-9). The case of downstream impact of Farakka Barrage in the Ganges have threatened the base of river ecology in Bangladesh, thereby threatened livelihoods of million fisher folk as well as the rich biodiversity of Sunderban mangroves.  

Attempts to define the Concept of Water Security
Water is essential for all socio-economic development and for maintaining healthy ecosystems. The increasing stress on freshwater resources brought about by ever rising demand and profligate use, as well as by growing pollution worldwide, is of serious concern. Mallin Falkenmark pioneered the idea of a ‘water stress’ threshold (Falkenmark 1989). The ratio of the quantity of renewable water within a state’s territory to that state’s population was held as an indicator of water scarcity. Water security was achieved if the state contained more than 10,000 cubic meters per capita. Water availability was deemed adequate if the state contained from 10,000 to 1,666 cubic meters per capita. States endowed with 1,000 to 1,666 cubic meters per capita were deemed to be water stressed. They were said to be chronically water stressed if they contained between 500 and 1,000 cubic meters per capita and to lie beyond the

29 Several Studies have already proved the downstream impact of Farakka Barrage on the Sundarban Mangroves as well as livelihoods of million Bangladeshis.
water barrier if they contained less than 500. This indicator of water stress was essentially based on an estimate of the quantity needed in agricultural production using irrigation.

The water scarcity refers to the ‘point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing institutional arrangements to the extent that the demand by all sectors, including the environment, cannot be satisfied fully' (UN 2006: 2). Water scarcity is a relative concept and can occur at any level of supply or demand. Scarcity may be a social construct (a product of affluence, expectations and customary behaviour) or the consequence of altered supply patterns stemming from climate change. However, scarcity often has its roots in water shortage, and it is in the arid and semi-arid regions affected by droughts and wide climate variability, combined with population growth and economic development, that the problems of water scarcity are most acute.

The issue of water security has arisen as byproduct of the growing interest in environmental security and human security as well as water stress and water scarcity. The concept has been in the realm of research and seminars. In the US, at least, that goes beyond protecting the state from external aggression to addressing environmental problems that threaten the health and well being of individuals or economic security of countries (EPA). The English dictionaries define security as freedom from danger, from fear or anxiety, from want or deprivation. Water security can be seen as freedom from fear related to water supply and society’s dependence on water for a whole set of different functions (Falkenmark 2000). Water security exists when the demand and access to water of human beings can be satisfied. Water security against hazards exists when environmental and societal vulnerability can be reduced and resilience enhanced.

According to the Global Water Partnership’s Framework for Action Report, water security is a common good. While defining the water and security, Jerome Delli Priscoli states that water stands out as one of our principle tools for preventive diplomacy and for building cultures of cooperation, if not peace (Priscoli 2000). As international rivers are the life blood of riparian countries, access to the water resources is the fundamental to the economic development of the country. Also to

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30 See, the Home Land Security Directives’ provisions 7, 8, 9, and 10, which are of particular relevance to water security issues.
meet the various demand of agriculture, industrial and other human consumption is very important.

Again, UNDP's 2006 HDR- 'Beyond Scarcity: Power, Poverty and the Global Water Crisis' makes explicit link between water and the improvement of the human condition. The Report argues that the world's water crisis is not a crisis of physical water availability but, rather, is entrenched in asymmetric power relations, poverty and related inequalities. The report gives several recommendations on water and sanitation as follows: water should be made a human right; governments should develop national strategies for improving the water and sanitation situation and the donor community should provide up front financial assistance to efforts aimed at improving the water and sanitation.

As competition among the water users at local, national and regional level increases with hampering external factors like variability and uncertainties of supply, national objectives are more and more pointed towards achieving water security. Water security is seen as an important aspect of national and regional security and international positions on water often have a political dimension that reflects broader national objectives (Appelgren and Klohn 1997). In these lines, the Australian Government has recently announced its 'Water Security Act 2001' to improve water efficiency and to address the over-allocation of water in rural Australia, particularly in the Murray-Darling Basin (Prime Minister Office 2007). The Water security is also linked to food security and energy security. While linking energy security to water security, the Institute for the Analysis of Global Security defines water security as 'the ability of state to access sufficient quantities of clean water to maintain adequate standards of food and goods production, sanitation and health' (Hoffman 2004).

Maude Barlow and Tony Clarke prescribe ten steps to achieve water security: water lifeline constitutions, water governance councils, national water protection Acts, opposing the commercial trade in water, challenging the lords of water, promoting the 'Water Commons Treaty Initiative', supporting a Global Water Convention, and so on.

31 On 25 January Australian Prime Minister announced the Commonwealth's $10 billion National Plan for Water Security. In the face of protracted drought and the prospect of long-term climate change, Australian Prime Minister announced a plan to improve water efficiency and to address the over-allocation of water in rural Australia, particularly in the Murray-Darling Basin.
(Barlow and Clarke 2003: 221-228). According to ‘Ministerial Declaration of The Hague on Water Security in the 21st Century’, the objectives of water security are meeting basic human need, securing food supply, protecting ecosystems, sharing water resources, managing risks, valuing water and governing water wisely to achieve the water security for all (World Water Council 2000).

In light of the above discussion, the water security can be defined as follows:

a) Securing and protecting access to fresh water resources for present and future generation (cooperation);

b) Providing basic water needs for various human consumption such as drinking and sanitation, agriculture and industry;

c) Preventing water related disasters to the human beings; and

d) Maintaining water ecology from degradation.

However, providing and maintaining water security is not only confined to the State agencies but includes various non-state actors and international institutions for their cooperation and implementation. To achieve these objectives of water security it is pertinent to negotiate with various stakeholders ranging from riparian countries and MDBs at the macro level to the community or people in the micro level.

**Negotiating Water Security: Options and Opportunities**

Negotiation over water resources has no accepted specific structure, process and outcome. It varies from river basin to basin in the world as well as in South Asia. The Indus Water Treaty of 1960 between India and Pakistan was negotiated and resolved through the third party mediation. Unlike Indus Water Treaty, the Mahakali Treaty of 1996 between India and Nepal and 1996 Ganges Water Sharing treaty between India and Bangladesh were agreed through bilateral negotiations. The negotiations over shared water resource reveals the complexity of talks as it relates to internal and external constraints-variables such as a riparian’s geographical position, domestic politics, military and economic power, unique interests and territorial integrity (Elhance 1999). However, the negotiation over water has always been on the allocation of water between states or among various water users. In order to resolve water conflicts, governments can potentially agree to follow certain rules specified in
the agreed document. For the last sixty years or so, international water law communities have put governing doctrines and guidelines for water apportionment forward. International water law, as with every facet of international law, is the product of decades of legal development. It is comprised of customs and principles, which have been interpreted and refined by scholars and national legislatures as well as by societal development. It is noteworthy that the principles cover a broad period of time in terms of international acceptance (Eckstein 1995).


- **Principle of Absolute Territorial Sovereignty (Harmon Doctrine)**

  The principle of absolute territorial sovereignty suggests that states have the right to unrestrained use of resources found within their territories, regardless of the transboundary consequences of such use. This principle is often equated with the Harmon Doctrine. Although not parallel, the two concepts are complementary, as the Harmon Doctrine asserts that in the absence of established law to the contrary, states are free to exploit resources within their jurisdiction without regard to the extraterritorial effects of such action.

- **Principle of Absolute Territorial Integrity**

  In sharp contrast to the principle of absolute territorial sovereignty, the principle of absolute territorial integrity provides that lower riparian states have the right to the

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32 The Helsinki Rules consists of guidelines for a ‘reasonable and equitable’ water allocation in international drainage basin. The Rule suggests vague criteria of water allocation but do not offer a concrete framework for basin-wide cooperation (Jest and Netanyahu 1998).

33 Some regards this principle as stemming from the historic paradigm that states, as sovereign nations, have unlimited control and jurisdiction over the entire physical territory of their domain. This principle attributes to a general aversion of states to accede to a negotiated compromise, or to the authority and decision of an international body for resolving disputes, over such important resources as water.

34 The Doctrine is named after former United States Attorney General Judson Harmon. In 1895, in response to a dispute between the United States and Mexico over the utilization of the Rio Grande, Attorney General Harmon declared that ‘the rules, principles, and precedents of international law impose no liability or obligations upon the United States.’
continuous or natural flow of a river flowing from upper riparian states. Essentially, the principle permits upper riparian to exploit the waters of a river so long as such utilization does not affect the interests of lower riparians. In effect, lower riparian states receive a veto power or a monopoly over the water rights of upper riparian states.

- Principle of the Obligation Not to Cause Appreciable Harm

Customary international law obligates states not to use, or allow the use of, their territory for acts contrary to the rights of other states. This principle receives wide recognition today as a general principle of international law. It is applied in numerous international treaties, declarations, and other international instruments. Moreover, international funding organizations, such as the World Bank, have indicated that they will not provide financial support for projects that are likely to cause appreciable harm to the territory of other states. When considering whether one state's action causes, or will cause, harm to the territory of another, a majority of international instruments and publicists suggest that the harm must be 'appreciable' or 'substantial' before international water law may be invoked.

- Principle of Reasonable and Equitable Utilisation

This principle is employing a cost-benefit analysis, which attempts to maximize the beneficial use of limited water resources while limiting the burdens. It is grounded on the principle where detrimental consequences are not ultimately prohibited but rather weighed against the benefits gained. Under this principle, each riparian state is entitled to a reasonable and equitable share in the beneficial uses of an international water resource. This principle is widely accepted as a general rule of customary international law and applies to groundwater resources.

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35 Declaration of the United Nations Conference on the Human Environment, June 16, 1972, Stockholm Declaration, providing in Principle 21 that states have the sovereign right to exploit resources within their territory only to the extent that such exploitation does not harm the environment of another state); Rio Declaration on Environment and Development, 1992, Principle 2 reads as follows: 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.
• **Principle of the Community of Interests**
  The community of interest theory goes a step beyond the principle of reasonable and equitable utilization in that it advances the goal of the most optimal use and development of a transboundary water resource system. Fundamentally, this theory seeks to achieve economic efficiency and the greatest beneficial use possible, though often at the cost of equitable distribution and benefit among the states sharing the resource. Furthermore, founded on the principles of ‘natural law,’ it ignores all national boundaries and regards the entire hydrologically connected water system as a single economic and geographic unit.

• **Principles of Prior Notice and Good Faith Negotiation**
  In considering the principles of no harm, reasonable and equitable utilization, and community of interests, states are further obliged to notify other states prior to embarking on efforts to exploit transboundary water resources. Furthermore, data and information must accompany the notification such that the notified state can objectively evaluate the project's potential effects. Thus, timely notification of exploitation projects, accompanied by sufficient technical information, is regarded as a recognized principle of international law.

**Characteristics of transboundary water resource negotiation**
While the problems in trans-boundary cooperation can be grouped into two broad categories of asymmetry and sovereignty, they can be usefully identified more explicitly according to the specific hurdles that hinder cooperation (Jest and Netanyahu 1998: 8-12; Dinar 2003: 4; Elhance 1999 and Elhance 2000: 201-222):

• **Asymmetry of Information:** The fundamental barrier to water negotiation arises from asymmetric information as riparian countries have differences in access to data and information. The riparian country uses the data it owns strategically for bargaining value. Also, the scientific gap between riparian countries creates uncertainty in negotiation process or outcome with respect to the availability of quality or quantity of water.
• Enforcement limitations: Successful water agreements need to be effectively monitored. However, monitoring has three major limitations: high cost, feasibility and sovereignty.

• Conflicting interests: Riparian countries by their asymmetric characteristics in population, agricultural land, and economic growth have always different perspective on harnessing international water resources. The differentiated approach always put constraints on a common negotiated outcome.

• Upstream/downstream Consideration: In the negotiation, the geographical location of the riparian plays a major role in determining the outcome. A country that controls the source of water can potentially hold a major position in the negotiation process.

• Although third party mediation (in financial aid or political support) is an important factor in negotiation, the outcome of successful water negotiations ultimately depends on the willingness and abilities of the concerned parties.

Micro-level Water Negotiators: Eligible for Present Day dispute resolution
After discussing the guidelines and salient characteristics of macro-level water negotiations, it is pertinent to understand the micro-level water negotiations. From generations, the villagers have been resolving the water demands by the village-appointed water mangers or neerkatti in Tamil Nadu, Karnataka and Andhra Pradesh managing traditional tanks, kollalus in Garhwal managing ghuls (traditional water channel); jagliyas or patkaris in Maharstra managing co-operative phad irrigation system and churpun in Ladakh managing irrigation in India (Mahapatra et al. 2003). Although this method is not prevalent today but normative until the 1950s in most of the South Indian states, can be found in Karnataka today. While the British first codified their work in Tamil Nadu, only the Karnataka government recognises this practice and usually allots the management of tanks bigger than 40 hectares to neerkattis (Anon 2000: 6).

36 Field visits were taken in 2003, 2005 and 2006 to Tamil Nadu, Utranchal and Andhra Pradesh to understand these traditional water managers.
A neerkatti’s (includes woman as well) role starts much before the onset of monsoon. The tank, being a common property, requires collective action to maintain it. Neerkattis decide the date on which residents help desilting the tank and clean the catchments. They size up the work required and divide up labour among the tank’s beneficiaries. With the first shower they take stock of the water available and so decide per capita allocation as well as the kind of crops to be taken. Thus farmers are thwarted from irrigating fields at their own will and the neerkatti ensures supply to every field on a rotational basis.

The role and functions of these water mangers differs from one another as their appointment. Some argues that these customary practices and unwritten codes of dispute resolution have to be validated into formal law, so that one can draw lessons from these to resolve intra-state water disputes in India (Richards and Singh 2001). However, some of the salient features of these water allocation methods for this study can be summed up as bellow:

a) First distributes water to fields farthest from the village tank as the lands located near the tank will get the benefits of tank seepage water. They even have the right to divert water to the dried fields by closing the diversion to all other fields.

b) They don’t enjoy political power in the village, but are given immense administrative power by the Gram Sabha, village community or framers committee, temporarily.

c) In general a neerkatti doesn’t own land in the command area of the village tank thus making them neutral to the job.

d) Besides managing irrigation and practical advice on crops, overall crop management like pest attacks and local remedies also forms a part of the mandate.

These traditional water mangers possess four principles that could be viable for resolving present day water conflicts. They are as follows: don’t allocate by volume of water but by time; plan the priority of local uses before embarking on water distribution; strong mechanism for equitable downstream and minority rights and alternative dispute resolution mechanisms for innovations.
The threat and challenges on world’s water needs to be addressed immediately. The attempts and initiatives have been there in the international stage as well as regional and local forum. Are they successful in resolving the ever increasing problem of water? How far the theoretical ambit of international politics accommodates to address the bilateral water disputes? The surge of global as well as regional water meetings has changed the style of addressing or resolving the world water problems and its related issues. Inclusion of new actors in the process has explored new frontiers to provide innovative platforms to resolve the water disputes. The following chapter (Chapter-2) discusses the dialogues on freshwater in the international forum especially in United Nations and its agencies. The chapter elaborates the various structure, process and outcomes of the dialogue, negotiations and resolutions on freshwater at the UN. An attempt has been initiated to evaluate all these processes focusing on talks on freshwater. The subsequent chapter (Chapter-3) deals with the dialogue on non-UN forums on freshwater. After 1992 Earth Summit, the water issue has been relegated to back burner. However, during mid-1990s the emergence of large water meetings have overshadowed the UN’s lukewarm efforts on freshwater. The triennial World Water Forum has become the parallel negotiated platform among various stakeholders to address and resolve the pressing water problem. This Chapter attempts to evaluate the structure and its outcome regarding freshwater.

Chapter-4 delves into specifically South Asian negotiations on water resource development. This section analyses major water treaties in the light of individual country’s position on water. The critical examination of the existing treaties tries to propose the future negotiation style and strategy in the South Asia. The Chapter also attempts to examine various spheres of negotiations on cooperative arrangement to harness the common international river water. The challenges and constraints so far on negotiation on water has been carefully marked and an attempt has been made to overcome these constraints in future.

The concluding chapter briefly restate the constraints and challenges on negotiation on water at the international forum as well as regional level. This chapter summarises the major findings of this research.