Journal of Political Studies, Vol. 21, Issue - 1, 2014, 259:280

Water Scarcity in South Asia: A Potential Conflict of Future Decades

Iram Khalid; Asia Mukhtar & Zanib Ahmed*

Abstract

The issue of water has a central position in world politics. The flow of trans-boundary water makes it relevant for more than one state. Rapid increase in world population, industrialization, urbanization and scarcity of fresh water resources has put immense pressure on water resources, both surface and ground water. South Asia is the part of world inhabiting about one quarter of global population and presenting to the world most volatile conflicts. Interstate hydro politics is today one of the most important issues on states' agenda. The partition plan of India and Pakistan sowed the seed of this conflict. The other states of South Asia i-e, Bangladesh, Bhutan, Nepal are also in a constant rift with India over water. This paper tries to explore the causes of this conflict, the intensity which water scarcity has assumed and its implications for regional relations. The research has suggested water governance as a solution to this issue on part of all states for internal management of water resources.

Key word: Water governance, scarcity, hydro politics, security, conflict

Introduction

The water crisis of South Asia is owing to its water scarcity. The region is abode to one-quarter population of world. But the available fresh water resources are not ample to meet the need of such huge population. The fresh water available for human use is only 0.75% of total water on Earth. The fresh water's major source is rivers. The rivers are shared by many states and about 260 major river basins are shared by two or more states (Committee on Foreign Relations, 2011, p. 9).The South Asian region is under immense pressure owing to scarce water supply. Rapid increase in population, urbanization, industrialization and lack of water resources management has posed the region with a daunting situation of water scarcity. According to an estimate, by 2030, 60% of world population will be left with fresh water supply (John, 2011, p. 1). The region of South Asia has been declared as water scarce. The population has increased rapidly and now it is inhabited by about

*Authors are Professor of Political Science; Ph.D. Scholar & M.Phil Student of Department of Political Science, University of the Punjab, Lahore – Pakistan.

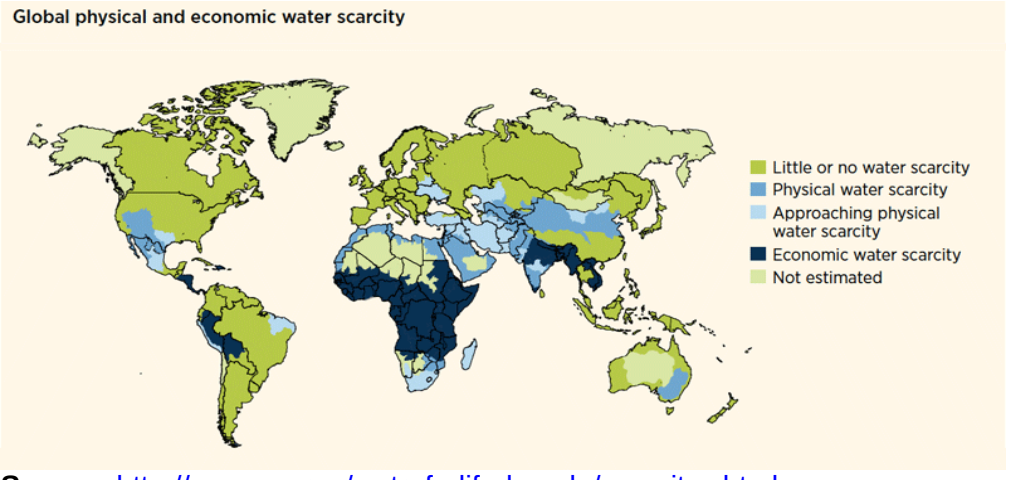
one-third of world population. The region is being drained by four major rivers and has four basins i-e, Brahmaputra, Indus, Ganges and Meghna (Khalid, 2012, p. 80). These major rivers have various tributaries which drain whole South Asian region.

The issue of water is primarily caused by decreasing fresh water availability and trans-boundary water flows. Indian population will increase to 1.6 billion by 2050 putting immense pressure on water resources. By 2005, per capita water availability has reduced to 1731 cubic meters. In Bangladesh, the per capita water availability was 8444 cubic meters which is expected to reduce to 7670 cubic meters by 2025. Thus, the root of problem lies in being lower riparian state. The 90% water flow to Bangladesh is out of its boundaries (John, 2011, p. 3).

The propensity of conflict of water in South Asia is due to shared waters, trans-boundary flows of waters and the control of flows of waters of one state by another state. All states of South Asia are facing water issue. India is the biggest state of the region having water controversies with all its neighbors. It has concluded water treaties with Pakistan, Bangladesh and Nepal. But still the inconvenience due to Indian hegemonic designs in the region is evident by increasing concerns of al south Asian states on water availability and sharing. This region is witnessing rapid increase in population, industrialization and urbanization. These all factors have challenged the security of South Asia and issue of water has assumed a prominent position in politics.

This study aims at scrutinizing the water issue in South Asia. The various reasons are explored in to get an inside in to the problem which may trigger serious conflict. This research revolves around certain aspects of the issue which have deep rooted relation with the issue and having propensity to escalate the crisis in to conflict .The questions around which this issue revolves are :Why is water issue a significant matter in politics? How does water scarcity affect state relations in South Asia? How can water scarcity be controlled by water governance and integrated water management?

Figure 1:



Source: http://www.un.org/waterforlifedecade/scarcity.shtml

Place in literature

"Troubled waters-Climate Change, Hydro politics and Trans boundary resources" edited by David Michael and Amit Pandya is a research work on global water issue. It tries to examine the relationship of Climate Change and water issues globally. Among all the regions of the world South Asia faces most severe crisis being heavily populated and concentration of population around river basins. The issue's root cause is mal-administration of water resources, both fresh water and ground aquifers. South Asia being water scarce microcosm region depicts the volatility of the issue. But there are prospects of resolution of water issue as the issues on two great rivers of the region i-e, Indus and Brahmaputra were somehow resolved through treaties. Indus Water Treaty 1960, between India and Pakistan and Brahmaputra Agreement, 1977 between Bangladesh and India are two glaring examples. Water issue and security are deeply linked. The solution to the problem lies in 'Water Governance' and deliberation of matter at global level seeking a mutual policy framework (Michael & Pandya, 2009)

The water issue is today a global phenomenon and its major area of disturbance is river basins. "Hydro politics in the developing World: A South African Perspective" edited by Anthony Turton and Roland Henwood analyses the exact nature of water issue globally and governance of river basins. The constructivist theory provides a theoretical framework for resolution of water and particularly 'Regime theory' regulating treaties. The interstate politics on water should be brought in to this paradigm to carve out a solution to this

problem. This book emphasizes on the management and proper administration of this river basins (Turton & Henwood, 2002)

Iram Khalid in her research article “Trans boundary Water Sharing issues: A case of South Asia” dissects the need of water for power generation and commercial irrigation. India is an emerging economy with a growth rate of about 9%. Its energy needs have surged immensely. It is aggressively planning hydro generation projects on Chenab and Jhelum which are detrimental for water flows in Pakistan on which its agricultural lands are irrigated. India plans to add 50,000 MW to its national grid by 2017 and another 67,000 MW within another 10 years. Pakistan is concerned about India’s hydro power generation projects on Chenab, Indus and Jhelum which are exclusively Pakistan’s rivers and their feasibilities have also been not shared with Pakistan. Wullar Barrage/Talbul Navigation Project, Baglihar dam, and Kishanganga hydro power project are major apprehensions for Pakistan currently (Khalid, 2012).

The nations having high animosity are witnessed to have water issue on their table. They have either concluded some agreements or are in process to do it. Wolf considers water management as conflict management. There are 236 rivers in world which cross the boundaries of one state and become international water courses. The river basins contributing to these rivers are about 40% and provide approximately 60% of fresh water flow. $0% of world population is dependent upon these river basins. The nations having high level of conflict are also engaged in water disputes i-e, Arabs and Isreal and India and Pakistan (Wolf, 2007)

The various theoretical views take water issue as either source of conflict or cooperation because of its trans-boundary nature. The liberal institutionalists are optimistic about water. They deem that its flow independent of territorial borders engage the states to share it and reach a level of cooperation. Malthus was wary of its nature and predicted severe conflict over water. Neo malthusians though, are not that pessimist about water yet they are not that optimistic. The ‘river claims’ have clearly this tendency to bring about violent conflicts. Malthus, a geographer, found a deep link between water conflicts and population increase. The argument is supported by the reality that today only 3% of total water is fresh water available for use (Hensel & Brochmann, 2008).

Since the times before Christ, the conflicts among states were full of water aggression. Water was either used as a weapon or target to subdue the enemy. Water reservoirs were attacked or access to them was denied in order to achieve advantage over the opponent. Twentieth century is full of such

conflict situations. The Arab-Israel war of 1967 was triggered by one of these factors too. The conflict of Israel and Syria over river Jordan was one immediate factor. Syria has the advantage of being upper riparian state here and the conflict is continued since creation of Israel in 1948. The river is shared by Israel, Syria and Lebanon. Similarly, the conflict over Nile between Egypt and Sudan is of violent nature. The fresh water availability to Egypt is 96% by River Nile, if disrupts, Egypt gets into grave water crisis. The issue though involves whole northern Africa as Nile being international water course yet the present conflict is being witnessed between Egypt and Nile. Even Egypt threatened to attack Sudan in case of building dam over it(Gleick, 1993).

The report "Avoiding water wars: Water scarcity and Central Asia's growing importance for stability in Afghanistan and Pakistan", prepared by United States Senates' Committee on Foreign Relations examines water problems in Central Asia and South Asia. Central Asian Republics and South Asia particularly India and Pakistan share rivers. Indus River plays a significant role in South Asian politics. Obama administration has perceived the importance of this critical issue and gave it special importance in its foreign policy. United States now consider it crucially important to assist South Asia and Central Asia. The effects of climate change are also deep and serious on water availability. This report discusses in detail the issue of water sharing in South Asia; however, it ignores the hegemonic designs of India and its water aggression (Committee on Foreign Relations, 2011).

The glaciers are the largest source of water storage in the world. The natural ice body of the world feeds the largest six rivers of Asia including Indus. The 'climate change' is negatively affecting the water flows in these rivers (Savoskol & Smakhtin, 2013).India's water demands are increasing rapidly. By 22% it will increase in 2025 and by 32% in 2050. Domestic and industrial demand will increase to 85%of total by 2050 in India (Amarasinghe, Shah, Turral, & Anand, 2007). The management of river basins is a challenging task today. Trans-boundary water flow demands the integrated effort. 'Integrated water resources management' is a solution to this problem if taken seriously (Lankford, Merrey, Cour, & Hepworth, 2007). In Pakistan agriculture is the major field which contributes about 24% of GDP. The surface water availability in Punjab reduced 46% from 1996-2001. Addition of salts in water and siltation is the major cause reducing water channels' capabilities in Pakistan (Qureshi, Turral, & Masih, 2004). The twenty first century is going to face severe water scarcity. Water storage is a major problem which, if solved, may help to curb this deficiency. The four ways can help in this regard; soil profile, underground aquifers, small reservoirs and large reservoirs behind dams (Keller, Sakhivadiwal, & Seckler, 2000).

Background:

South Asia starts from the foothills of Himalayas. The largest ten rivers of Asia by volume originate from Himalayas or Tibetan Plateau. These rivers include Yangtze, Mekong Brahmaputra and Indus. China has the advantage of controlling the flow of all such large rivers affecting water supply to South and South East Asia. China does not have any water agreement with any such state. These rivers feed 47% of global population (Pomeranz, 2013, p. 4). China is under immense pressure owing to its rapid soaring population and massive industrialization policy. Numerous water projects are under process on Indus, Sutlej, Brahmaputra, Salween, Irrawaddy and Mekong rivers in Tibet adjacent provinces. China claims that such projects would not hinder water supplies lower riparian states. China is constructing huge project to divert waters of Yangtze northwards. Projects on Mekong will affect fishing industry in Vietnam and Cambodia. The hydro power project and dam on Yarlung and Tsangpo (Upper Brahmaputra) will affect the flows os water in India and Banglades h(Pomeranz, 2013, pp. 5-7).

China's energy needs are estimated to grow up to 60% from 2012 to 2035(Agency, 2012). China's major concern is to shift its energy needs from hydro power resources. These projects have tendency to bring China and the lower riparian states, which are affected, in to conflict. China's per capita water availability is 2,093 cubic meters, which is one-quarter of global availability (Turner, Shifflet, & Batten, 2013, pp. 11-12). The SAARC (South Asian Association of Regional Cooperation) states i-e, Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan share waters and the resultant disputes too(Wirsing, 2013, p. 19).

The two largest states of South Asia i-e, India and Pakistan are in constant conflict since partition over various issues. One major issue among all is controversy is over distribution and sharing of trans-b0undary water resources. Although two nations concluded Indus Water Treaty in 1960, yet the issue remains unresolved due to changing climatic, political economic and ecological circumstances. By 2030, India's fresh water demand is estimated to be increased to 1.5 trillion cubic meter s(Group, 2009, p. 10). By 2050, India's population is expected to reach 1.7 billion and Pakistan's 275 million. The annual availability of fresh water resources around Indus basin will drop below 750 cubic meters (per capita). This is the international threshold for sever water scarcity (Group I. B., 2013, p. 18). Bangladesh's water insecurity lies in its lack of control of its water flows. The 91.4% surface water supply in to Bangladesh is fed by 57 out-of-country rivers (Wirsing, 2013, p. 20).

India's water compulsions:

India's water availability is decreasing and its water demand is increasing rapidly. It is expected that by 2030, water shortage will reach up to 50% (Prakash, Sharma, & Chourey, 2013, p. 2)According to censusof 2011, the population of India has reached 1.2 billion. India has 12 major river systems. Out of all these Ganga-Brahmaputra-Meghna system is largest. India developed its storage capacity hectically since partition which now stands at about 212.78 billion cubic meters (Prakash, Sharma, & Chourey, 2013, p. 3).

The level of rate of usage of water resources in India has reached the level of unsustainability. The rate of water utilization in India has reached 59%. The natural mechanism at this level does not have the tendency to recharge the resources itself. The number of perennial rivers in India is also very low (Raj, 2010, pp. 1-2). According to paper published by Strategic Foresight Group in 2010, India's per capita water availability in 2006 reached near to 1700 cubic meters. The World Bank has marked this level as water stressed. By 2030, this is estimated to reach at about 1240 cubic meters, bringing India close to water scarcity threshold which is 1000 cubic meters.

India is aggressively advancing water storage and hydro power projects which are a major cause of tension for its neighbors. The rivers shared by Pakistan, Bangladesh and Nepal are significantly affected by India's projects. The largest rivers of South Asia i-e, Indus, Brahmaputra and Meghna are under India's special consideration. India has entered in to agreements with Bangladesh, Pakistan and Nepal over sharing the waters of these rivers. However, the violation of such agreements by India has become a major reason of dispute in South Asia.

India's water sharing issues:

India and Pakistan are facing water dispute since partition over sharing waters of Indus and its tributaries and this issue has assumed severity with increasing water demands and limited fresh water availability. Indus originates from Himalayas in Tibetan Plateau. It then enters into Indian Held Kashmir before entering into Gilgit region of Pakistan. It further divides in to various eastern and western tributaries until reaching Arabian Sea flowing for about 3200 km. Its annual flow in region is about 207 billion cubic meters (Akhtar, 2010). Major tributaries of Indus are Jhelum, Chenab, Ravi, Sutlej, Beas. The western tributaries of Kabul River and Kurram River flow towards Afghanistan.

The dispute over Indus was mediated somehow by World Bank in 1960 and Indus Water Treaty was concluded between India and Pakistan. This Treaty

gives Pakistan exclusive rights over the waters of eastern tributaries of Indus. According to Treaty, Pakistan enjoys right of full use of waters of Indus, Jhelum and Chenab and India has supremacy over Ravi, Beas and Sutlej. Pakistan gets 75% of waters of these river s(Nosheen & Begum, 2012, p. 271). This Treaty resolved a crisis lingering from 1947 between India and Pakistan. But later violation by India create succeeding dispute.

According to IWT, India could tap waters of eastern tributaries of Indus for hydro power projects but from these rivers before entering in to Pakistani territory. India is pursuing hydro power projects on these rivers which are affecting the flow of waters in Pakistan. Pakistan claims that these projects are in violation of IWT and depriving it of its due share. The Treaty was observed in its true sense for only two decades. From 1980s, Pakistan claims, India started violating the provisions of treaty. Following are the projects which are source of concern for Pakistan:

- Salaal project in Kashmir on River Chenab. This was first project on which Pakistan raised concerns. This dam was diverting water flows to Western Punjab. In 1976, through talks this matter was successfully resolved and India shared all details with Pakistan(Siddiqui, 2010)
- Wullar Barrage project is the second controversial project between India and Pakistan. It is on Jhelum River in Kashmir. India names it Talbul Navigation project on Wullar Lake. It is the largest fresh water lake in Kashmir. The construction started in 1984 and the matter is still unresolved(Nosheen & Begum, 2012, pp. 275-276).
- Baglihar dam is a 900MW hydro power project on River Chenab in Kashmir. This will considerably affect water flow to Chenab and particularly two link canals originating from Head Marala, Sialko t(Akhtar, 2010).
- Kishanganga is a 300MWpower project on River Neelum. This project will divert Neelumriver up to 100 km and water supply to Neelum valley will be affected considerably (Nosheen & Begum, 2012, p. 278).
- DulHasti hydroelectric plant is on River Chenab in district Doda in Kashmir. It is a 390MW power plant. Pakistan claimed that it was a full fledge dam as Baglihar. However the impact of this project is not so worse. It will only affect water supply up to 1-2 days(Ahmed, 2012)
- Uri II Hydel power project is on River Jhelum in Baramullah District in Kashmir. It is downstream of Uri I. Pakistan raised objection and asked for details in October 2002. India is still continuing the projecnt(Nosheen & Begum, 2012, p. 279).
- NimooBazgo is the run of river 45MW project in Ladakh

- Bursar dam is the largest project on Jhelum and Chenab. The hydroelectric potential will be 1020MW while it will store 2.2 MAF which is far high tan IWT's permissible limit(Nosheen & Begum, 2012, pp. 279-280)

Bangladesh is another country in South Asia having water sharing issues with India. It shares 54 rivers with India. Bangladesh is at odds due to being lower riparian state. The largest rivers are Brahmaputra, Ganges and Meghna. Ganges is a 2500KM long river originating at Gangotri in Uttar Pradesh state of India. The tributaries in India are Yamuna, Tons and Gamoti. The tributaries shared with Nepal are Kamala and Mahakali, while the tributaries of this river in Tibet are Kosi and Gandhak. The basin of this river is divided among India, Bangladesh and Nepal. India has 80% of the basin, 18% in Bangladesh and 2% in Nepal. Brahmaputra originates in south western Tibet. This 2900KM long river is known there as YarlungTsangpo River. From there it enters in to Arunachal Pradesh in India, then Assam valley and then it flows in ti Banglades h(Khalid, 2012, p. 89).

Bangladesh faces water excess in monsoon and drought in dry season. The agriculture comprises majorly of rice and 80% of small farmers there grow rice depending on water flow from India. The flow of Ganges in Bangladesh is affected by construction of Farraka Barrage at Farraka in West Bengal. It was initiated by India in 1951 and water was diverted by Bhagirati-Hoogly system. At that time Pakistan raised objection over the project. India started construction unilaterally in 1960 which completed in 1974. The government of Shaikh Mujib in Bangladesh allowed India its test run. This project benefits Calcutta port. The issue is that it causes floods in excess water season and water supply is cut down in dry season (Khalid, 2012, p. 90).

Bangladesh took this matter to UN in 1976 and an ad hoc agreement was signed for five years. Bangladesh and India shared the water of Ganges in 60:40 and in dry season India agreed to leave 80% more wate r(Khalid, Bagladesh Water Issues, 2012). India is further pursuing a project on Ganges and Brahmaputra to divert their waters affecting 100 million Bangladesh's population. Tipaimukh dam on Barak River is another Indian effort to fulfill its water needs. This is a barrage with 1500MW hydroelectric production potential benefitting Assam. This is in clear violation of International Laws as Bangladesh government is not taken in to consideration (Briscoe & Malik, 2006)

Nepal is the upper riparian state and share Mahakali and Karnali Rivers with India which fall into Ganges. Nepal has huge water resources and massive hydroelectric potential which is untapped due to mal planning and

unavailability of such massive resources. The trans-Himalayan rivers Karnali, SaptaGandaki and SaptaKoshi flow through Nepal and provide 71% of water flows in dry season and 41% to annual flows of Ganges(Douglas, 2006). The nature of Nepal-India relationship over water is different as Nepal is upper riparian state. Nepal is concerned about back effect and inundation of canals. Nepal is apprehended by water treaties where it feels that it has been treated unequally.

- Sharda Dam construction in 1927. Treaty signed in 1950 and Letters of Exchange in 1950 and 1965
- Koshi Agreement, 1954
- Gandak Agreement, 1959
- Tanakpur Agreement, 1991
- Mahakali Treaty, 1996(Khalid, Trans- boundary water sharing issues: A case of South Asia, 2012, p. 91).

Pakistan's water compulsions:

Annual water supply in Pakistan is 31.25 MAF. The basic issue is that without unplanned use the ground water is wasted and cannot help to supply ample water. Agriculture is the major sector in Pakistan which contributes about 24% of its GDP. 70% of Pakistan's exports are also dependent on this sector. Due to shortage of water in rivers, the difference can be met from ground water if utilized properly and by planning. If ground water is utilized in conjunction with canal water, it may give better results. The farmers are not aware of this water utilization without any mechanism. It increases land siltation. And also reduces underground water table (Qureshi, Turral, & Masih, 2004, p. 7).

The scarcity of water in Pakistan is increasing with every passing day and it is probable that it will take up severe form of insufficiency soon. By 2025, Pakistan's water shortage will increase by 23.51%(Saleem, 2011, p. 26). The agricultural requirements are the most pressing issue. Being deficient of reservoirs, whole dependence is on flowing water of rivers and link canals, lakes, aquifers. The plain of Punjab and Sindh are the main fields for all crops. These plains are irrigated by Indus and its tributaries. Agricultural output constitutes major exports of Pakistan too. Thus, the reliance of agricultural sector is on fresh flowing water of Pakistan is at disadvantage due to being lower riparian state.

The river water flow outside of Pakistani borders is 36% (Gleick, 1993, p. 103). This puts Pakistan at odd when India is on control of such tributaries of Indus which drain major agricultural land. The plausible difference between

both states is at the issue of Indian projects at the rivers on which Pakistan has 'exclusive rights' under Indus Water Treaty. These storage and power projects are hindering due water supplies to Pakistan. Under the principles of international law, Pakistan has this right to that India share every concerned information with Pakistan (Gleick, 1993, p. 108). India's reluctance to share respective information is further complicating the matter.

Figure 2:

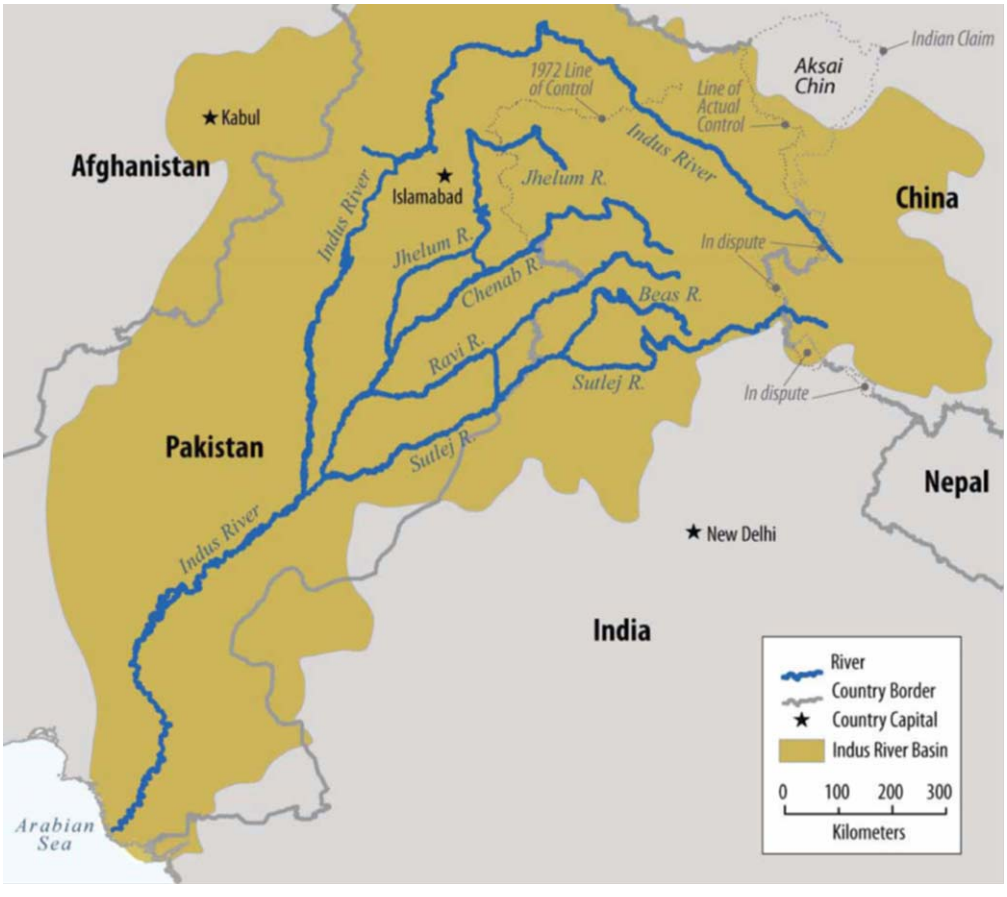


Figure 2: Map of Indus River Basin
Source: CRS produced using U.S. Department of State, International Land Boundaries, https://www.intelink.gov/basestate/landBHome.asp; U.S. Geological Survey, of the World, http://earthtrends.wri.org/text/water-resources/maps.html; ESRI Data and Maps 9.3.1; DeLorme World Vector Data, 1:250,000; IHS World Data, December 2008.

Water Dispute between India and Pakistan

The seeds of dispute between India and Pakistan dates back to partition. The issue was also between provinces over water distribution before partition. Immediately after independence the first instance of water aggression was witnessed in 1948. The first case lodged with tribunal of partition was of water. The issue was also taken to UN (Askari, 2013, p. 327). Pakistan had been under pressure since then. India used to leave water in flood season of high flow which caused severe devastation to crops in Pakistan, on which Pakistani economy is majorly based. India stopped the flows during the season of intense needing causing other damage to Pakistani crops again. The matter was finally put up by World Bank and its mediation started in 1952 which ultimately resulted in Indus Water Treaty, 1960(Sahni, 2006, p. 154).

The source of water in Pakistani rivers is based in Himalayan region spread over 50,000 sq, Km. The water requirement of Pakistan is 141.0 MAF at farm gate. The major source of river flow and irrigation in Pakistan is rainfall. Average rainfall in Pakistan is 238 mm which comprises 150 MAF. The major requirement is irrigation of crops for which 95.8% goes out of total water supply. Indus has the largest irrigation system in world through its tributaries and canals. But being in-efficient it wastes about 50% of total supply. The Indus system receives about 141.67 MAF annually water supply. For water supply to 106 MAF is diverted to canals and rivers. Remaining drains in to Arabian Sea without being utilized. The major reservoirs of Pakistan are Tarbela, Mangla and Chashma. Tarbela has lost much capacity to save water due to siltation. The storage capacity of Tarbela has reduced by 24.6%, Mangla has lost 13.2%. Pakistan is also short of hydroelectric projects though it needs to produce much electric supply. And in Pakistan water is much supplied and cheap source of electricity production (Javed, 2010, p. 215).

Indus Water Treaty was the bilateral agreement between India and Pakistan which reduced Pakistani water apprehensions for some time. The largest water reservoirs and dams built in Pakistan are the successive effort of this treaty. The Tarbela, Mangla and Chashma are the largest reservoirs built after this treaty on the rivers over which Pakistan had exclusive right. It also paved the way for eight link canals and a gated syphon. The Pakistani apprehensions are due to clear violation of this treaty by India. Since, 1980s India is aggressively pursuing projects on these rivers which come under Pakistani control. The projects are of massive size and huge capacity which will hinder water supply to Pakistan. The major projects which are in completion stage are;

- Baglihar on Chenab River-----900MW

- Kishanganga on Neelum River----- 330 MW, It may divert Neelum River by 100 KM
- Wullar Barrage/Talbul Navigation Project-----It may divert water flow of Jhlumriver.
- Uri II on River Jhelum-----240 MW, Pakistan objects n its unilateral construction(Sattar, 2009, pp. 211-212)

Pakistan has objections over India's pursuit of water storage and power storage and hydroelectric projects. Pakistan raises objection over India's unclear policy and lack of sharing of appropriate data. According to treaty, India can built few run-of-river projects on Pakistan's share of rivers, yet after sharing the adequate data. Pakistan has concerns over India's negligence to share proper information. Pakistan is also apprehended by India's inappropriate data production over new rivers (Khalid, 2012, p. 80).

Bangladesh water issue:

Bangladesh is the land of Ganga-Brahmaputra-Meghna rivers basin and 80% of its territory is within the basins of these rivers. But the territory of Bangladesh covers only 7-8% of total basin of these rivers. Bangladesh faces water dilemma as 92.5% of surface water flown in to country from sources out of state. The availability of water in rivers depends primarily on monsoon rainfalls which is spell of about four months. The water flow in rivers is 80% from monsoon rainfalls. The whole remaining year water availability is ensured by the waters accumulated in this season. River waters flow is variable due to various factors. Being lower riparian state it depends on water flow from India, soil erosion and siltation in rivers. During monsoon season, Bangladesh experiences floods while during remaining period the flow of water varies (Kolas, Miklian, & Edelen, 2013, p. 11).

The world is under severe impact of climate change which has a significant impact on Bangladesh in South Asia. Major landmass of Bangladesh is barely 1 meter above sea level and this piece of land is under the impact of cyclones. It is estimated that by 2050, 17-20 % of land will be absorbed by seas (Munirruzaman, 2013, p. 2). This situation builds considerable pressure upon the security of Bangladesh affected by variable water flows and climatic uncertainty. Bangladesh is having differences with India over water sharing of resources and Indian projects which affect flows of Brahmaputra and Ganges rivers in Bangladesh. This situation adds to the complexity of already conflict situation in South Asia.

Nepal's water deficiency: a case of poor water governance:

Nepal is a small state with considerably low population and huge water resources. Nepal's estimated population by 2015 would be 32 million (Hassan, 2013, p. 36). Growing industrialization is another problem which is negatively affecting water systems in Nepal. The Bagmati, Bishnumati and Manohara river systems in Kathmandu valley are near to collapse as their waters are not usable any further(Upreti, 2007, p. 21). Nepal is an agrarian economy where 90% of small scale farmers resort to water distribution systems managed by them self. The major problem lies in poor governance of water resources in Nepal.

Nepal has huge hydro power generation capability. Its limited usage as compared to massive potential may enable it to export hydroelectricity to neighboring deficient South Asian States. The hydro power capability of Nepal is about 83,000MW out of which 42,000 is technically and financially feasible. But the tapped hydro power potential is only one percent of 42,000 MW (Malhotra, 2010, p. 9). Nepal is a water rich state having 210.2 billion cubic Kilometers of annual fresh renewable water resources including ground water. 80% of the water is contaminated. Thus, the issue of water in availability in Nepal is the outcome of poor governance and lack of proper planning. Nepal is also apprehended by Indian interventions in its public sector to hinder smooth planning to tap its water resources (Shivakoti, 2007, pp. 112-114).

China's water needs: implications for South Asia:

South Asia lies at the foothills of Himalayas thus earning it a status of upper riparian state for South Asia. The ten largest rivers of Asia originate in Tibetan Plateau. The water flows in South Asia and South East Asia are naturally in control of China. Rapid industrialization, population growth and immense urbanization in China press it to exploit maximum water resources. The massive industrialization has negatively affected water resources by polluting rivers, lakes and ground water resources which critically reduces usable water quantity.

China comprises of huge landmass which varies water availability in its various parts. Southern China is water abundant while north is under water scarcity. The average per capita water availability in Northern China is 757 cubic meters which is below 1000 cubic meters threshold of 'water scarcity'. The average rainfall per annum in North China is 200-400 mm/year while it is 2000mm/year in South China(Xie, 2009, p. xx). The disparity in water supply and reduction of water resources owing to rapid increase in pollution puts

China at a position of water exploiter of South Asia. China has also differences with Vietnam and Cambodia over water supplies in rivers.

The exploitation of fresh water resources by China is outcome of huge population's needs and rapidly growing industries. It inhabits about 21% of world population while it has only 6% fresh water resources. It is expected that by 2020, only coal industry in China will engulf 27% of total water supplies. The population increase is expected to rise to 1.3 to 1.45 billion by 2029. The estimated water consumption in China in the year 2010 stands at 670 billion cubic meters. China is undertaking massive projects to fulfill its gigantic water needs. One of such projects is construction of 2500 KM canal to divert water from water abundant south to deficient north. This project costs $60 billion. China is employing slow and steady growth of its water infrastructure(Wong, 2013, pp. 2-3).

Water scarcity in south Asia: A potential conflict of future:

South Asia is one of the most populated regions of the world and is the most volatile parts of the world being host to varied and various kinds of conflicts. Today, the world is looking forward from oil disputes and is concentrating on another natural resource i-e, water, the most basic human need. This region is experiencing swift increase in population and depletion of water resources. The developing world is majorly home to such disputes. By 2025, world population will be increased by three billion more masses out of which 90% will be in developing world. South Asia is especially under the effect of climate changes which has transformed rainfall pattern. India is at center at the dispute. The water flowing to India comes majorly out of Indian Territory. At least 75% of this water is from neighbors of India and is cause of adding to dispute in South Asian region (Condon, Hillman, King , Land, & Patz, 2009, p. 17).

The rivers basins are shared by various states and the trans-boundary flow of rivers bring states in conflict over water if not shared adequately. Three river basins are considered to be important in South Asia. Indus river basin is shared by India and Pakistan and adds to the already existing crisis between both states S(UNEP, 2008, p. 14). Indus Water Treaty resolved the matter for some time but within two decades of this agreement violation started by India. This situation has reached the verge of serious crisis. The other basin is Ganges-Brahmaputra-Meghna Basin shared by India, Nepal and Bangladesh. The other volatile basin is Helmand shared by Afghanistan, Iran and Pakistan (UNEP, 2008, pp. 14-15).

Table 1: Indus Basin Shared by South Asian States:

Basin Name	Area in sq.km	Countries	Area of country in basin(sq.km)	Country percent area
Indus	1,138,800	Pakistan	597,700	52.48
		India	381,600	33.51
		China	76,200	6.69
		Afghanistan	72,100	6.33
		Chinese Control, claimed by India	9,600	0.84
		Indian Control, Claimed by China	1,600	0.14
		Nepal	10	0.00

Source:http://www.transboundarywaters.orst.edu/publications/register/tables/IRB_asia.html.Retrieved on 2nd February 2013.

The sharing of water by states without a joint mechanism makes this issue more complex. South Asia is under severe water threat owing to water scarcity. The states of South Asia have concluded various treaties but the bilateral agreements have been the victim of violation by either state inflicting loss to the other. There is need of rapid action to curb this problem. The regional framework may help in this regard as the bilateral agreements have proved to be futile. The involvement of South Asian states at a single platform to look in to matter may be a step forward.

Figure 3: Map of South Asia

Source: United Nations Cartographic Section (2009b)

Findings:

- South Asian region is under severe threat of another conflict over competition for water resources. The region is constrained by huge

population and their massive needs of such large amount of population. The population is increasing at rapid pace and it is expected to become one of the most inhabited regions by 2025. The burden of huge population is also drawing the region towards urbanization and industrialization. These activities are affecting water flows and unplanned use of water resources both ground and fresh waters.

- South Asia is the region sharing all big rivers among states. The sharing pattern has although been tried to be planned by bilateral agreements yet the absence of any monitoring authority has hindered this effort. The states resort to violation of such agreements to meet their ever growing needs. In South Asia, Indus Water Treaty, Mahakali Treaty and agreement over Farraka Barrage are glaring examples(Khalid, Trans- boundary water sharing issues: A case of South Asia, 2012).
- The issue of water in South Asia is revolving around the violations of India. India is the largest state in south Asia sharing waters with Bangladesh, Nepal and Pakistan. India has hegemonic designs which are evident from its water aggression (Hassan, 2013).
- South Asian waters originate from China and major portion of these waters is at China's disposal. China has not concluded any treaty with its neighbors yet it assures that its exploitation of water resources will not affect neighboring states' water supplies.
- The absence of collective framework in this region is another major problem. After the failure of bilateral agreements the focus must shift to multilateral arrangement of water sharing. The example is recent water sharing agreement in Middle East among Jordan, Israel and Palestine on Dead Sea(Kershner, 2013)

Suggestions:

The world water crisis has perplexed all concerned states. The issue is considered to be more an issue of management of water resources and governance mechanism. Water governance refers to allocation of 'rights and resources'.(Mollinga, 2008, p. 9).

- There is urgent need of addressing the issue at regional level.
- The integrated water management can be a feasible arrangement at regional level where all South Asian States sit together to chalk out a joint mechanism to address this issue. A regional framework to regulate water flows will be of immense importance.

- At domestic level of states water resources must be managed by proper planning under the auspices of water governance.

Conclusion:

The world is today entangled in so many conflicts. The disputes over natural resources occupy preferential position among states' interactions. Currently, the concentration of world is on water resources. The scarcity of water resources has compelled states to enter in to severe competition over water. Rivers flow unbounded of the natural territories of states and become relevant for more than one state. Trans-boundary flows of rivers, poor governance of water resources at domestic level, lack of joint framework to cope with emerging problem are few factors adding to the complexity of water scarcity issue in South Asia. There is an urgent need of formulation of frameworks at domestic, inter-state and regional level to control this growing need of water. The bilateral agreements in South Asia did not prove to be very successful arrangement. Thus, the need is of regional arrangement as the issue is relevant to and equally for all states of the region.

References

Agency, I. E. (2012). *World Energy Outlook 2012.* International Energy Agency.

Ahmed, A. (2012). Indus Waters Treaty: A Dispassionate analysis. *Monthly Digest*, 1-14.

Akhtar, S. (2010). Emerging challenges to Indus Water Treaty. *FOCUS*, 15-25.

Amarasinghe, U. A., Shah, T., Turral, H., & Anand, B. K. (2007). *India's Water Future to 2025-2050:Business as usual scenario and deviations.* Colombo: International Water Management institute.

Askari, M. U. (2013). Pak-India Water politics: A prologue from past to present. In D. I. Khalid, *Pakistan Forign Policy: Evolution, Developmant and Strategies* (pp. 315-347). Lahore: Peace Publications.

Briscoe, J., & Malik, R. (2006). *India's water economy bracing for a turbulent Future.* New Delhi: Oxford University Press.

Committee on Foreign Relations, U. S. (2011). *Avoiding water wars: water scarcity and Central Asia's growing importance for stability in Afghanistan and Pakistan.* Washington: US Government Printing Office.

Condon, E., Hillman, P., King , J., Land, K., & Patz, A. (2009). *Resource Disputes in South Asia: Water scarcity and potential for interstate conflict.* Madison: La Follete School of Public Affairs.

Douglas, H. (2006). The Politics of water in South Asia. *Transforming Cultures*, 135-157.

Gleick, P. H. (1993). Water and Conflict: Fresh water resources and international security. *International Security*, 79-112.

Group, 2. W. (2009). *Charting our water future:Economic frameworks to inform decision-making.* 2030 Water Resources Group.

Group, I. B. (2013). *Connecting the drops: An Indus Basin roadmap for cross border Water Research, Data Sharing and Policy Coordination .* Observer Research Foundation, Stimson Center and Sustainable Development Policy Institute.

Hassan, Z. u. (2013). Way Forward To South Asian Water crisis. *Journal of South Asian Studies*, 35-49.

Hensel, P. R., & Brochmann, M. (2008). Armed Conflict over international rivers:The onset and militarization of river claims. *American Political Science Association*.

Javed, B. D. (2010). The water resources management from security, economic and political perspective of Pakistan:The potential way out of the challenges. *pakistan Army Green Book*, 214-221.

John, W. (2011). *Water security in South Asia:Issues and policy recommendations.* Observer Research foundation.

Keller, A., Sakhivadiwal, R., & Seckler, D. (2000). *water scarcity and role of storage in development.* Colombo: International water Management Institute.

Kershner, I. (2013, 12 09). A are Middle East Agreement on Water. *New York Times*.

Khalid, D. I. (2012). Bagladesh Water Issues. *South Asian Journal*, 73-87.

Khalid, D. I. (2012). Trans- boundary water sharing issues: A case of South Asia. *Journal of Political studies*, 79-96.

Kolas, A., Miklian, J., & Edelen, K. (2013). *Water Scarcity in Bangladesh: transboundary rivers, conflict and cooperation.* Oslo: Peace Research Institute.

Lankford, B. A., Merrey, D. J., Cour, J., & Hepworth, N. (2007). *From integrated to expedient:An adaptive framework for river basin management in developing countries.* Colombo: International Water Management Institute.

Malhotra, P. (2010). *Water issues between Nepal, India and Bangladesh.* New Delhi: Institute of Peace and Conflict Studies.

Michael, D., & Pandya, A. (2009). *Troubled Waters:Climate Change, Hydropolitics, and Transboundary Resources.* The Henry L. Stimson Center: washington DC.

Mollinga, P. P. (2008). Water, politics and Development: Framing a political sociology of water resources management. *Water Alternatives*, 7-23.

Munirruzaman, M. G. (2013). *Security implications of climate change: A case of Bangladesh.* Centre for Non-Traditional security studies.

Nosheen, & Begum, T. (2012). Indus Water Treaty and Emerging Water Issues. *Abasyn Jornal of Social Science*, 265-288.

Pomeranz, K. (2013, July). ASia's unstable water tower:The politics, economy and ecology of Himalayan water projects. *Asia Policy*, pp. 1-50.

Prakash, A., Sharma, M., & Chourey, J. (2013). *Water in India: situation and prospects.* Delhi: UNICEF.

Qureshi, A. S., Turral, H., & Masih, I. (2004). *Strategies for the management of conductive use of surface water and ground water resources in semi-arid areas.* Colombo: International Water Management Institute.

Raj, A. (2010). *Water Security in India: The coming Challenge.* Future Directions International.

Sahni, H. K. (2006). Politics of water in South Asia: A case of Indus Water Treaty. *SIAS Review*, 153-165.

Saleem, B. M. (2011). Emerging Water Crisis. *Pakistan Army Green Book*.

Sattar, A. (2009). *Pakistan's Foreign Policy: A concise History from 1947-2009.* Karachi: Oxford University Press.

Savoskol, O. S., & Smakhtin, V. (2013). *Glacier Systems and Seasonal Snow Cover in Six major Asian River Basins:ater Storage properties under changing climate.* Colombo: International Water Management Institute.

Shivakoti, G. P. (2007). Coping with Policy, institutions and governance challenges of water resources issues with special reference to irrigation in Nepal. In F. Rotberg, & A. Swain, *Natural Resources security in South Asia: Nepal's waters* (pp. 112-140). Singapore: Institute of Security and Development Policy.

Siddiqui, I. H. (2010). *Hydropolitics and water wars in South Asia.* Lahore: Vanguard Books.

Turner, J. L., Shifflet, S. C., & Batten, R. (2013, July). China's upstream advantage in the great Himalayan Watershed. *Himalayan water security:The challenges for South and Suth East Asia*, pp. 1-50.

Turton, A., & Henwood, R. (2002). *Hydropolitics in the developing World: A Southern African Perspective.* Pretoria: African Water Issues Research Unit.

UNEP. (2008). *Fresh water under Threat South Asia: Vulnerability Assessment of fresh water resources to environmental change.* Nairobi: United Nations Environment Programme.

Upreti, B. R. (2007). Changing political context, New power relations and hydro conflict in Nepal. In F. Rotberg, & A. Swain, *Naturl resources security in South Asia: Nepal's waters* (pp. 15-66). Singapore: Institute for Security and Development Policy.

Wirsing, R. G. (2013, july). Melting the Geopolitical ice in south Asia. *Himalayan Water Security: The challenges for South Asia and South East Asia*, pp. 19-25.

Wolf, A. T. (2007). Shared Waters:conflict and Cooperation. *The Annual Review of Environment and resources*.

Wong, G. (2013). *China's war on water scarcity.* PWC.

Xie, J. (2009). *Addressing China's water scarcity.* Washington: The World Bank.