



CONFLICT OVER WATER RESOURCES: A THREAT TO PEACE IN THE SUBCONTINENT

Prof. Dr. Sayeda Daud

Dean

Faculty of Humanity and Social Sciences

Metropolitan University

Karachi – Pakistan

sayedadaud@gmail.com

Abstract

Introduction: The ever growing dearth of water resources will prompt national and global clashes everywhere throughout the world community. As consumption and population increases, the requirement for water resources will increase prompting strains and conflicts between neighboring countries. The unequal circulation leaves little for a population that exhibits extraordinary need. Aims of the study: In light of this issue, Pakistan must develop and incorporate plans to oversee existing water strife. Also, political leaders and government authorities must include building attention to the social and financial advantages of giving water to their citizens in sub-continent. Material and Methods: This paper identifies the importance of water resources and its impact on the behavior of communities towards their geographical regions where the restricted access to water will lead to insecurity and escalating conflicts. It assesses the historical perspective on significance of water resources. Conclusion: It also analyzes the world major water resources and its distribution, the prevailing situation in subcontinent where geographical location of main rivers and their distribution leading to cause of future conflict between the two rival nations.

Introduction

The world population has tripled from 1.6 billion to 6 billion in the previous century. It is relied upon to ascend from the present 7.4 billion to 9.9 billion by 2050. Water utilization has dramatically increased the rate of the expansion in population. The areas that are relied upon to be short of water by 2025. Draining water sources have increased the danger of inside and cross-border clashes. Thus, the rivalry between industry, farming, and buyers are additionally increasing. According to the exploration of International Food Policy Research Institute, 1.8 to 2.4 billion individuals will be living in areas with physical water shortage by 2025 (Petersen-Perlman, Watson, & Wolf, 2018). Water sources are shared by numerous nations. Roughly 40 % of the total populace lives in waterway and lake bowls that involve at least two nations, and more



than 90 for every penny lives in nations that offer bowls. The current 276 transboundary freshwater and waterway bowls cover about one portion of the Earth's property surface and record for an expected 70 for each penny of the worldwide freshwater stream. A sum of 148 States an incorporated area inside such bowls, and, 21 countries lie totally inside them. Likewise, around 2 billion people completely depend on groundwater, which consolidates approximately 300 transboundary aquifer system (Kristvik, Muthanna, & Alfredsen, 2018). Water shortage starting at now affects every region. Just about 1.3 billion people, or one-fifth of the aggregate populace, live in zones of physical deficiency and another 500 million people are resulting in these present circumstances. Another 1.6 billion people, or appropriate around one-fourth of the total population, confront to money related water inadequacy where countries don't have the fundamental foundation to take water from conduits and aquifers. The contentious conditions between neighboring nations and culture will prompt clashes as the demand to supply ratio for water continues to increase.

Historical Perspective

Water has always been the dynamo of civilization. This was perceived at the early human progress in Mesopotamia and Egypt. Water can be considered the main cause of all the belongings, unceasing and primal. Social orders are influenced specifically by the quality and measure of open drinking and sustenance water. They are likewise compelled in a roundabout way the impact of water on farming, imperativeness, industry or transport. In the history, social orders have discovered new measures to stable the conveniences to water from their areas. For storing the water, they composed innovative strategies, spring water, groundwater, and even dampness (Tang *et al.*, 2018). Civilizations have dynamically advanced from gatherings of surviving tribes to colossal aggregates of work area bound groups as mind boggling country states. This development was not unilineal, steady, or all-inclusive and it was set apart by a noteworthy transformation in the way social orders dealt with their water assets. In a few societies, metropolitan communities for the tip top, ministers, and specialty experts prompted the rise of the soonest extensive urban areas. The interminable areas of these urban areas required transport of water, security from surges, transportation through channels, stockpiling of water, and water dissemination and sewage system (Teixeira, 2018). Because of a closed system of entire monarchy government and in addition low rate of financial development, the pace of advancement was moderate. The specialty pro and proficient researchers were not composed and their gadgets were not open for down to earth information. The achievements of the Alexandria researchers totally speak to the leap forward in water history on the grounds that these creations shaped the establishments of hypothetical hydrology regarding functional applications. The Roman Empire left another superb inheritance (Xie, Zhang, & Panda, 2018). More noteworthy Rome had a populace of upwards of 500,000 while Alexandria likewise moved toward 400,000. The water prerequisite of both Alexandria and Rome were met by innovative arrangements. In Alexandria, the city skimmed over many repositories getting water from a channel associated with the Nile. In Rome, channels and ways were developed to convey water to the city, for drinking and residential use as well as for open showers. Consistently, more than 100 million



gallons of water went through the city. The wonderful urban focus was Mohenjo-Daro of the Harappa Indus progress (Dixit, 2018). The very much created Harappa human advancement secured a tremendous region of around a million square kilometers. The city was remarkable for its water administration framework, which took after the city matrix framework, an unmistakable component of numerous Harappa sites (Kumar, Vaid, & Mittal, 2018). The next milestone in water history was the advancement of water conveyance system by Persians known as "Qantas" an underground arrangement of passages associating wells and burrowed utilizing vertical movements to gather and transport water, some of the time over separations more than 50 kilometers in length to stretch out cultivating to peripheral forsake zones by using underground transport of groundwater. This technique for exploiting groundwater spread from Persia to dry terrains in Iraq, Syria, Jordan, Palestine, Egypt, Algeria, and Cyprus. Qantas additionally spread to Arabia, the Gulf States, and Oman, and also to Pakistan, Afghanistan, and China. This is one of the significant advancements in the historical backdrop of humanity where dissemination of water innovation occurred starting with one development then onto the next (Mukherji, Scott, Molden, & Maharjan, 2018). From the 8th to the 12th century, with the defeat of Rome, the world entered another period of worldwide data through Muslims. They consolidated the wellsprings of learning from China to Spain, making the path for the thriving of world data that was passed on to the Europeans. Muslims started to create and enhance Roman innovation and achieved its pinnacle as a force to be reckoned with. Under the Muslim administer, water system framework, reservoir conduits, Qantas, watermills, showers, and wellsprings spread to many parts of the world. Muslim additionally exhibited an arrangement of water administration and water courts (Mukherji *et al.*, 2018). Ensuing annihilation of the Arabs in Spain and the debilitating of the Ottoman Empire, Western Europe rose to start a period of advancement in view of exchange, managing an account, and sea investigation. The improvement of medieval towns in Europe, identified with exchange and specialties in the climate of rivalry and competition made it important to secure water for occupants and furthermore made utilization of water for barrier and industry (Sharma, 2018). Sanitation, Sewage and water contamination progressed toward becoming issues of concern and had a noticeable part in adjusting water administration frameworks. Waterways and water processes in the late eighteenth century denoted the route to the world where water is controlled and controlled. In a similar time, between provincial connections were reinforced by the waterway frameworks inside water bowls. The administration of water was firmly identified with the ascent of the cutting edge country state on a between local scale for transport, trade, and industry (Thatte, 2018).

World Major Water Resources and Its Distribution

97.5% of the water on the Earth is salt water and just 2.5 percent is natural consumable water called fresh water which is utilized for the entire needs of mankind i.e. farming, recreational, family unit and modern. This fresh water is primarily found in two structures. Glacier/polar ice tops and ground water. 68.7 % of new water is as glacier and polar ice tops while staying 30% new water assets are as ground water with a lone little portion of 1.2 % display over the ground or noticeable all around. New water is an inexhaustible asset, however, the world's supply of new



water is consistently diminishing, with conspicuous consumption in Asia, South America and North America (Brecher, 2018).

Groundwater Resources

Groundwater is fresh water found in the subsurface pore space of soil and rocks. It is also water that is flowing within aquifers below the water table. In many places, groundwater discharges naturally to the surface, in the form of natural springs or contributing to rivers and wetlands. Groundwater is also a major contributor to surface water in rivers and streams, especially during droughts when it becomes a valuable buffer. This is beneficial for humans as we can use groundwater invariably for a long time without major consequences (Hegde, 2018). However, the average rate of seepage above a groundwater source should be taken as an indicator for average consumption of water from that source. There is an important relationship between surface and ground water, i.e. if the surface water is exposed to substantial evaporation, a groundwater source may become saline. This condition can occur naturally below endorheic bodies of water, or artificially under irrigated land. Soil salinization can occur in coastal areas where substantial use of a groundwater source may reverse the direction of seepage from ocean to groundwater (Jolly, 2018).

Situation in Sub-Continent

The Sub-Continent consists of six countries: Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. It occupies around 3 % of the global land area whereas hosts 23 % of the world's population. The region is one of the most thickly populated region in the world. Precipitation changes spatially and temporally in the region, with the lowest rain fall in Pakistan (494 mm/year) and the highest in Bangladesh (2600 mm/year) (Kaul & Jha, 2018).

Distribution of Fresh Water

The fresh water in this region is delivered by the rivers Indus, Ganges and Brahmaputra Basins, which include some of the highest yielding aquifers of the world. The aquifers linked with these basins cross international borders of the adjoining countries of sub-continent, forming number of transboundary aquifers, that includes the Indus basin aquifers (between India and Pakistan), Ganges and Brahmaputra basin aquifers (between India and Bangladesh), the Ganges tributary aquifers (between Nepal and India), the Brahmaputra tributary aquifers (between Bhutan and India and between India and Bangladesh). At the beginning of every hydrologic year, >4000 billion cubic meters' water enters the sub-continent hydrological systems, of which almost half is lost by poorly understood and un-quantified processes (e.g. overland flow, surface discharge through rivers to oceans, submarine groundwater discharge, evaporation etc.) (Steduto *et al.*, 2018).

Condition of Water



The urbanization and change in life style has also affected this region in the form of severe shortage of drinking water and other usable water in many areas of sub-continent. Because of poor water management in the region, surfacewaters have been exposed to sewage and industrial waste rendering them unfit for domestic use in many urban and rural areas as well. This practice forced the users to rely on groundwater and rainwater sources to meet drinking and agricultural water needs. Presently, about 60–80% of the domestic water supplies across the sub-continent are met by groundwater. Whereas Irrigation accounts for >85% of groundwater withdrawals in the region are considered to be the primary contributor to groundwater depletion (Jaffee & Case, 2018).

Contamination

As a result of mixed topography, the dissemination of usable potable groundwater in sub-continent is not uniform and due to presence of natural contaminants, there is a rising apprehension about the availability of safe water in many areas. Extensive agriculture with substantial use of chemical fertilizers and pesticides is another reason of water contamination as these chemicals infiltrates to the groundwater systems (Kabir, Davey, Serrao-Neumann, & Hossain, 2018). If these issues are not addressed through suitable management, the availability of usable water is likely to decline in near future. The climate change would also have a serious effect on the ground water conditions. The main sources of river water in basins of sub-continent are meltwater that flows from high altitude glaciers. As an effect of this global warming, glacial lake outburst causing higher surface run off that enhances the risk of floods in the region (Rej & Joshi, 2018).

Indo Pak Water Conflict

Having seen the water resources condition in sub- continent, let's look into the effect of geo political situation of the region on water. The two neighboring countries, Pakistan and India have been rivals since their inception The Indo-Pak water dispute started just after independence, when India choked the river water flow to Pakistan and threatened their agricultural system. The Indus basin encompasses systems of rivers mainly Indus river with its five tributaries i.e. Jhelum, Chenab, Ravi, Bias and Sutlej. The water from Indus river system has been utilized since the foundation of early civilization in the area. Most of the upper reaches of Indus basin originates from India before reaching Pakistan. After flowing through the Punjab, all these rivers join in Mithankot in Pakistan and flow through Sindh into the Arabian Sea near Karachi (Thatte, 2018). Before partition there were significant inter-state differences over water between Punjab, Sindh, Bikaner and Bahawalpur which shaped into international difference after independence. The disputes around water sharing were now between West Punjab (Pakistan) and East Punjab (India). British took advantage of naturally fertile Lands of west Punjab and developed the Indus Basin irrigationsystem. Whereas, land in East Punjab was not comparative fertile. The Unfair boundary demarcation by Sir Cyril Radcliffdivided the waters and integrated Indus canal system. This left the newly formed state with no choice but to find a proper mechanism to share and manage the irrigation system for theirrespective lands (Grigg *et al.*, 2018).



Indus Water Treaty (IWT)

India having better resources built its irrigation system quickly which could serve the agriculture needs of its western Region. As the origin of most of rivers lies in India this fact caused an apprehension of droughts and famine in Pakistan. Significant disagreements between the two countries continued, until the signing of the Indus Water Treaty in Karachi on 19 September 1960. According to Indus watertreaty, India was given unrestricted access to the waters of Eastern Rivers (Sutlej, Ravi and Bias) and Pakistan was allowed to use the waters of Western rivers (Indus, Jhelum and Chenab) along with India who can utilize the western rivers for irrigation of its crop area only. This treaty explains the obligation and rights of water sharing for better cooperation between India and Pakistan. The distinct characteristics of the treaty set a precedent of confidence building measure between the two rival nations over a very sensitive issue (Engström, Howells, & Destouni, 2018).

Present Situation

Despite the fact that both the nations have under gone three wars and many hostilities, this treaty stayed intact until the recent events which brought this treaty under discussion. The recent Indian government has very stringent relations with its neighbors specially relations with Pakistan. The Indian Prime Minister Narendra Modi recently issued a statement: Water that belongs to India cannot be allowed to go to Pakistan such kind of statement shows the intent that India has the notion in mind to deprive Pakistan of access to water which would be direct violation of basic human rights (Myrntinen, Cremades, Fröhlich, & Gioli, 2018). It is practically not possible to stop the water flow to Pakistan because it could cause flooding in India, however controlling the flow could have serious repercussions for Pakistan. Nevertheless, Modi's statement has conveyed a strong message of destabilizing the economy of Pakistan through its coercive water policies. He had been giving such kind of statements which shows his strong hatred for Pakistan.

Modi has also criticized role of World Bank in the Indus Water Treaty (Hegde, 2018). Modi desires India to solve its water related conflicts with Pakistan without the mediating role of World Bank and should modify the Indus Water Treaty as per its own satisfactions. Whereas Indus water treaty has served both the countries and World Bank has played its role as facilitator in keeping the treaty intact up till now. Pakistan has taken a serious note of these kinds of plans and breach of treaty would be taken as an act of hostile act against Pakistan. While addressing the National Assembly of Pakistan, foreign affair Advisor Mr. Sartaj Aziz said that "threats of a water war are part of a military, economic and diplomatic campaign to build pressure on Pakistan" (Latif, Yaoming, & Yaseen, 2018). According to the treaty, India can use the water of Western River to generate hydroelectric power but these should be "run of the river" projects. India has completely disregarded it and constructed Baglehar dam in 2008 on the river Chenab and two more dams are under construction, Krishan Ganga on Neelum Jhelum and Ratle on Chenab. The construction of these dams is the direct violation of Indus water treaty and would significantly deprive the Pakistan from its rightful irrigation water. Agriculture is the largest economic sector



of Pakistan and subsistence of majority of population depends on it. It contributes about 24 percent of Gross Domestic Product (GDP) and accounts for half of employed labor force and is the largest source of foreign exchange earnings. Hence, Pakistan cannot afford to lose its waters, and for that reason Pakistan has assumed a stern posture against any alterations to the Indus Water Treaty without the indulgence of World Bank (Sohail *et al.*, 2018).

Can Water Conflict Unfold Into War?

Former vice president of World Bank Ismail Serageldin one of the most important voices drawing attention to water crisis said in 1995 "if the wars of this century were fought over oil, the wars of the next century will be fought over water unless we change our approach to managing this precious and vital resource". A water conflict does not seem to be an issue that can lead to war but we will be oblivion if we do not consider the indirect usage of water for the existence of life. Water could be an ancillary cause of many wars (Pagett, 2018). Where water scarcity exists, limited supplies of water could make nations to see access of water as a concern for national security. Finite resources of water have created disagreements among the nations as evident by the water conflicts around the globe, may it be between Egypt and Sudan (Nile River), Turkey and Syria (Euphrates River) or India and Pakistan (Indus River). Water conflicts are common at the inter-sector, inter-community, inter-farm, inter- (and intra-) household level (Palmer & Melki, 2018). The conflicts over water have never been transformed into water wars as nations solve their water scarcity problem through trade and agreements. A case study of international interactions over water stated that "For the years 1948 to 1999, collaboration on the issue of water, including the signing of treaties, far exceeded strife over water and fierce clash specifically. Of 1,831 occasions, 28 percent were conflictive (507 occasions), 67 percent were helpful (1,228), and the rest of the 5 percent were impartial or not significant" (West, 2018). Although, the most recent study by NASA on consumption of water assets bolsters the other viewpoint. And the outcomes are, at 21 of the 37 biggest aquifers, water is being depleted at a more noteworthy rate than it is as a rule normally renewed, 13 of which fell into the most vexed category (Lowe, 2018). Soon enough the Gap between depletion and replenish would continue to grow as there is no infinite source of water for consumption. This situation would lead to increased water conflicts among the nations sharing same water resources and we cannot rule out the possibility of a water conflict turning into water war as world population continues to grow and water consumption continue to rise (Rohner, 2018).

Future Perception and Solutions towards Conflict Resolution

Having looked at the socio economic and political situation of the region, present circumstances does not look promising, the perpetual hatred of India towards Pakistan is evident from its every policy concerning Pakistan, may it be the core issue of Kashmir or the recent water conflict over Indus water treaty and the recent Indian government is putting fuel to the fire by giving statements like "blood and water cannot flow together" (Jones, 2018). There could be various adverse implications related to the hostility and suspicion between India and Pakistan, which hampers cooperation on important economic matters. There are speculations that India is



intentionally violating the Indus water treaty in order to push Pakistan to resolve to military action against it (Qureshi, 2018). India expects that it would win the resultant war and would solve its internal water scarcity issues. There is a possibility that the Political leaders of both the countries may get exasperated and decide to use force to achieve their objectives. The water conflict should therefore be resolved before both the countries resort to some actions which may adversely affect both countries (Demetriou & Erdal Ilican, 2018).

Solution toward Conflict Resolution

Transboundary water cooperation has always been an extended and complex journey. India and Pakistan need to resolve the water issue by taking confidence building measures. Occasionally countries collaborate to get financial assistance, so both these countries should cooperate with each other on the issue of Indus water because both these countries are getting financial help from the world bank as well as from the developed countries and also from the Indus Basin development fund. India has to show some flexibility in its behavior in solving all the issue with Pakistan (Shah, Liebrand, Vos, Veldwisch, & Boelens).

Review of Indus Water Treaty

Up till now Indian behaviors is obstinate towards conflict resolution. Indian has threatened to revoke the Indus water treaty which would not be helpful at all. The Indus Water Treaty was the very successful treaty in the world, it has survived two wars and frequent tensions and provided a structure for irrigation and hydropower development for more than half a century. India should respect the role of the World Bank in solving the water conflict between Pakistan and India (Qureshi, 2018). Unless the role of the World Bank as mediator between these two rival countries is not accepted by India, the conflict would remain stand till without any progress of conflict resolution. Some of the aspects of treaty that needs to be reviewed could be as follows. Indus water Treaty needs to be resilient and flexible to cater for the climate change. IWT should have a mechanism that stipulates water quantity as it would offer some certainty in the uncertain climatic conditions in future (Thatte, 2018). The flexibility would also cater for the population growth and decreasing resources. The Indus Waters Treaty does have an allocation agreement but it is not sustainable for the factors stated above. To deal with the climatic extremities on water such as floods and droughts, variable management stipulations have to be designed. In Indus water treaty, Review Procedures and Joint Management are already in place. It is required to have a mechanism of conflict resolution, may it be a third-party involvement or arbitration to review the actions of stake holders. When there are disagreements, this system provides an invaluable platform for information and communication. Conflict Resolution definitely increases the confidence level of the parties, safeguarding their needs in an impartial environment (Kakakhel, 2018).



Conclusion

Water Conflicts will continue to transpire in future because clean water resources are depleting and usage is increasing. War should not be a likely outcome of resource disparities and solutions must be sought to deal with conflicts that do arise. Therefore, it is vital to understand the benefits of collaboration between the countries of shared water resources. The improved management of water allocation, agriculture techniques and efficient energy generation can minimize the tension and conflict and in return it will improve the political and economic relation between the rival nations. However, these benefits vary from basin to basin, depending upon the geographic, political, economic and cultural conditions of the region. In Indo Pak scenario, the question rises in many minds that whether the two nuclear states will ever go to war on the water conflict. So far both countries have shown flexible attitude and at this juncture they need to resolve the conflict and sign a new agreement that is beneficial for both. The region is in need of new strategies to come out of the water crisis mainly because of environmental degradation, global warming, and growing population. It is the need of time now that both countries must leave behind all the differences and think for the improvement of the poor masses.

Recommendations

From the analysis of water scarcity in Indus river Basin and in the backdrop of Indus water treaty, it appears that the Treaty needs to be modified to cater for the emergent needs and upholding a supportive waters management between the two Countries. The succeeding areas of collaboration can provide foundation for modifications in the form of a duly endorsed treaty: Under article VII for future cooperation, both Countries should agree to have a joint research commission in the domain of hydrogeology, climate change, and study of glaciology. In this regard the frame work of permanent Indus commission should be taken as a reference and should be able to accommodate such functions. A provision must be made in IWT where India and Pakistan must make an agreement for storage and release of water system to maintain an optimal availability of water. With improved predictability through climate change research, both countries should develop a joint adaptation strategy to offset the effects of climate change in the region. With the mutual accord, it would allow the other riparian to use surplus water. It would be beneficial for both countries as it would reduce the cost of maintaining large water reservoirs. The IWT should also have a provision to protect the Ecological system of the region. Both Countries should accommodate the environmental flow needs while determining the water uses from their allocated rivers. The existing allocation has left Ravi into a sewage and Sutlej a sand river in Pakistan. Maintaining a minimum river flow safeguards the ecological and physical integrity of a water resource. It would require some adjustment in allocation of eastern and western for the minimum flow to the rivers. Considering the increased demand of water for irrigation and energy generation, joint water development and energy generation could a viable option. However, it can only behappening under the atmosphere of trust beyond doubts and suspicions.



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