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CONTENTS

	Page
• Foreword and Overview	i
• Indus Waters Treaty Under Stress: Imperatives of Climatic Change or Political Manipulation *Engineer Syed Jamait Ali Shah*	1
• Quest for Re-interpreting the Indus Waters Treaty: Pakistan's Dilemma *Dr. Shaheen Akhtar*	15
• Pakistan Water Security Dilemma – Approaches to Rejuvenating the Indus Waters Treaty *Sardar Muhammad Tariq*	47
• Sustaining the Water Division and/or Sharing the Benefits: A Conflict-Management Perspective *Dr. Zaigham Habib*	67

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EDITOR'S FOREWORD

The seminar on water security, held at the NDU on 19th January 2011, was an excellent forum to crystallize ideas on issues of water scarcity and management that continue to overwhelm the contemporary scene, serving as a critical reminder in the evolving concept of national security. The overarching theme, together with various thematic segments, of the deliberative exercise were crucial from the standpoint of highlighting both the challenges and opportunities as well as the way forward. The objective was best served in the intellectual discourse of this assembly of practitioners and academia.

The deliberative exercise was focused on the efficacy of the Indus Waters Treaty 1960 that had established a technical formula and mechanism for river waters division in an otherwise politically volatile region. It took stock of the sustenance and gains of the Treaty as well as the possibility of loopholes in this instrument being used for political manipulation. The debate also related to how best we can sustain the water division, together with assuring its flow, while sharing the benefits with the other side.

Full-length research papers of four main speakers at the seminar are an important outcome of the seminar geared to benefiting a larger readership. It is our proud privilege to unfold this compilation and to invite participation of our readership in this discourse of national significance and for our generations to come.

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AN OVERVIEW OF THE SEMINAR ON WATER SECURITY

Ambassador Arif Kamal

Seminar titled: 'Pakistan's Water Security Dilemma: Re-visiting the Efficacy of Indus Waters Treaty', held at NDU on 19th January 2011, was a national-level assembly of academicians and policy-relevant experts to brain storm on the country's interface with the neighborhood on river waters in as much as this impacts on national security. The exercise focused on studying the impact of climate change and unresolved political issues in the region on the country's water security, and to identify constraints as well as openings in the way of the country's strategic planning.

The discussion on the overarching theme was carried out in two thematic sessions with four topical presentations, besides the inaugural. The first thematic session was dedicated to the study of challenges and opportunities while the second dealt with possible way forward. The efficacy of Indus Waters Treaty remained in the backdrop of discussion in the two sessions.

Thematic Focus

The academic exercise was built on the premise that issue of water scarcity and management continues to overwhelm the contemporary international scene, serving as a critical reminder in the evolving concept of national security. The issue carries a double-edged significance as a propeller of the future 'water wars' and equally, as an impetus for conflict management strategies. In the South Asian context, the Indus Waters Treaty 1960 has sustained as an instrument for water

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division. However, its efficacy has now come into question amidst imperatives of the climate change effecting the water reserves and continuing political disputes between India and Pakistan, Kashmir in particular. In this broader context, it is important to pay heed to calls to counter the possibility of using loopholes in the Treaty for political manipulation. Similarly, it is relevant to deal with questions now being unfolded to re-visit the treaty and/or take approaches on its rejuvenation.

Participation

Participation at the seminar, especially those piloting the discussion, was indeed commensurate with the need to revisit this issue of significance in the South Asian arena, with long-term implications for Pakistan. It was quit remarkable to witness an impressive reunion of policy-relevant experts and academia in terms of their professional standing: the two session chairs: Ambassador Akram Zaki and Ambassador Inam ul Haque; four presenters: Syed Jamait Ali Shah, Dr. Shaheen Akhtar, Mr. Sardar M. Tariq and Dr. Zaigham Habib; and four discussants: Dr. Ishfaq Ahmed, Mr. Shams ul Mulk, Dr. Kaiser Bengali and Ambassador Tariq Fatemi. Concurrently, the audience represented a broad spectrum of policy relevant circles, think tanks, academia NDU faculty and students. The interaction amongst presenters/discussants and the audience provided a stimulant for discussion on the occasion.

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A Summary Record of Proceedings

At the inaugural, the President NDU delivered a keynote address on the conceptual frame of the water dilemma for Pakistan while underlining the importance of activating our strategic thought process and planning mechanisms. In this context, he invited particular attention to the imperatives of

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climate change and unresolved political issues and the need to counter the possibility of using loopholes in the Indus Waters Treaty for any political manipulation. As the headwaters of the Indus Basin System remain within Indian control, we cannot allow ourselves to be hostage of a situation that relates to 'no war' or 'no peace'.

Session – One

Challenges and Opportunities

The first thematic session was chaired by Ambassador Muhammad Akram Zaki with two speakers: Syed Jamait Ali Shah and Dr. Shaheen Akhtar; and two discussants: Dr. Ishfaq Ahmed and Mr. Shams ul Mulk. The session was dedicated to challenges and opportunities in the South Asian water regime with particular reference to strains on the Indus Waters Treaty in the backdrop of climatic change and potential for political manipulation. Furthermore, It also evolved around Pakistani dilemma in the wake of varying ideas for 're-interpreting' or 're-visiting' the Treaty.

The Indus waters regime as envisaged in the IWT continues to take the brunt of Indian mindset and their inclination to interfere with the waters, exclusively reserved for Pakistan. The potential to interfere is widened if not actualized, in the backdrop of contentious issues between the two countries. The Pakistani case in the current setting should lay emphasis on achievement of the Treaty and dividing the rivers rather than the waters. Given the constraints of a 'lower riparian', ruptured basin and loss of leverage (i.e. Eastern rivers), Pakistan needs to adopt a multi-pronged strategy based on water rationale to protect its water rights within the existing parameters of the Treaty. Pakistan also needs to project its concerns on issues such as transparency in information sharing. The focus should be on implementation of the Treaty by India in letter and spirit.

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The question of upper and lower riparian is essentially a misnomer in the IWT context. In the first place, Pakistan needs to stick to the Treaty, while emphasizing on its true implementation. Besides, we should put our house in order and take meaningful steps to enhance our storage capacity. Thirdly, climate change and behavior of glaciers melting needs a proper study so as to assess the water flow and uphold the upcoming disasters in an appropriate way.

Pakistan needs to follow an effective water diplomacy urging the World Bank, Western countries especially the U.S to assist Pakistan in improving its water infrastructure of Indus Basin irrigation system. China can also be helpful in this regard.

Session – Two

A Way Forward

The second session was chaired by Ambassador Inam ul Haque, with two speakers: Sardar Muhammad Tariq and Dr. Zaigham Habib; and two discussants: Dr. Kaiser Bengali and Ambassador Tariq Fatemi. The session unfolded thoughts on possible approaches to rejuvenate the Indus Waters Treaty and brought into sharper focus the questions related to water division and/or sharing the benefits. An impulse for discussion was provided by the conflict management perspective, together with primacy of Pakistani interest.

An overview of the existing water disputes between India and Pakistan shows that there are little chances of benefit sharing, therefore implementation of IWT in letter and spirit is needed. India insists on paradigm shift from water sharing to benefit sharing which places India at the epicenter of riparian politics but this process of benefit sharing has many constraints.

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Meanwhile, World Bank summarized six mechanisms on benefit sharing, they being, issue linkages, good relations, large geographic scope, side payments, slack cutting and exercise of power which leads to three scenarios. First, India should control the Eastern rivers and Pakistan the Western rivers and in case of any contentious issue - guidance from the World Bank must be sought. Second, Pakistan has to develop a framework for equitable sharing of costs and benefits and thirdly, both Pakistan and India–to mutually develop and enjoy benefits from water resources of the Indus Basin.

Both Pakistan and India need to adhere to the IWT as a legal document and maintain a dialogue process for solution of the issue. On the internal front, Pakistan faces the issues of water management, overpopulation and disharmony among the provinces, which needs proper attention both on part of the government and people. Our success in addressing the domestic issues will place the country's moral position on a stronger footing in the International community.

Findings

The multi-faceted imperatives of the water issue as discussed at the seminar lead upto consensus with a four-fold focus: -

- Pakistan cannot hope to re-visit or re-negotiate the IWT because of a three-fold disadvantage: limitations on our capacity to assure any better results; risk of opening a pandora box that provides a leverage to India; and potential to thwart the peace process between the two countries.

- Pakistan needs to stay within the domain of Indus Waters Treaty while stressing on its implementation in letter and spirit. In this context, we need to bring out

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with greater vigor that IWT is a river sharing Treaty, not a water sharing Treaty; and therefore the question of upper and lower riparian becomes irrelevant. The exceptions allowed to India in the upper reaches of Indus waters basin like agriculture use, limited storage for hydropower generation cannot be overstretched beyond the context envisaged in the provisions and the region in question.

- The country's water security dilemma is accentuated in the absence of an effective water storage capacity, water conservation and management strategy. The situation can be improved through a multi-pronged and time efficient management and a strong political will to translate plans into reality.

- The Indian elite while adhering to IWT, continues to toy with ideas for 'benefit sharing' in the wake of so called 'new realities'. Indian think tanks, IDSA in particular, have been carrying out in depth studies on water security issues with an eye on 'IWT-II'. Conversely, there are no comparable policy-relevant scholastic inputs in the Pakistani realm.

What Next?

The co-pilots of the seminar while reviewing the consensus points felt that the subject should remain on high deliberative agenda amongst the Pakistani think tanks in view of its critical importance for national security. In this context, it was agreed in broad terms that three aspects of actionable agenda merit special consideration. These are: -

- Pakistan should stay within the domain of Indus Waters Treaty. It should project the river sharing formula of IWT, not a water sharing Treaty.

- Three Task Groups need to be established to study issues in water security.

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- Hydro-politics- study and analysis of the emerging issues in Indo-Pakistan water regime: NDU can possibly provide a platform.

- Glaciers melting and its medium and long term impacts: SPARCO can provide the lead.

- Environmental phenomenon and its impact on water regime: the concerned Ministry may initiate the study.

➢ The resource persons assembled for the seminar on water security may be asked to join a selected group of NDU faculty so as to brain-storm on the scope and modalities of the study on hydro-politics in South Asia.

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INDUS WATERS TREATY UNDER STRESS: IMPERATIVES OF CLIMATIC CHANGE OR POLITICAL MANIPULATION

Engineer Syed Jamait Ali Shah

Abstract

At the time of independence, the boundary line between the two newly created independent countries, i.e. Pakistan and India was drawn right across the Indus Basin, leaving Pakistan as the lower riparian. Dispute thus arose between the two countries regarding the utilization of irrigation waters from existing facilities. The negotiations held under the World Bank, culminated in the signing of Indus Waters Treaty in 1960. In view of the intent and the spirit of the treaty, Pakistan expects that Indian projects on the western rivers would fall strictly in accordance with the provisions of the Indus Waters Treaty so that the water rights as envisaged through the treaty would appropriately be honoured. Though it is true that climatic factors are becoming important to adjudge their effects on flows in river systems, but it is also pertinent to mention that while such factors are being evaluated, Pakistan should make every effort for optimal development of its water resource available through the western rivers. This is probably the only solution available to Pakistan not only to cope with the risk of water scarcity, but also for the wider water resource management, both in view of the climate change, as well as the likely political manipulation of Indus Waters Treaty by India.

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Introduction

The Indus System of rivers in the Indus Basin comprises of river Indus and its five main tributaries i.e. Jhelum, Chenab, Ravi, Beas and Sutlej. They all combine into one river near Mithan Kot in Pakistan, which outfalls into Arabian Sea at the south of Karachi. The boundary of the Indus Basin is clearly

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defined in the west, the north and the northeast by mountain ridges (watersheds).[1]

The total area of the Indus Basin is roughly 350,000 square miles. Most of it lies in Pakistan and the rest in Occupied Jammu and Kashmir, India, China and Afghanistan. The climate in the plains downstream of the rim stations ranges from semi arid to arid. Annual rainfall ranges from about 2 inches to about 30 inches. The total annual average discharge of these rivers at the rim stations is about 170 MAF (Million Acre Feet).

On 14 August 1947, when South Asia was divided into two independent countries, there existed one of the most highly developed irrigation system in the world and approximately 37 million acres of area use to receive irrigation supplies from the flow of waters of the Indus System of rivers.[2] All of the available water supplies were allocated to the various princely states and provinces in conformity with the principle of equitable apportionment of the waters with preferential right to existing users. At the time of independence, major portion of the Indus Basin formed a part of Pakistan and out of 37 million acres; 31 million acres were in Pakistan. The boundary line between the two countries was drawn without any respect to the irrigation works. It was, however, affirmed by the boundary commission and expressly agreed by the representatives of the affected zones before the arbitral tribunal that the authorized shares of the two zones in the common water supply would be continued to be honoured.

The Background

- **The First Indian Aggression**
  - The water dispute between Pakistan and India came up soon after the ceasure of the arbitral tribunal on 31 March 1948. On 1 April 1948, India taking advantage of its being an upper riparian at every river, stopped the waters in all irrigation canals (irrigating about 1.6 million acres in Pakistan), which cross the India-Pakistan border and

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demanded that Pakistan should recognize that the proprietary rights on the waters of the rivers in Punjab (India) wholly vest in that government and the Punjab in Pakistan could not claim any share of these waters as a right.

- The claim forwarded by Pakistan, however, was based upon the time honoured formula that existing uses are sacrosanct and the excess water, not previously committed, could be divided amongst the riparians according to the area, population, etc. This principle had the support of several treaties between the nations or states, or even the provinces in the same country.

- The Indians put forward a principle under which the upper riparian has an absolute right to the water and the lower riparian can only get it under an agreement or treaty entered into between the riparians.

➢ **Road to the Treaty**

- India agreed to restore some of the supplies to Pakistan in May 1948, when a very pro-Indian temporary agreement was signed. It was, however, generally realized that Pakistan could not live without a restoration of the full supplies and, on this question, there could be no compromise. Even internationally there was awareness that there could be a war on the issue.

- Direct negotiations between the parties failed to resolve the dispute. Negotiations under the World Bank commenced in May 1952. It was agreed that specific engineering measures be worked out by which the supplies effectively available to each country will be increased substantially beyond what they have ever been.

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- The working party set up under the Bank, however, failed to agree on a comprehensive plan for the utilization of the waters of the Indus River System. The World Bank in its proposal of 5 February 1954, listed three basic difficulties (given hereafter), which prevented the working party from reaching the heart of the problem, i.e. a fair diversion of the waters between the two countries.

➢ **Difficulties in Resolution:** The three basic difficulties noted by the Bank in resolution of the dispute were the following:[3]

- The first difficulty lies in the fact that the water supplies and storage potentialities are inadequate to the needs of the basin;

- The second difficulty is that although the working party is planning on the basis of the development of the Indus Basin as an economic unit, two sovereign states are involved, which greatly limits the practical aspects of planning. The countries would be reluctant to have works regulating the water supplies on which they depend constructed in territory controlled by the other country. The prospects of establishing an efficient and smooth-running joint administration would not be favourable too.

- The third difficulty, and the most serious of all, arose in the course of discussions. The plans put forward by the two sides differ fundamentally in concept. An essential part of Pakistan's concept was that existing uses of water must be continued from existing sources and the corresponding concept of the Indian plan, on the other hand, is that although existing uses (defined to include only actual historic withdrawals) must be continued, they need not necessarily be continued from existing sources.

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Indus Waters Treaty - 1960

The bank engineers worked out their initial proposals on averages ignoring the special needs of the season for sowing and maturing of the crops when the demands of water is maximum and the flows are minimum. It took Pakistan two years to convince the bank that Pakistan's contentions were correct that the division of the waters as put forward by the bank would not accomplish the result visualized in the actual proposal. After protracted negotiations under the World Bank, when the bank was convinced that the existing uses in Pakistan could not be met by transferring the waters from the western rivers, and that storages on the western rivers would be required for the purpose, the Indus Waters Treaty was signed in 1960. [4]

The treaty consists of 12 Articles and 8 Annexures.[5] It is based on the division of the rivers between the two countries. The waters of the Sutlej, Beas and Ravi rivers, named in the treaty as "eastern rivers", are for the unrestricted use for India; and the waters of Indus, Jhelum and Chenab rivers, named in the treaty as "western rivers", are for the exclusive use of Pakistan; except for certain specified uses allowed to India in upper catchments.

Replacement Works

Under the treaty,[6] Pakistan was required to construct and bring into operation a system of works on the western rivers, in order to accomplish the replacement of water supplies for irrigation canals in Pakistan, which at the time of partition were dependent on water supplies from the eastern rivers. The replacement works comprised of two storage dams (one on Indus river and one on Jhelum river), six new barrages (diversion dams), remodelling of two existing barrages, seven new inter-rivers link canals and remodelling of two existing link canals. This only became possible through the generous assistance (grants and loans) by the friendly countries like USA, Canada, UK, Netherlands, Germany, France, Italy, Australia, Newzeland, etc. The fund was called the Indus Basin Development Fund and was set up and administered by

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the World Bank with the assistance of Indus Basin Development Board, constituted by the Government of Pakistan. India made a fixed contribution £ 62.060 million towards this Fund, which was payable in ten years in equal instalments. Thus India got 24.00 MAF of perpetual flow of the rivers for this amount. The estimated cost of replacement works (1964 estimates) was US $ 1208.50 million. There was a transition period of 10 years during which Pakistan was to receive waters from the "eastern rivers" for use in the aforementioned canals.

Such a division of rivers was a distinct departure from the concept of international law of upper and lower riparian rights (protection of existing uses from the same source). In this way Pakistan had to forgo the entire perpetual flow of fresh waters of the three eastern rivers (24.00 MAF), which it used to historically receive for irrigation.

Institutional Arrangements

Under the provisions of Article VIII (1) of the Indus Waters Treaty 1960,[7] both India and Pakistan appointed Commissioners for Indus Waters. Each commissioner, unless either government decides to take up any particular question directly with the other government, is the representative of his government for all the matters arising-out of the treaty and serves as the regular channel of communication on all the matters related to the implementation of the treaty. The two commissioners together form the Permanent Indus Commission. The functions of the Commission are:

- To establish and maintain co-operative arrangements for the implementation of the treaty;
- To promote co-operation between the parties in the development of the waters of the rivers;
- To make every effort to settle promptly any question arising between the Parties; and

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- To undertake tours of inspection of the rivers to ascertain facts.

Under the treaty, restrictions have been placed on the design and the operation of hydroelectric plants, storage works and other river works to be constructed by India on the western rivers. India is required to supply to Pakistan certain specified information related to these works at least 6 months in advance of undertaking the river works so as to enable Pakistan to satisfy itself that the design conforms to criteria set out in the treaty. Within a specified period, ranging from two to three months, Pakistan has the right to communicate to India, in writing, its objections, that it may have regarding the proposed design, on the ground that it does not conform to certain criteria specified in the treaty. Under the treaty, restrictions have also been placed for the irrigated cropped area to be raised by India in the basins of western rivers. The treaty also provides for a regular exchange of the daily hydrological data and other data under Articles VI and VII (2) of the treaty.

The treaty provides for a self-generating procedure for the settlement of differences and disputes. Any question, which arises between the Parties concerning the interpretation of application of the treaty or the existence of any fact, which, if established, might constitute a breach of the treaty, is to be first examined by the Commission, which endeavours to resolve the question by agreement.

The Current Stress on the Indus Waters Treaty – Major Ongoing Issues with India

- **Wullar Barrage and Storage Project**
  - Under the treaty, India is not allowed to construct any storage on the main stem of river Jhelum. However, 0.75 MAF storage is allowed on the tributaries of river Jhelum.
  - The site of the Wullar Barrage is located on Jhelum Main about 40 Km upstream of line of control in

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District Baramula of Occupied Jammu and Kashmir. India started construction of this barrage in 1985 to convert the natural Wullar Lake into a man-made storage work with a capacity of 0.3 Million Acre Feet (MAF) at the outfall of the Wullar Lake. Pakistan lodged a strong protest with India and the work was ultimately got suspended in 1987. Since then, the dispute is under resolution with India at the level of the two Governments, as the Commission was unable to resolve the matter. India has dubbed their project as Navigational Use allowed to India under the treaty. Pakistan has declared the project as treaty violative & non-feasible and has asked for its abandoning. The project if allowed to India will provide them capability to control the flow of river Jhelum.

- So far, 14 rounds of Secretary Level Talks including 5 rounds of Pakistan-India Composite Dialogue have been held. The work is suspended at site. Regular vigilance is being kept through all possible means.

➢ **Baglihar Hydroelectric Plant**

- Baglihar Hydroelectric Plant is located on river Chenab in Occupied Jammu and Kashmir about 147 Km upstream of Marala Headworks in Pakistan. 'Difference' on the design of the Plant between the Parties was resolved by the Neutral Expert in February 2007. The Neutral Expert reduced the height of the dam by 1.5 meter, reduced the storage by 5 Million Cubic Meter (MCM) and raised the level of power intake by 3 meters. However, the number and level of gates for the spillway, and undersluices as proposed by India were retained by the Neutral Expert[8].

- The changes determined by the Neutral Expert were carried out by India before the completion of the Plant and were inspected at site by Pakistan Indus

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Commissioner on 30th July 2008. India formally commissioned the Plant on 10th October 2008, however, the testing of turbines was started on 5 September 2008 as reported in the print media.

- For commissioning of the Plant, India filled the dam for its dead storage in August 2008 and did not abide by the specific provisions of the treaty as to maintain the flow of 55,000 cusecs at Marala Headworks in Pakistan. As per our estimate, there was a reduction of above 200,000 Acre Feet of water during this period.

- In spite of repeated requests by our Indus Commissioner, India did not provide details of schedule for initial filling of Baglihar Plant. The protest on reduction of flow was accordingly lodged with India at the level of the Permanent Indus Commission and the Foreign Office. Pakistan's concern was also raised by the President of Pakistan with the Prime Minister of India at New York. Similarly, the Prime Minister of Pakistan also apprised the Prime Minister of India on the matter in China and the issue also came under discussion between the Security Advisers of the two countries on 13 October 2008.

- On the intervention by Pakistan at the highest level, a site inspection and a meeting of the Permanent Indus Commission was arranged by India from 18-25 October 2008. After the inspection of the site, Pakistan Indus Commissioner in the meeting of the Commission asked for compensation of lost water which was reduced due to violation of the treaty provisions by India. Similarly, hourly data for the operation of initial filling was asked in order to jointly agree the reduction of flow. India, however, did not cooperate to supply the hourly data and refused compensation of flow to Pakistan. Indian Indus Commissioner was of the view that the

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reduction of flow was due to structural constraints inherited in the dam besides the unsupportive weather conditions. The Pakistan Commissioner, however, maintained his stance in line with the above noted facts. The issue was lastly debated for resolution at the level of the Commission in the year 2010.

- **Nimoo-Bazgo Hydroelectric Plant**

  - Nimoo Bazgo Hydroelectric Plant (45 MW) is located on main stem of river Indus. This Plant is also Run-of-river Plant, however, it contains a storage component of about 42,500 acre feet (52.40 MCM).

  - Pakistan's Question with regard to free board/parapet wall was addressed by ICIW during the 105th meeting dated 29th May 2010 to 2nd June 2010 by making openings (4x4") in the solid parapet wall at the dam crest level. With reference to the pondage and orifice spillway, however, India was unable to support its design as it lacked data and information. PCIW therefore, recorded his intention to proceed further for the next step as provided in the treaty for resolution of the issue. ICIW however, stated that he would address Pakistan's concern with regard to pondage as well as the spillway gates and in this regard Indian Commissioner wanted consultation with the high ups and asked for a time of one week to inform Pakistan. PCIW agreed to India's request and started that he will give Pakistan reaction after having received information from India. However Indian Commissioner did not agree to make changes in the design of the Plant. The next step to resolve the issue under the treaty may be initiated.

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- **Kishenganga Hydroelectric Plant**

  - The proposed Kishenganga Hydroelectric Project is located in occupied Jammu and Kashmir on river Neelum. The design envisages the construction of 180.05 meter long and 35.48 meter high concrete dam. The full Pondage capacity is 18.35 MCM (0.0169 MAF) with dead storage of 10.80 MCM (0.00876 MAF) and an operating pool of 7.55 MCM (0.0061 MAF). The water of river Kishenganga is to be diverted through a 24 KM long tunnel to produce 330 MW Power. The water after production of power will join the Wullar Lake. The scheme, if implemented by India, will result shortfall of about 21% Neelum inflow for Pakistan's Neelum-Jhelum Hydroelectric Project, thus reducing energy potential by 16%.

  - This project was earlier a Storage-cum-Hydroelectric Project (under Annexure E of the treaty) with a dam height of 75.48 m and a reservoir of 0.18 MAF. The diversion tunnel and power producing capacity were same. Pakistan raised objections on the diversion of flow and design of the project by India. The Commission failed to resolve the issue; however, India reconfigured their Project from Annexure E to Annexure D to the treaty i.e. from Storage Work to Run-of-river Plant in April 2006.

  - The detailed information about Run-of-river project was received from India on 25 June 2006, Pakistan's objections under the provisions of Indus Waters Treaty, 1960 were sent to India on 24th August 2006. Pakistan's `objections/questions on the proposed Run-of-river Kishenganga Hydroelectric Plant were discussed during three meetings of the Commission held from 30 May to 4 June 2007, 31 May to 4 June 2008 and 24 to 28 July 2008 without reaching the resolution by

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agreement. Pakistan Commissioner, therefore, processed the case to resolve the differences regarding design of the Kishenganga Hydroelectric Project through Neutral Expert and for the dispute of "Diversion of Waters" and "Draw Down below DSL" by a Court of Arbitration as provided in the Indus Waters Treaty 1960.

- Government of Pakistan requested Government of India on 10 July 2009 to jointly appoint Neutral Expert for resolving the "difference" and for "negotiations" to resolve the "disputes" by agreement as provided in Article IX of the treaty. Pakistan has instituted the proceedings for establishment of a Court of Arbitration on 17 May 2010. The first meeting of the Court was held in January 2011.

- The construction of our Neelum Jhelum Hydroelectric Project, considered to be a counter project of Indian proposed project, is located in Azad Jammu and Kashmir. The project with a gross head of 420 meter is to produce 969 MW power through two 15 KM and one 17 KM long tunnels. President of Pakistan formally inaugurated the project on 9 February 2008. WAPDA has awarded the contract for construction of Neelum Jhelum Hydroelectric Project to M/s. CGGS-CMEC, a Chinese consortium. Completion of the project at the earliest possibility is quite important for Pakistan in view of its stance against India viz-a-viz Kishenganga Hydroelectric Project.

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Conclusion

The crux of the Indus Waters Treaty 1960, is the division of rivers of Indus System between Pakistan and India. Waters of western rivers (Indus, Jhelum and Chenab) were allocated to Pakistan with certain restricted uses allowed to India in Occupied Jammu and Kashmir, whereas the water of eastern

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rivers (Ravi, Beas and Sutlej) available for unrestricted uses by India.

In view of the intent and the spirit of the treaty, Pakistan expects that regarding the projects and usage from the western rivers, the Indian design of the works would fall strictly in accordance with the provisions of the Indus Waters Treaty 1960 so that the water rights as envisaged through the treaty would appropriately be honoured.

Though it is true that climatic factors are becoming important to be considered as assessed so as to adjudge their effects on flows in our river systems, but it also would be worthwhile to mention that while such factors are being evaluated, Pakistan should make every effort for optimal development of its water resource available through the western rivers. This is probably the only solution available to Pakistan not only to cope with the risk of water scarcity, but also for the wider water resource management, both in view of the climate change, as well as the likely political manipulation of Indus Waters Treaty 1960 by India.

Author

Syed Jamait Ali Shah, until recently Pakistan's Commissioner for Indus Waters, is a leading technocrat and exponent of Pakistan's position on various key aspects of the treaty implementation process. He was the mainstay of Pakistan's negotiating process for settlement of differences and disputes in accordance with the treaty and also for case processing with the World Bank and the Neutral Expert on controversy over Baglihar Plan. He has also advised Government on the trends of optimal utilization of water resources, hydroelectric developments, flood control and adoption of international laws on utilization of water of common rivers and its impact on the existing Treaties, including preparation of guidelines for a draft agreement between Pakistan and Afghanistan and prepared guidelines for National Technological Policy for research and development in the area of housing, water resources management and infrastructural development.

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QUEST FOR RE-INTERPRETING THE INDUS WATERS TREATY: PAKISTAN'S DILEMMA

Dr. Shaheen Akhtar

Abstract

The Indus waters regime created in 1960 is coming under a lot of stress due to growing water scarcity in India and Pakistan and emerging climatic and environmental threats to the Indus basin rivers system. Being a lower riparian, Pakistan is faced with a dilemma as how to reinterpret the Indus Waters Treaty without giving in on its water rights provided in the treaty. The paper argues that given the constraints of a lower riparian, ruptured basin and loss of leverage (i.e. eastern rivers), Islamabad cannot go for fresh negotiations on the treaty but can adopt a multi-pronged strategy based on water rationale to protect its water rights within the parameters of the treaty. This can be done through; effective implementation of Article VI, enhancing transboundary water management under Article VII, constructive multi-track water diplomacy and efficient water uses and sustainable water resource management in Indus-Pakistan.

Introduction

Water is emerging as a critical issue in India-Pakistan relations. The growing water stress in the two countries is likely to deepen with emerging climatic threats to the Indus basin river system. As a result, the Indus water regime created in 1960 is coming under enormous pressure from change in the demographic, hydrological, political, economic, energy environment and Himalayan glaciers melt. This is putting strain on the normative, functional and administrative viability of the Indus Waters Treaty (IWT) signed in 1960. Pakistan being a lower riparian is on the receiving end of the change which has alarmed water insecure Islamabad. An intense debate is going on in the Pakistani media, public at

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large and policy making circles as how to defend Pakistan's water rights under the treaty and thwart any Indian attempt to 'steal Pakistan's water'. The water shortages experienced in the last few years, especially in the wake of filling of Baglihar dam by India in 2008 only accentuated such perceptions. Meanwhile, an intense debate around Indus II is going on in India that suggests renegotiation of the treaty with Delhi seeking water sharing rights on the western rivers. This would give India a position vis-a-vis the western rivers which it does not have at present. The norm of 'benefit sharing' is also being played up to maximize Indian control over the western rivers.

The devastating floods in 2010 brought in yet another dimension of climate change into play. Scientists across the world indicated that the global warming might have caused these floods.[1] It is widely believed that climate change would worsen water stress in the Indus basin which depends on glacial runoffs for 90 percent of its waters. Being a lower riparian Pakistan is faced with a dilemma as how to reinterpret the IWT that ensures its water security in the coming decades without compromising on its water rights under the treaty, especially on the western rivers. The paper argues that given the constraints of a lower riparian, ruptured basin and loss of leverage (i.e. eastern rivers), Pakistan cannot go for a fresh negotiations on the Indus Waters Treaty but can adopt a multi-pronged strategy based on water rationale to ensure its water security within the broader parameters of the treaty. This may include: One, effective implementation of Articles VI on 'exchange of data'; enhancing the scope of the Indus Water Commission and maximum use of the dispute resolution mechanism available in the treaty, especially at bilateral level. Two, utilization of Article VII on 'future cooperation' for initiating transboundary watershed management, sharing of Environment Impact Assessment (EIA) of hydropower projects on the upstream of the western rivers and commissioning of joint environmental studies. Three, an effective international water diplomacy using emerging international water and environmental norms, principles and laws to protect its water rights and urging World Bank, the Western countries, especially the US to assist

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Pakistan in improving the deteriorating water infrastructure of Indus Basin Irrigation System (IBIS). Finally, Islamabad must adopt an internal water resources management strategy based on socio-centric approach that focuses on indigenous physical and human resource management and is more resource-efficient and ecologically conducive. The questions raised include:-

- What are emerging challenges to Pakistan's waters rights under the Indus Waters Treaty, especially on the western rivers of the Indus basin?
- What are major constraints on Pakistan's in renegotiating the IWT?
- What is Indus II debate in India and how Pakistan should respond to it?
- What can be done to ensure better functioning of the treaty; bridging trust deficit in the implementation of the treaty and exploring new areas of cooperation so as to meet the challenges of climate change and environmental degradation in the Indus basin?

Growing Water Scarcity: Water Wars vs Water Rationale

Growing water scarcity in Pakistan and India has led to an intense competition over water resources of the Indus basin and stirred a debate on possibility of a future Indo-Pak war over the Indus waters. Waters wars rationale forecasts war between countries dependent upon a shared water resource if there is water scarcity, competitive use and countries are enemies due to a wider conflict. On the other hand, Water rationality implies any action taken by a state to secure its water supply in the long-term, both in quantity and quality. In 1960 instead of fighting a war over Indus basin waters, two countries negotiated IWT and through cooperation were able to ensure their long term water supply. Thus water rationale prevailed over water wars rationale.

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Is Indus Water Regime Withering Away?

The Indus river basin comprises Ravi, Beas, Chenab, Jehlum, Sutlij and Indus that originate from glaciers in the Western Himalayas, the Karakoram, and the Hindu Kush. Another two tributaries of Indus the Kabul and the Kurram rise in Afghanistan. Most of the Indus basin lies in Pakistan- 52.48 percent while India has 33.51 percent, and about 13 percent of the total catchment area of the basin is situated in Tibet (China) and Afghanistan. In Pakistan, the alluvial plains of the Indus basin spread over approximately 25 percent of the land area while in India it is only 9.8 percent of the total geographical area of the country.[2] Further, Indus River feeds ecosystems of temperate forests, plains and arid countryside in the delta region of Pakistan.

In Indus basin ecological insecurity contributes most to the water resources vulnerability. The quantum of water flowing in the Indus and its tributaries varies widely from year to year, depending on snowfall in the Himalayan and Karakoram ranges and rainfall in the catchment areas. Super floods occur approximately once every five years, which has raised the average flow to 140 MAF over the past 30 years. In the remaining four years, average water availability has been 135.60 MAF.[3] Besides, there is erratic monsoon pattern. Seasonal flow of waters not only in Chenab but Jhelum and Indus also has been depleting year after year for reasons ranging from global warming to deforestation and shrinking of mountain glaciers feeding these rivers.

Pakistan's Vulnerability

Pakistan is one of the world's driest countries with a single basin and its dependence on external water resources is 76 percent while that of India 34 percent. The population and economy are heavily dependent on an annual influx into the Indus river system flowing mainly through Indian occupied territory of Jammu and Kashmir. The basin accounts for 25 percent of gross domestic product (GDP), 47 percent of total employment, and more than 60 percent of annual national foreign exchange earnings.[4] Various national and

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international reports indicate that the country is fast moving from water stressed to water scarce. The per capita water availability has fallen from about 5,600 cubic meters available at the time of independence in 1947 to 1,100 cubic meters in 2005. It is projected to hit below 700 cm per capita by 2025.[5]

Indus Rivers Basin Regime

The partition of the subcontinent in 1947 divided the Indus Basin between Pakistan and India with most of the water-rich headwater going to India, and Pakistan becoming water-short lower riparian. The physical control to cut off water supplies to Pakistan coupled with population displacements, and unresolved territorial issues that exacerbated hostilities over the water dispute. Pakistan's vulnerability was exposed when on 1 April 1948 India stopped water supplies from the Ferozpur headworks to the Dipalpur Canal and to the main branches of the Upper Bari Doab Canal. The shut down, timed with the sowing of the wheat crop, affected 1.7 million acres of cultivable land in Pakistan, threatening the loss of about one million tons of wheat output. The wheat crop was saved only after Pakistan accepted, under duress, India's terms for the resumption of water flow.[6]

Under IWT, signed in 1960 after prostrated negotiations with active mediation by the World Bank, entire flow of the eastern rivers- the Sutlej, the Beas and the Ravi was allocated to India while full use of the western rivers- the Indus, the Jhelum and the Chenab barring some qualified exemptions was given to Pakistan. Pakistan, as the lower riparian state, received about 75 percent of the Indus water while India the remaining 25 percent.

Article III specifying Pakistan's rights to Indus waters stated:

- Pakistan shall receive "unrestricted use of all waters of western rivers" Article III (1)
- India shall be under obligation to let flow all waters of western rivers & shall not permit any interference with

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these waters, except for restricted uses provided in Annex C & D. Article III (2) [7]

Besides, under Article II on eastern rivers, Pakistan was permitted by way of exception to take water for domestic use, non-consumptive use and certain limited agricultural use specified in Annexure B. Annex B stipulated agriculture use of 45,500 acres from four tributaries of river Ravi- Basantar, Bein, Tarnah and Ujh. [8]

IWT has normative as well as functional values as it contains, in addition to the substantive rules regarding the regime of the Indus system of rivers, provisions regarding the implementation of an administrative and institutional mechanism and the management of the basin resources.[9] The treaty worked well for the first four decades despite major wars and spells of high political tensions. However, over the last decade it began to come under stress.

Looming Normative Stresses

The IWT was not based on any principle of law when it divided the waters of the Indus between the parties. Indeed, the treaty expressly stated that nothing contained in it was to be construed as in anyway establishing a general principle of law or any precedent. The lawyers for the parties disagreed strongly about the applicable principles of international law governing international water resources. There were conflicting principles put on the table, India invoked the principle of "equitable utilization"- the favourite of International Law Association (ILA) while Pakistan stressed on "no appreciable harm"- the favourite of International Law Commission (ILC).[10] In the absence of any consensus on principles of international water law, the treaty was based on a political compromise but having implications for the sustainable management of the basin. The division of the rivers gave the two countries an independent control and regulation of supplies within their own territories.

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Indus II Debate in India

The existing normative dimension of Indus water regime is coming under new pressures from the emerging norms in the area like 'benefit sharing' entering into the water discourse in India. The debate around Indus II in India suggests renegotiation of the treaty advocating 'benefit sharing' on the western rivers which will allow it exploit "potential in the upper catchments of the three western rivers that are allocated to Pakistan but are under Indian control".[11] There are two viewpoints on Indus II debate in India, arguing benefit sharing within or outside the treaty. B. G. Verghese, refers to Article VII about 'Future Cooperation' and argues that Indus II can be built on Indus I on the basis of 'benefit sharing' on the western rivers.

> "The potential needs to be thoroughly surveyed and could thereafter be harnessed through joint investment, construction, management and control. Pakistan cannot continue to deny India its limited entitlements in the western rivers and also freeze all further development if it wants to grasp what could be a far larger prize by way of additional storage, flood moderation and hydro power which both could share."[12]

Ramaswamy R. Iyer on the other hand argues that existing Indus Treaty offers no scope for Indus II as Verghese is advocating because Indus I has divided the river system. He suggests India to seek 'water-sharing on the western rivers' in a new treaty on Indus.

> "If we want a new relationship between the two countries on the Indus a totally new treaty will have to be negotiated; it cannot grow out of the existing treaty; and questions will immediately arise about the coexistence of two divergent treaties."[13]

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A recent IDSA Task Force Report *Water Security for India: The External dynamics* also calls for modification of the treaty so as to enhance India's rights to western rivers. It states:

> "With Pakistan, given some stringent provisions in the IWT that thwart India's plans of developing projects on the western rivers, 'a modification' of the provisions of the treaty should be called for. Whether this is done through renegotiations or through establishing Indus II Treaty, modifications of the provisions are crucial in case of western rivers."[14]

The task force has also recommended a shift from 'water sharing' to 'sharing benefit' in the Indus basin.[15] There is a possibility of improving the treaty if the two governments want to do that. Article XII of the treaty provides that its provision may be modified by a duly ratified treaty by the two governments. The big question mark is how co-riparian can find ways and means to accommodate each other's emerging concerns.

Emerging Functional Strains

Under the treaty, India has rights to entire waters of eastern rivers, barring minor exceptions. In addition, it has right to utilize 3.6 MAF of waters from western rivers subjected to restrictive provisions in the treaty which are now at the centre of functional strains. India can irrigate a maximum crop area of 1.34 million acres and utilize 3.6 MAF for storage projects, including general storage (1.25 MAF), power storage (1.6 MAF) and flood storage (0.75 MAF). Of this storage, 0.4 MAF is allowed on the Indus, 1.5 MAF on the Jehlum and 1.7 MAF on the Chenab. India can also construct run-of-river hydroelectric plants on the western rivers. All the technical parameters for each river are specified in Annexure D. Annexure E defines the limits of various storages of water for India on the western rivers.

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India's Entitlement of Storage on the Western Rivers (MAF)

River system	General Storage	Power Storage	Flood Storage
Indus	0.25	0.15	Nil
Jhelum (Excluding Jhelum Main)	0.50	0.25	0.75
Jhelum Main	Nil	Nil	As in Paragraph 9, Annexure E
Chenab (Excluding Chenab Main)	0.50	0.60	Nil
Chenab Main	Nil	0.60	Nil

Source: Indus Water Commission

In the past decade or so, India started building an array of hydropower projects on the western rivers which has caused controversies and IWT regime is increasingly facing strains in its functioning especially regarding exchange of data, transparency in data sharing on new projects. As a result, dispute resolution at the bilateral level at the Indus Water Commission is becoming difficult leading to recourse to second and third tier of dispute resolution mechanism in the treaty- the Neutral Expert and Court of Arbitration. This is quite evident in case of Baglihar on Chenab main and Kisheganga on a tributary of the Jelum River.

The interpretation of the permissive and restrictive provisions on the western rivers is the main source of controversies around the Indian hydroprojects. This includes interpretation of the technical design of the dams and hydropower projects and legal interpretation of diversion of rivers or tributaries of Indus system. Pakistan uses restrictive clauses of the treaty to protect its exclusive rights to western rivers. Many of its concerns get aggravated by its lower riparian status. Thereby, Islamabad strongly feels that the Indian projects do not follow technical parameters laid in the

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treaty and that unlimited proliferation of dams and diversion of water would interfere with the flows of the western rivers into Pakistan. In contrast, India uses permissive clauses to justify its projects on the western rivers and its upper riparian position gives it a certain amount of control over the functioning of the IWT.

The treaty lays down principles of cooperation in Articles VI and VII which relate to "exchange of data" and "future cooperation" respectively. This is intended to ensure cooperation in implementation of the treaty and future collaboration in optimum development of the Indus rivers. From the Pakistani perspective, Article VI on exchange of data is faced with a number of problems in its implementation. India is not timely sharing all information regarding the flow data and the construction of its hydropower projects on the western rivers. This has caused lot of distrust and misperception, causing panic reactions in Pakistan. Thus, water debate in Pakistan is dominated by a perception that India is 'stealing water' or indulging in 'water terrorism' against Pakistan. Officially, Islamabad is increasingly resorting to third party dispute resolution mechanism. The growing recourse to third party mechanism is not only going to cost the parties in money and time but would also widen distrust, undermine the efficacy of the institution of Indus Water Commission and politicize the water issue between the two countries.

Impending Management Challenges

The partition of the Indus came only after attempts at basin wide development and planning had failed. The Indus Treaty is considered as a 'suboptimal solution to the management of the Indus.'[16] Water resource management in the basin is adversely affected by the hydrology of the Indus River system which is highly variable, season-wise and year-wise, increasing its vulnerability to the vagaries of climate change. Extreme hydrological events may result into droughts or floods. The flow variation between summer and winter, on average, is about five to one while the demand of agriculture is

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two to one between summer and winter. [17] The transboundary management of the Indus basin is facing new challenges from the climate change and environmental degradation in the catchment areas, over abstraction of ground waters and pollution of water bodies. Some of the major transboundary and internal management challenges are:

- **The Climate Change** has added complexity to the transboundary water resource management in the Indus basin. The World Bank Report, *Pakistan Water Economy Running Dry*, in 2005 identified climate change as one of the sobering fact in the Indus basin. "It is now clear that climate change is already affecting these western glaciers in a dramatic fashion".[18] The International Centre for Integrated Mountain Development (ICIMOD) observes that receding and eventually disappearing high altitude reservoirs of snow and ice will over time reduce downstream runoff, and increase its variability.[19] It is generally believed in the scientistic community that the 2010 floods in Pakistan were driven by a 'supercharged jet stream' that had also caused floods in China and a prolonged heatwave in Russia. Experts from the United Nations (UN) and universities around the world said the "extreme weather events" prove global warming is already happening.[20] Dr Peter Stott, head of climate monitoring and attribution at the Met Office, observed, it was impossible to attribute any one of these particular weather events to global warming alone. But there is "clear evidence" of an increase in the frequency of extreme weather events because of climate change. [21]

- The melting of the Hindu-Kush-Karakoram-Himalaya glaciers will have serious consequences for the Indus basin. Two thirds of the Himalayan glaciers are reported to be receding while Karakoram glaciers are advancing, both having implications for the management of the basin. The Kolahoi, the biggest glacier in Indian held Kashmir (IHK) and the source of Jehlum River is melting faster than other Himalayan

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glaciers. It has receded from 11 km2 to 8.4 km2 over the past three decades.[22] Similarly, there are 459 glaciers stretched over 1,414 sq kms (Km2) in Chenab basin, but until 2004, they had retreated to 1,110 km2.[23] The 3,600 meter high and 78 km long Siachen glacier on the other hand has become highest battleground on the earth between Indian and Pakistani military since 1984. The glacier is melting faster and has shrunk to half of its size. Indian military presence on the glacier is considered a major reason behind its speedy melting. The Siachen glacier's melting ice is the main source of the Nubra River in Indian controlled Ladakh, which drains into the Shyok River. The Shyok in turn joins the Indus River. Thus the glacier is a major source of the Indus waters.[24] The fast retreat of the glacier will directly touch lives of millions across Pakistan dependent on the Indus River for their livelihood.

- **The Environmental Degradation** in the upper reaches of western rivers is going to have adverse impact on the down stream flows of the western rivers. IHK possesses vast forests stretching from the lower valleys high up into mountain passes right to the edge of massive glaciers. Forests in Jammu & Kashmir vary according to both altitude and climatic conditions. The KEWA report on deforestation in J& K, shows that in the last 50 years, deforestation has accelerated in the region as a result of poor government control (and in some cases corruption), lack of local awareness, and military conflict.[25] Sustained deforestation has begun to have a severe effect on the entire environment of the region. In both IHK and Azad Kashmir, the cutting down of old alpine forests has occurred at an alarming rate with the full knowledge of both administering governments.

- Wullar Lake is facing environmental degradation. The lake located in IHK is Asia's largest fresh water reservoir that feeds river Jehlum and fills Mangla dam

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in Pakistan. It is one of six Indian wetlands designated as Ramsar sites but is facing environmental threats of converting large parts of catchment area into agricultural lands, pollution from heavy use of chemical and animal wastes, hunting of birds and infestation of weeds.

- Under the increasing water stress, the continued deforestation in the region is affecting the flows downstream. The variation in the flow in the system over a past decade has been observed to be alarming and unprecedented. According to Indian Meteorological Department (IMD) temperature in IHK has increased by over one degree, and it is now continuously soaring at .05 degree every year. IMD observes that deforestation had caused 35 percent decrease in monsoon and 10 percent in snow annually in IHK. [26]

- **Transboundary Impacts of Indian Hydroprojects.** Indian hydroprojects are bound to have devastating local and transboundary environmental impacts. Experts strongly believe that India's Kishenganga Project is going to have adverse environmental impact on Gurez Valley in IHK and Neelum Valley in AJK. It will submerge many parts of the beautiful Gurez Valley and displace more than 25,000 Dard Shin natives from the area.[27] The project would reduce the river's flow into Pakistan by 27 percent[28] which will adversely affect the agriculture usages in the Neelam valley and Muzaffarabad district, besides affecting the power generation capacity of the Neelum-Jehlum by 16 percent. It will affect about 200 kms of river bed in AJK. The river will turn dry over 40 kms, a negation of international environmental laws. Under the law, at least 70 per cent of river flows are to be protected in case any project is taken in hand. [29]

- **Transboundary Impact of Over-Abstraction of Ground Water:** Over-abstraction of groundwater in

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Indus-India basin closer to Pakistan's border is having serious impacts on the aquifers of Indus-Pakistan.[30] Subsidized energy for groundwater pumping is a major reason behind over abstraction in Northern India- Punjab, Haryana, Delhi and Rajasthan. Consequently, water table in Pakistan's bordering areas with India is going down alarmingly. National Aeronautics and Space Administration (NASA) study in 2009 using satellite imagery based on Gravity Recovery and Climate Experiment (GRACE) Satellite observation shows groundwater changes in India during 2002-2008.[31] This show that over abstraction of groundwater in bordering Indian states is affecting aquifers of Pakistan. The surface water scarcity in the basin states would ultimately put more pressure on the depleting aquifers. There is a need to look into options of managing aquifers in the basin states.

- **Transboundary Impacts of Drainage and Waste Waters Discharges:** Another management issue arises from the pollution of drainage water and waste water discharge into river bodies in the rivers of Indus basin flowing into Pakistan. In the catchment areas of the Indus India, the effluents are being discharged into the rivers due to rapid urbanization and growth in agriculture. The natural slopes allow flow of untreated effluents from Indian Punjab to Pakistani Punjab. The drains entering into Pakistan bring heavy loads of wastes- having environmental implications for human and livestock health, besides affecting the health of the water bodies.[32] Pollution in Wullar Lake, Dal Lake and Jehlum River is affecting health of water bodies of the Indus river system flowing into Pakistan.

The Internal Water Resources Management in the two countries is deeply shaping the new threats to the quality and quantity of water in the Indus basin. As IWT gave independent control to both sides over their respective segment of the basin, they gave little importance to sustainable management of their water bodies by preserving

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the socio-ecological systems. Instead, the national water strategies on both sides have focused more on the supply side management than demand management. They have followed technocratic approach that looks almost exclusively on supply side hydrology and advocates engineering solutions that are least mindful of the health of the basin or transboundary impacts. Thus there is little emphasis on socio-centric approach which lays emphasis on indigenous physical and human resource management and is more resource-efficient and ecologically conducive and strongly suggests integrated Water Resource Management (IWRM) strategy.

Revisiting Indus Water Regime: Options for Pakistan

Options within the Treaty: Effective Implementation of Article VI

A number of steps can be taken to build trust and strengthen functioning of the treaty by effectively implementing Article VI on exchange of data; expanding scope of Permanent Indus Water Commission (Article VIII) and judicious utilization of Article IX on the settlement of 'differences' and 'disputes'.

- **Trust Building through Timely Data Sharing by Installing Telemetry System:** As a downstream country and being party to IWT, Pakistan has right to know the gauge level and regular inflow and outflow figures from hydro projects in India. In fact, most of Pakistan-India current water conflict is rooted in trust gap caused by inadequacies and opacity in data sharing regarding the flow data provided to Pakistan. Parties are still relying on outmoded data sharing mechanism that is unable to ensure transparent and real time water transactions between India and Pakistan. The distrust in sharing of flow data can be bridged by guaranteeing real time data sharing through installation of telemetry system. Telemetry has become indispensable tool for water management applications on real time basis. Telemetry system is used globally as an effective real time monitoring mechanism for water quantity, quality,

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sediment flow, snow and ice melt, weather forecasting and meteorological data for improved decision-making.[33] Timing of flows is also very crucial for Pakistan because agriculture in the Pakistani plains depends not only on how much water comes, but that it comes in critical periods during the planting season. In July 2010, in a meeting of Indus Water Commission, both sides agreed in principle to put in place a telemetry system on the Indus to record and transfer real-time data. If the proposed telemetry is properly installed and operated, either jointly or by a third party, this will help in restoring trust and minimize uncertainty and confusion over the flow of western rivers. The telemetry systems should include watershed forecasting and flood warning telemetry systems.

- **Transparency in Data Sharing Regarding the Construction of Indian projects:** on western rivers is critical in trust building. Pakistan's concerns are multiplied due to lack of timely and inadequate data sharing which has greatly politicized the water issue and deepened distrust between the two countries. Delays and inadequate data supply to Pakistan by India on projects like Wullar Barrage, Baglihar, Dul-Hasti, Uri-II and Kishenganga, Chutak, Nimoo Bazgo hydroprojects has deepened Pakistan's apprehensions. Delayed and incomplete information and engineering details constrains Pakistan's ability to review and adjudge compatibility of India projects with design criteria provided for in the treaty.[34] Further, provision of such information is essential for Pakistan to ensure that run-of-the-river plants are being operated in accordance with the treaty. Another related major concern for Islamabad is that Delhi does not stop work on a project where technical parameters have become controversial between the two countries on the plea that it is not provided in the treaty. Under IWT, India requires to communicating details of new projects six months before their commencement, diversion for storage and farm purposes from western rivers and

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providing details about ancillary projects.[35] Former Indus Water Commissioner Jamaat Ali Shah has pointed out that "the provisions of the treaty imply that any objections must be resolved. If India goes on constructing and we go on objecting without resolution in a time bound manner, then both the letter and spirit of the treaty are negated."[36] If India supplies timely information on the design of its projects on the western rivers before staring work on them, it would remove Pakistan's apprehensions regarding their incompatibility with the treaty. Being a co-riparian, it is also Pakistan's "right to be acquainted with civil works projects on eastern rivers in India" [37] which affects it as a downstream.

- **Expanding Scope/Mandate of Indus Water Commission:** The functioning of the PIWC set up under Article VIII of the treaty should be strengthened by expanding its scope and mandate. The main task of the Commission is to maintain a co-operative arrangement for the implementation of the treaty; promote co-operation between the parties in the development of the waters of the rivers; meet regularly to review implementation of the treaty; make every effort to settle promptly any question arising between the parties; and undertake tours of inspection of the rivers to ascertain facts.[38] Although, it has performed its supervisory role quite well but it, mandate is too limited that is putting strain on the very functioning of the institution. The role of PIWC needs to be in line with the current realities or else it will lose its relevance in implementing the treaty. There is a need to expand role of the Commission regarding co-operation in the harnessing and sustainable management of Indus waters. An Indus Water Consultative Group comprising India, Pakistan and international water experts can be formed to provide input on supply capacity of the Indus basin taking into account the issues like climatic changes and environmental degradation. The group can conduct joint studies on the impact of climate

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change on Himalayan glaciers, joint watershed management and joint studies on environmental impact assessments of the hydro projects, especially on the lower riparian. It can also thrash out a joint watershed management strategy for the catchment areas of western rivers. India is also in favour of revitalizing the institution of Commission. There is a realization within the Commission that its role should be in consonance with emerging realities in the Indus basin or else it will lose its relevance. The meeting of the Commission, held in New Delhi in June 2010 has decided to strengthen the working of the Commission by setting up a body to oversee it.[39] There is also need to develop capacity of Pakistan chapter of Indus Water Commission in water diplomacy, water conflict resolution, water entitlements, legal and technical issues so that Pakistan can defend its case soundly based of varied expertise in the field.[40] Expanded scope and mandate of the PIWC and a strong Pakistan Indus Water Commission will help in defending Pakistan to case well averting frequent recourse to the Court of Arbitration (CoA).

- **Judicious Utilization of Article IX:** Article IX of the treaty specifies three tier dispute resolution mechanisms- bilateral level - Commission under Article IX (1) and Two Governments – IX (3) & (4) as well through third party involvement Neutral Expert – IX (2)(a) and Court of Arbitration – IX (5). Since bilateral level is getting weaker due to new realities, the third party option is becoming more attractive. There is an urgent need to strengthen the bilateral strand.

Reinterpreting IWT: Expanding Cooperation under Article VII on 'Future Cooperation'

The IWT is silent on many emerging threats to Indus basin that may include climate change, environmental degradation, management of shared aquifers and water quality. These can be addressed by utilizing so far unutilized Article VII on future

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cooperation. Since these concerns were not present at the time of the signing of the treaty, they could be covered by this provision. The water rationale demand that both countries broaden the scope of Article VII to develop cooperation in transboundary watershed management, declaring all glaciers protected area, sharing environmental 'Impact Assessment' of hydro projects in the upstream of western rivers and maintaining transboundary aquifers and ensuring ecological flows in the eastern rivers.

Article VII lays down the principles of 'future cooperation'. It states:

> "The two parties "recognize that they have a common interest in the optimum development of the rivers" and "they declare their intention "to cooperate by mutual agreement, to the fullest possible extent." [41]

While just talked about installation of hydrologic and meteorological observation stations and some drainage or engineering works subjected to mutual agreement. There is need to use Article VII for sustainable transboundary management of Indus basin. This article provides opportunity to meet the threats emerging from climate change in the Indus Basin which was not factored in when the treaty was signed in 1960. Some of the cooperative steps are identified as under:

- **Study of the Behaviour of Himalayan Glaciers:** Glacial fluctuations and changes in precipitation patterns are expected to alter the hydrology of the river basin, hence jeopardising hydropower generation and agricultural production and consequently altering people's livelihoods.[42] The study of the behaviour of Himalayan glaciers is a must as they are considered quite vulnerable to adverse impact of climate change. Both sides need to form a group of experts to study behavior of glaciers whether advancing or decreasing. The largest challenges stem from inadequate information and monitoring, and limited scientific understanding of these high elevation glaciers.

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Conflicting behaviour of glaciers, such as retreating, advancing, and even surging, within small distances is posing difficult questions to the scientists.[43] International Centre for Integrated Mountain Development (ICIMOD) based in Nepal has already taken a lead by organizing a workshop in July 2010 on 'Climate and environmental change impacts on the cryosphere of the Indus basin and its implications for future water scenarios'. Scientists at the workshop included those from India, Pakistan, China and Afghanistan who identified key gaps in knowledge about the Indus basin. They agreed to improve collaboration on scientific and technical research on the impacts of climate change on the cryosphere of the Indus basin. They also proposed a long-term Indus Basin Progamme that can be implemented by local and international agencies with ICIMOD in a strong facilitating role. A combination of bilateral and multilateral approach which includes China and Afghanistan that are not part of the treaty is absolutely necessary to respond to new climatic threats in the HKH region. This will also facilitate sharing of experiences to create an environment of ownership of scientific work among regional government institutions engaged in sustainable water resource management in the Indus basin. Transboundary scientific coordination and collaboration in scientific and technical research is essential in order to obtain a holistic perspective of the existing and anticipated changes in the natural system of transboundary river basins like the Indus. Institutional cooperation is quite possible between the metrological departments of India, Pakistan, China, Nepal and Afghanistan that are important stakeholders in HKH region.

- **Declaring all Glaciers Protected Area:** India-Pakistan urgently needs to declare all Himalayan glaciers as protected areas as climate change and environmental degradation, aggravated by human activity is adversely affecting these ice reservoirs. Of

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particular importance is Siachen glacier where continued presence of the armies, especially on the Indian side of the glacier has accelerated the melting of the glacier. Siachen is under threat of disappearance and must be demilitarized. Dialogue on Siachen has moved slowly but is considered doable. A number of new ideas have come up under discussion in the ongoing composite dialogue which suggests turning it into a 'mountain of peace' or a 'zone of peace'. It simply requires political will to formalize them by settling the issue. This will end drain on the resources wasted- India spends about $2 million a day while Pakistan $ 1 million per day to sustain troops on Siachen.[44] This amount can easily be diverted to creation of Protection of Himalayan Glaciers Fund that can be spent on the sustainability of the HKH region. China and Afghanistan can join the fund and make their contribution.

- **Cooperation in Transboundary Watershed Management:** Environmental threats recognize no political or geographical borders, but no joint effort is being made in India and Pakistan to meet the challenges of environmental degradation in the Indus watershed and monitor the changing weather pattern. Being lower riparian, Pakistan has no access to the upper catchments of the western rivers allocated to it as these lies in the Indian controlled territory. The changes in watershed condition and course of rivers demand better strategies for management.

  Joint approach to watershed management is critical to maintain sustainable flow in the upstream region to control floods and soil erosion. The basin watershed area in both parts of Kashmir is facing deforestation and environmental degradation. India has been pursuing the idea of joint water management while Pakistan has proposed joint watershed management which is actually geared to augment supply in the system. This can be done through joint surveys and

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development of the upper basins of the western rivers that are facing threats and uncertainties emanating from gathering climate change. Cooperation in watershed management is deeply linked with the joint response to climatic threat to HKH glaciers. This would not only benefit India and Pakistan in the Indus basin but would also benefit India in Jamuna and Ganga river basins that originate from the same region. Article VII on "Future Cooperation" can be used to enhance the sustainability of water in the Indus system in an optimal manner.

- **Sharing of Transboundary Environment Impact Assessment (TEIA):** Hydropower projects in the upstream of the Indus Basin Rivers have adverse transboundary environmental impacts on the downstream flows and flora and fauna which will be aggravated by climate change. The Treaty permitted India under strict conditions to construct run-of-the-river hydropower projects but was largely silent on sharing of transboundary environmental impact assessment on the downstream state. Being lower riparian and dependent on a single basin, Pakistan is extremely vulnerable to adverse environmental impacts. India should share Trans-boundary Environment Impact Assessment (TEIA) of various hydropower projects being planned or built on the western rivers as well as the eastern rivers. This can be done bilaterally or multilaterally. At the bilateral level, cooperation is possible under Article VII, by initiating joint commissioning of environmental studies as proposed by Pakistan that can help in ensuring ecological sustainability of the Indus basin. At the multilateral level, there is emerging body of transboundary environmental laws that require upstream states to share the environmental impact of their projects with the lower riparian. European and North American countries are adopting regional agreements that provide for TEIA. The Espoo (EIA) Convention[45] sets out the obligations of parties to

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assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of the States to notify and consult each other on all major projects under consideration that are likely to have significant adverse environmental impact across boundaries.[46] Canada, Mexico and the US also have North American Agreement on Transboundary Environmental Impact Assessment.

There are various international treaties on management of international watercourses and climate change that call for national measures for the protection and ecologically sustainable management of transboundary surface and ground waters. These include Helsinki Rules on the uses of International rivers (1966) UN Convention on Protection and Use of Transboundary Watercourses and International Lakes (1992), UN Convention on Non-Navigational Uses of International Watercourses (1997). United Nations Framework Convention on Climate Change (UNFCCC) 1997 can also be used to this effect. Article 5 of the UN Non-Navigational Uses of International Watercourses requires water courses nations to participate in the use, development and protection of an international water course in an equitable and reasonable manner. India and Pakistan are not party to the Convention. Other concerns relating to ecological flows in eastern rivers and transboundary water pollution also needs to be addressed

- **Ensure Ecological Flows in Eastern Rivers**: The flow of the three eastern rivers allocated to India has declined since the signing of IWT. The two eastern rivers Sutlej and Ravi get flood water but during lean period there minimum flow is abysmal. Consequently, Pakistan is facing the problem of maintaining eastern rivers for flood years without water. Ecological flows are also important to maintain biodiversity and environment in Indus-Pakistan. Also important is the issue of minimum flows in eastern rivers for domestic

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purposes, especially in the low flow times. The low minimum flows during 1976-77 to 2009-10 touched very low minimum average of - 0.30 MAF- Ravi 0.29; Sutlej 0.01.[47] India should ensure minimum ecological flows in eastern rivers so as to maintain the biodiversity and environment in Indus Pakistan. This can be addressed under Article VII. This can be reinforced by various international water and environmental laws, mentioned above.

- **Addressing Transboundary Water Pollution:** The quality of water is as much important concern as the quantity of the Indus waters. The issue of pollution of the waters of the rivers and tributaries of the Indus system was taken up in Article IV (9) of the Treaty. It stated that each party should 'prevent' "undue pollution of the water of the rivers" and take measures to ensure that before any sewage or industrial waste is allowed to follow into the rivers, it will be treated." Lately, the issue has been taken up in the meeting of Indus Waters Commission held in July 2010. Pakistan asked India to stop contamination of water in the Hadiara nallah that flows near Lahore and brings the industrial waste to Pakistan and pollutes the Ravi and Kasur drains. The issue of Baramulla waste polluting Jehlum River was also raised with India. New Delhi has agreed to conduct joint inspection to measure pollution levels in the Jehlum River, Hudiara drain ad Kasur drain. Both sides have also agreed to conduct a joint survey to monitor river pollution.[48] International Water Laws, Helsinki Rules on the uses of International rivers (1966) in particular emphasizes on controlling pollution in the transboundary rives. Both sides need to cooperate to maintain quality of water and should not dispose of its waste into watercourses on the Indus basin. Efforts should be made to invest in water quality conservation and waste water infrastructure.

- **Maintenance of Transboundary Aquifers**: Pakistan water table in Punjab, particularly in the

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bordering areas with India has gone down alarmingly because of over extraction of groundwater in Indian Punjab. The issue of ground water was not visualized in the Treaty as there was not much reliance on it in the 1950s which has increased massively in the last decade or so, the deep fresh aquifers are fast depleting. This warrants a comprehensive study of the current situation of transboundary aquifers, water table declines and quality degradation in the Indus basin, especially aquifer bordering the basin states.[49] Collaborative steps are also needed to employ artificial ground recharge (AGWR) techniques to improve the long term sustainability of deep aquifers. The issue can be taken up in the discussion of Indus Commission under Article VII. There should be sharing of information and best practices for better management of groundwater resource.

Constructive Multi-Track Water Diplomacy

Since India-Pakistan water issue is not only politicized but also internationalized, it would be important for Pakistan to make use of the emerging international water and environmental norms, principles and laws to protect its water rights in the Indus basin. There are number of international conventions on sustainable management of the shared basins that can be drawn upon in responding to new threats to the Indus basin.

Regional cooperation in addressing vulnerabilities emerging from climate change is quite possible. In the April 2010 Thimphu statement on climate change both countries have agreed to undertake the measures, which include: (i) to review the implementation of the Dhaka Declaration and the Saarc Action Plan on Climate Change and ensure its timely implementation; (ii) to establish an Inter-governmental Expert Group on Climate Change to develop clear policy direction and guidance for regional cooperation as envisaged in the SAARC Plan of Action on Climate Change; study climate risks in the region and related socio-economic and

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environmental challenges; conservation of biodiversity and mountain ecology covering mountains in the region; and monitoring the monsoon pattern to assess vulnerability to climate change. [50]

Pakistan should come out of a reactive mould and adopt a more proactive strategy to handle transboundary water issues with India. Pakistan has been quite ineffective in using the growing norms in international water and environment laws to its advantage or support its case based on more scientific facts. In NE verdict in Baglihar, enough weightage is being given to impact of climate change and 'new technical norms and new standards provided in the treaty. This gives enough space to Pakistan to reinterpret the treaty in the light of new threats to the Indus basin and look for solutions that address mutual vulnerabilities.

Further, there has been hardly any systematic analysis conducted by Pakistani experts in a scientific manner [51] and coordinated manner on the transboundary water issues with India. There is dire need to move away from the emotive discourse to a more informed and scientifically supported discourse that strengthens Pakistan's case more logically. Pakistan also need to pursue multi-track water diplomacy for sustainable management of the Himalayan rivers' basins, especially the Indus basin and use the platform of ICIMOD, SARRC, and many other social sector organizations like IUCN, WWF, Global Environment Facility (GEF) and UNEP to explore innovative areas of cooperation, within and outside the treaty.

Also very important is the fact that Pakistan needs international assistance to fix its fast deteriorating infrastructure. The Indus basin irrigation system (IBIS) is the largest contiguous irrigation network in the world but it is crumbling due to a combination of age, deferred maintenance and neglect. The 2010 floods have exposed the weakness in the Pakistan's water infrastructure. The country needs financial resources to sustain its huge irrigation system as well as build new reservoirs as it has very low storage capacity. The

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World Bank, Asian Development Band and the US can assist Pakistan in this regard.

Internal Management of Water Resources and Sharing of Best Practices

Internal water resource management becomes very important given the fact that physical separation of the Indus tributaries has hampered the possibilities of efficient integrated basin management. In view of growing water scarcity, it is the responsibility of both states to ensure internal water resources management by following the principles of Integrated Water Resources Management (IWRM) and share best practices in water conservation techniques in agriculture, industrial and domestic uses.

There is need for a paradigm shift in water management from technocratic approach that looks almost exclusively toward engineering solutions to socio-centric approach which lays emphasis on indigenous physical and human resources management at more resource-efficient and ecologically conducive. A combination of supply-demand management strategies would help in meeting new threats to the Indus basin water resources. On the supply side strategies, efforts are needed to augment the availability of `usable' water through extensive recourse to local rainwater harvesting ('catching the raindrop as it falls') and watershed development. Reservoir management is also very important and emphasis should be on the small and medium dams that can meet the local needs of the area. The demand side management strategies may include the practice of the utmost economy and efficiency in water use and of resource-conservation. Better water conservation strategies need to be introduced and the maximum conservation needs to be done in the irrigation sector.[52] A holistic approach to water resources recognizing linkages between water, land, users, environment and infrastructure is necessary to evade crisis of water scarcity in the basin states. [53]

Both sides need to share best practices in water conservation techniques in agriculture, industrial and

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Reinterpretation of the Treaty is quite possible under Article VII on future cooperation and it has already entered into water discourse in India. This article can form basis of cooperative strategies in responding to emerging climatic threats, environmental degradation to the Indus basin and coordination in resource management strategies in both countries. Cooperative strategies may include scientific collaboration in the study of behavior of Himalayan glaciers, declaring glaciers protected area, common approach to transboundary watershed management, sharing of transboundary impact assessment (TIA) of India hydropower projects; maintenance of transboundary aquifers; addressing transboundary water pollution and ensuring ecological flows in the eastern rivers. There are key gaps in knowledge about Indus basin that are causing anxieties in lower riparian Pakistan and need to be addressed. Both sides need to cooperate to install monitoring and forecasting capabilities for the glacial region and catchment areas of the upper Indus basin to meet challenge of climate change. Finally, efficient water uses and sustainable water resource management in Indus-Pakistan and Indus-India is critical to emerging concerns regarding water quality and environmental sustainability of the Indus basin. Cooperative approaches at the basin and sub-basin levels can help build trust and improve water relations between upper-lower riparian and assure long term access to water both in quality and quantity.

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PAKISTAN WATER SECURITY DILEMMA – APPROACHES TO REJUVENATING THE INDUS WATERS TREATY

Sardar Muhammad Tariq

Abstract

This paper briefly traces the history of water disputes which emerged immediately after the partition of the sub-continent into two independent and sovereign states of India and Pakistan. It highlights the firm views of India and Pakistan on riparian water rights prior to signing of the Treaty in 1960. It further mentions the strong reaction of Indian Lok Sabha against the Treaty. Also, India has signed bilateral agreements with Nepal and Bangladesh and this article evaluates the extent to which these treaties have been honoured by India and what lessons can be learnt from those treaties. This research paper also discusses the evolution of the International Water Laws since the signing of the Indus Waters Treaty. At the end, available options are discussed to move forward to rejuvenate the Indus Waters Treaty.

Background

Water disputes between India and Pakistan emerged immediately after the partition of the sub-continent into two independent and sovereign states. This partition unfortunately cut across the already established and well functioning networks of irrigation canals and numerous hydraulic structures with control structures of the eastern rivers falling within the domain of India and canal network extending into West Punjab and irrigating some 5 million acres of fertile land. Soon after the partition, India communicated to Pakistan of its intention to divert the waters of eastern rivers for its own uses. As the control structures were in Indian Territory, India could do it easily. This meant that the single and only economic base of Pakistan i.e. irrigated agriculture would be left high and dry. This act of

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India tantamount to strangulating Pakistan's agro-based economy and igniting the fuse for a major war. The sensitivities of this issue were realized by international communities as well and with the good offices of the World Bank and over a decade of negotiations, Indus Waters Treaty was signed in 1960 between India and Pakistan with World Bank as a guarantor and also signatory to the Treaty. Under this Treaty the three eastern rivers viz. Ravi, Sutlej and Beas were given to India and the three western rivers namely Indus, Jhelum and Chenab were given to Pakistan with limited uses by India.

Post Treaty Reaction[1]

The Treaty was not the best for either side. There were conflicting principles put on the table by both sides. Indians held their argument on "equitable utilization" – the favourite of the International Law Association and took the position that Pakistan got 75% of the water represented violation of the principle of "equitable utilization". The Treaty came under heavy fire in the Indian Parliament and was subjected to trenchant criticism by most of the speakers who participated in the *Lok Sabha* debate on the subject on 30th November 1960. They blamed the Government of India for a policy of appeasement and surrender to Pakistan and said that Indian interest had been let down.

From Pakistan side the fact that they were allocated only 75% of the water when they had 90% of the irrigated land represented a violation of the principle of "appreciable harm" – the favourite of International Law Commission.

Denial of perennial flows to Pakistan of three eastern rivers created tremendous management problems and resulted in the first "hydrological shock" whereby the vast and most productive irrigated land was deprived of perennial flows of river waters. The three rivers allocated to Pakistan under the Treaty were in the west whereas the irrigated land was in the east with hundreds of kilometers of distance between them. Pakistan not only had to undertake massive engineering works to transfer the water of western rivers to

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east through storage dams, inter-river link canals, barrages, headworks etc, construction of these infrastructural works were the largest civil engineering works ever undertaken in the history of the world and had to be completed within a record and challenging period of 10 years. Pakistan not only faced the problem of infrastructural development but had to set aside a large sum of money annually to meet the future operation and maintenance cost of these huge hydraulic structures exposing itself to a very high degree of structural safety hazards. The three eastern rivers allocated to India had a cumulative flows of 33 MAF out of which India was only utilizing 3 MAF and left with 30 MAF for future expansion. Against this Pakistan did not get any additional water and had to develop storages for its future requirements. It was therefore a difficult situation for both India and Pakistan as both were depending upon position based arguments.

India's Bilateral Treaties with Nepal and Bangladesh

Treaties between India and Nepal[2]

Nepal and India so far have entered into agreements on the construction of Joint Projects on three main rivers-Koshi, Gandaki and Mahakali. Among the three Projects first two are in operation while the third one on Mahakali River has not yet been started.

The Koshi agreement was signed between the two countries in 1954. This Project was basically aimed at controlling flood in India and providing much needed irrigation to the Indian fields. The Project was constructed in Nepal near the Nepal India border. A barrage has been constructed with two out-flowing canals. The entire water of Koshi River has thus been connected to India leaving Nepal with some water to irrigate about 15 thousand hectares of land. The irrigation water supplied to India could irrigate about 595,000 hectares of land. The entire cost of the Project was borne by India. A small power house of 20 MW is to be built in India whose 50% power is to be provided to Nepal on mutually agreed price.

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The Gandak Project Agreement was concluded in 1959 between Nepal and India on River Gandak. Like the Koshi Agreement, the Gandak Agreement also is meant to construct a barrage to control the flood downstream in India and irrigate its land, leaving some water to irrigate 39,600 hectares of land in Nepal. The entire flow of the river passes to India which irrigates 920,520 hectares of land in India. A small power house of the size of 15 MW was constructed using the canal water for supplying power free of cost to Nepal.

Both these agreements are widely criticized by Nepalese people. As such, they were subsequently amended. However, those amendments did not alter the substance of the agreement particularly the sharing of benefit between the two countries. They remained heavily imbalanced. As a matter of fact, these were the projects done in Nepalese soil by India for their own uses. Whatever meager benefit was given to Nepal was simply a some fraction as a good will gesture. Till to date, in the mind of the general public of Nepal there is an ill feeling about India due to these projects.

In 1996, an agreement was signed into between India and Nepal on the Integrated Development of Mahakali River. This agreement combines three different projects – the Sarada Barrage, the Tanakpur Barrage and the Pancheshwar Dam on the river. The Pancheshwar Dam Project is yet to be constructed. Among the three Projects, Pancheshwar is a multipurpose Dam Project generating more than 6000 MW of electricity and irrigation to more than one million hectares of land in India and about 94,000 hectare of land in Nepal. The project benefits also include flood control. The project is to be constructed on the river Mahakali which forms border between the two countries. This agreement has established following principles:

- Power 50 % to each country.
- Nepal to get 50% of the water of which it shall use for irrigating of 94 thousand hectares of land. The rest shall flow to India. The benefits which India is going to

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get due to extra water shall be assessed and be charged to India for the construction of the Project.

- India shall pay for the flood control benefit also.
- Mahakali Commission shall be established for the implementation of the Project.

The Project Report has not been completed because of the differences between the countries on the calculation of benefits to India and its share in the cost. Although the agreement was concluded in 1996 detail Project Report for Pancheshwar has not been completed. However, other components of the Agreement like Sarada Barrage and Tanakpur power house are in function and India is getting benefits out of these projects. Nepal's benefits from these projects are meager. From delayed tactics, it looks as India does not want to construct the Pancheshwar Project. India is already getting almost the entire water of Mahakali River and using it through Sarada Barrage and Tanakpur power house, the first of which was constructed under agreement and the second was unilaterally constructed by India on the face of Nepalese opposition. Apart from the above three projects, both the countries are in negotiation on water resources for the last 30 years without much success. India keeps on re-interpreting the Treaty clauses to its advantage which are constantly being challenged by Nepal. This Treaty could have formed a good example of benefit-sharing had India struck to the original clauses and the spirit behind these clauses.

Treaty between India and Bangladesh[3]

India constructed a barrage at Farakka on the upstream of the Ganges and started withdrawal of water on the basis of an ad-hoc agreement signed on 18 April 1975. In this agreement, Bangladesh gave consent for withdrawal of 11-16 thousands cusecs water from April 21 to May 31, for a limited period of 41 days. In return India promised that rest of the water will flow through Bangladesh. But after the expiry of 41 days period, India kept on withdrawing water in the lean period of 1975 and 1976. In April 1976, the flow of water at Hardinge point

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came as low as 23,000 cusecs against 65,000 cusecs of the corresponding time of previous years.

India signed a 5-year water-sharing treaty with Bangladesh on 5 Nov 1977. The Treaty had a Guarantee Clause for getting 80% of the flow during lean period and an arbitration clause. After the expiry of the Treaty in 1982, India refused to renew/extend the time period.

Then on October 1982, a two-year mutual agreement followed by another three years agreement (on Nov 22, 1985) was signed between the two sides. But in these two agreements, the Guarantee and Arbitration clause of 1977 Treaty were withdrawn. After that on 12 Dec 1996, a 30-year Water Treaty was signed between India and Bangladesh. This Treaty was also devoid of the Guarantee and Arbitration clauses. After the 1996 Treaty, during the lean period, for the last few years, the flow of water at Hardinge bridge point comes down to 10,000 cusecs, even sometimes as low as 5,000 cusecs.

Adverse Impacts of Farakka Barrage

The main environmental problems already created due to withdrawal and diversion of water through Farakka Barrage may be summarized as follows:

- Due to continuous withdrawal of water through Farakka Barrage for the last 31 years, a significant number of rivers in the Padma basin of Bangladesh have already turned into dead rivers. The Garai, a pre-Farakka mighty river now is almost dead. In pre-Farakka days, during rainy season, the maximum flow of water through the Garai used to be in the range of 142,000 – 328,000 cusecs, now it has become a memory of the past. According to a report of Water Development Board, 17 rivers in Bangladesh are already dead. Many rivers are nearly dead.

- During the dry season when water is much needed in all areas of Bangladesh, in particular for the irrigation

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of 200,000 hectares of land under the Ganges-Kobotak project, water becomes almost non-available. The Ganges-Kobatak (G.K) is the largest irrigation project of Bangladesh. It supplies water from the Padma (Ganges) to 300,000 acres of land. The project consists of 120 miles long main canal, 292 miles long branch canals and 62 miles long sub-branch canals. But scarcity of the Padma water has made the project ineffective. Agriculture in a vast area of Kushtia, Hessore and Faridpur regions comes to a standstill in dry season. Most of the 113 tributaries of the Padma become dry or have scarce water from November – May. The water sharing of the Teesta River, ended without any agreement although many meetings were held. The Teesta River near Teesta Bridge looks like a part of a desert during dry season. A vast area of land once a grainery of Bangladesh has become desert and a food-deficient area now.

- When excessive rain in the upper Ganges basin and ice-melt water creates pressure on the barrage due to abnormal rise of water, India opens all the sluice gates. Then the sudden on rush of water causes floods in Bangladesh or increase the intensity of floods.

- During the dry season (water-scarce period) the irrigation system based on shallow-tube wells suffers adversely due to the considerable downward shift of the ground water tables (3-15 meters). On the average, every year the ground water tables are lowered by about 5 meters which is recharged from rain water and normal flooding.

- As a result of the diminished flow, the intrusion of sea water in the southern part of the country, particularly through the Rupsa River, on the bank of which is located one of the major industrial cities, Khulna, has become so pronounced that the salinity has gone up more than 60 times then the pre-Farakka times.

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Increase of salinity in such magnitude has significantly altered the ecology of the region.

- As an adverse effect of the Farakka barrage, many places of the Murshidabad District of the West Bengal has been suffering from serious water logging.
- In post-Farakka period, the ground water in many places of West Bengal is registering very high arsenic content, since then the ground water of the district Rajshahi, which is adjacent to Farakka is also shown high arsenic content.
- The interrupted and diminished flow of the Ganges has also caused disturbances in the normal sediment transport. As a consequence, the Ganges flood-plain in Bangladesh is being deprived of the natural supply of the micro-nutrients.
- Desertification syndromes have already started in the north-eastern part of Bangladesh as a consequence of the withdrawal of water through the Farakka Barrage.

By the adverse impacts so far created, on the environment and ecology of Bangladesh by Farakka Barrage, it is logical to term it 'a undeclared environmental war against Bangladesh'. But it is pertinent to note that very purpose for which this dam was constructed is defeated. The Farakka Barrage is popularly known in Bangladesh as "Death Barrage".

Inter-basin River Linking Project[4]

India is now implementing a gigantic project, 'Inter-basin River Linking Project' to divert water from all the common rivers. This project has two components i.e. (i) the Himalayan components and (ii) the Peninsular component. In the Himalayan component 14 link canals and in the Peninsular component 16 link canals, all together 30 link canals will be excavated within the frame work of the project.

India in its river interlinks project aims to connect 37 rivers by 30 link canals. The total length of these link canals

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would be approximately 12 thousand kilometers. The breadth of the link canals have been proposed to be 50-100 meters and the depth to be approximately 6 meters.

The upstream withdrawal of water through Farakka Barrage has already started desertification syndrome in Bangladesh, intrusion of salinity in the inland fresh water and created many serious environmental problems including the bio-diversity loss. In addition, if India executes the inter basin river link project, then Bangladesh known all over the world as a land of rivers, fish and rice and a beautiful green land will lose all its present identity.

There are international protocols for sharing of common rivers flowing through more than one country. It is mandatory to supply the data of the flow of water through a river, its courses, the environment and ecology of the river bank and catchments area and bio-diversity of the country to the country or countries sharing the same river. But India is not supplying any information about its on-going inter basin river link project to Bangladesh.

The rivers included in the inter basin river link projects are all international or common rivers between India and Bangladesh. Therefore, unilateral construction of any barrage on upstream, withdrawal of upstream water and change of river course are definitely in violation of the international laws.

India's Latest Policy Document[5]

India's latest thinking on Transboundary waters is amply reflected in a recent report by Institute of Defense Studies in India (IDSA 2010) on water security and elaborates the increasing attention to water issues within a broader geographical context.

While reviewing India's bilateral water relations with neighbouring countries, country by country, the report notes that if not managed well, riparian issues will lead to increased conflicts. It calls for a paradigm shift from the historical

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supply side considerations in domestic and international agreements, and past investments focused on water sharing among competing interests, to one that focuses on benefit-sharing. It stresses that rivers can no longer be viewed as a "soft-component" of a country's foreign policy. Rather they must be seen as intricately linked to development goals and domestic needs impacting bilateral relations. The report goes on to say that while it is important to adopt sensible riparian policies and 'healthy rivers' schemes, there is a need to re-evaluate existing treaties and reframe them based on current hydrological knowledge and future mutual needs. India's geographical contours place multiple upper, middle and lower riparian systems within its borders – thus placing it at the epicenters of riparian politics. Therefore, collaborative riparian management will be crucial for setting many of the water induced conflicts in the region; greater hydro-diplomacy both internally and across national borders – will need to balance the region's growing water needs with larger security concerns.

The gist of this policy document is described hereunder:

- The Policy while reviewing India's bilateral relations with neighbouring countries, country by country, notes that if not managed well riparian issues would lead to increased conflicts.
- It calls for a paradigm shift from historical supply-side considerations in domestic and international agreements, and past investments focused on water sharing among competing interests, to one that focuses on benefit-sharing.
- It stresses that rivers can no longer be viewed as a "soft component" of the country's foreign policy. Rather they must be seen as intricately linked to development goals and domestic needs impacting bilateral relations.
- The document goes on to say that while it is important to adopt sensible riparian policies and healthy river schemes, there is a need to re-evaluate existing treaties

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and reframe them based on current hydrological knowledge and future mutual needs.

- The policy document places India at the epicenter of riparian politics due to its geographical contours as multiple upper, middle and lower riparian systems lie within its borders.

- The document goes on to suggest that collaborative riparian management will be crucial for settling many of the water induced conflicts in the region. It emphasizes greater hydro-diplomacy – both internally and across the national Borders – that will be essential to balance the region's growing water needs with larger security concerns.

Evolutions of International Water Laws[6]

The International Water Laws since then have constantly gone under evolutions to reflect current understandings, which recently are more oriented towards the promotion of cooperation rather than conflict, encouraging interest-based prospects rather than positional discussions and negotiations. The primary role of the Law in this context is to enable determination of each state's equitable and reasonable "entitlements" to the benefits of the use of Transboundary waters and to establish certain requirements for state's behavior while managing and developing the resource. To prove that benefit-sharing paradigm is really a good idea, it will become incumbent on the water resources management practitioners to demonstrate the material benefits and positive-sum outcomes to adhere to its principles. This is essential in creating confidence in the stake holders on both sides of the divide.

Commenting on International Water Laws and IDSA Task Force Report in the Oct-Nov 2010 publication of Dams, Rivers and People, New Delhi; the importance of role of water in the national and regional politics is summed up as quote "Resource nationalism will increasingly dominate the

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hydrological contours of South Asia and will largely define regional politics."

"The hydrological contours of India, both as an upper riparian and a lower riparian, will be the epicenter of new riparian politics and diplomacy over transboundary rivers --- India's riparian relations with its neighbours will become progressively fragile with Pakistan, Bangladesh and Nepal continuously raising concerns over regulating and sharing of river waters."

"International Water Laws on allocating water within river-basin are difficult to implement and often contradictory".

The UN Convention on Non-Navigational Uses of International Watercourses approved in 1997 by a vote of 104 to 3 (but not yet ratified) requires watercourse nations (Article 5) to participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Burundi, China and Turkey (upper riparians) voted against the Convention. India (middle riparian) abstained. While Bangladesh (lower riparian) voted for, Pakistan abstained. Of the other transboundary South Asian states, Nepal voted for and Bhutan was absent. The Convention was adopted by a vote of 104 in favour to 3 against and with 27 absentees.

From India's acts and approaches, it becomes quite obvious that India would not honour International Water Laws and would not respect the existing treaties. India in International Forums have repeatedly indicated that under water stress situation and climate change impacts, the existing treaties would become irrelevant.

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Existing Water Disputes between India and Pakistan

Wular Barrage and Tulbul Hydropower Project

India's projects of Wular Barrage and Tulbul Hydropower on the river Jhelum have been objected by Pakistan as

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violation of Article (II) of the Treaty which prohibits both parties from undertaking any man-made obstruction that may cause "change in the volume of daily flow of waters". Further that Article III (4) specifically barred India from "storing any water of or construct any storage works on western rivers". India is allowed "incidental storage" on western rivers on its side under Article 8(h) of the Treaty only after its design has been scrutinized and approved by Pakistan and its storage capacity does not exceed 10,000 acre feet.

Both Wular Barrage and Tulbul Project have implications on Pakistan's water availability during the low water season, when river flows are reduced to one fifth of the summer flows. There are chances of serious threat to Pakistan, if India decides to withhold water over an extended period during the dry season. It would also multiply the risks of floods and droughts.

Mangla Dam also on river Jhelum which is a source of irrigation and hydropower for Pakistan would be adversely affected. Similarly Kishenganga Project on river Neelum would also affect the Nelum-Jhelum hydropower Project of Pakistan.

The issue of Wular Barrage has been one of the disputes highlighted for India-Pak talks.

Kishenganga Hydropower Project

India plans to construct a 103 meter high dam on the Kishenganga River in Gurez Valley creating a large reservoir from a channel and a 27 km tunnel dug South through the North Kashmir mountain range, will redirect the Kishenganga (Neelum) waters to the Wular Lake at Bandipur. Total distance by which the river will be diverted is 100 km. the project would generate 390 MW of hydropower.

India's project being on the upstream of Neelum River will affect the flow of Neelum River on which Pakistan is also constructing a 696 MW Neelum-Jhelum Hydropower Project with a tunnel of almost 47 km. India on the other hand claims

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that it is within its rights to construct the Kishenganga Project has been working on it since 1980s. According to the Treaty, the country that completes the project first will have priority rights over the water uses. So far the Indus Commission has had numerous meetings but unable to resolve the issue. The opinion of International Arbitrator and the referring it to International Experts are being considered by Pakistan.

Baglihar Dam Project

This project is located at Chander Kot about 160 km north of Jammu on Chenab River. In Pakistan's view, the hydropower plant on Chenab River is a clear violation of the Treaty and a clear violation of International Water Law. The Baglihar Dam Project was planned in two phases and first phase was completed in 2005 and the second phase was completed in 2008. As per design, the Baglihar Dam is 143.3 m in height, 317 m in length with a design storage of 30,000 acre feet. According to Pakistan's stand, design of Baglihar Dam violates the Treaty, as it will affect the flow of Chenab River that will cause shortage of water in Pakistan.

Pakistan and India held numerous meetings without any outcome and finally Pakistan requested the World Bank for appointment of a Neutral Expert in May 2005. The expert gave his verdict on February 12, 2007 in which he partially upheld some of the objections of Pakistan. The crucial decision was allowing India storage upto 26,000 acre feet to flush sediments.

Since India is planning almost 33 hydropower projects on western rivers and if the decision of Neutral Expert is applied to all the future storages by India on western rivers, it will have catastrophic consequences for Pakistan as India if resorted to filling these reservoirs during low water season, the accumulative affect of it could destroy the Rabbi crops in Pakistan.

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A Way Forward[7]

Moving forward with particular thinking or mind set can never see the end of the path. The complexities of issues, lack of political wisdom and will, positional based stands, high level of mistrust, linkages to Kashmir issue, negative public perceptions and deep buried hostilities offer formidable obstacles to cross. Any move forward will require a deep analysis of the mind sets on both sides. India's past history, its respect for already executed treaties and its recent thinking have to be taken into consideration. Whereas India suggests to adopt a paradigm shift from conflict to cooperation and from water sharing to benefit-sharing, its hegemony in declaring itself as at the epicenter of riparian politics due to its geographical contours tantamount to a warning to other riparian countries. India is suggesting to re-evaluate the existing treaties and reframe them on current hydrological knowledge and future mutual needs. Apparently one can say, India's thinking is in line with the current concepts on Transboundary water issues and in conformity with the International Water Laws but at this point of time, benefit-sharing has very limited international experiences and relatively a new approach. It is a complex issue with multiple parameters to be addressed including economic, social, environmental and political gains. Under these circumstances, the way forward is to honestly implement the existing treaty in its true spirit.

Issue that can be Addressed Bilaterally[8]

- To remove mistrust on data exchange, satellite based data collection system should be installed for real time data information. Cost of such system should be shared by both the countries.
- Since storage for flushing sediments has already been allowed to India, its timing is crucial for Pakistan's agriculture. This should be addressed bilaterally and can be resolved amicably once real time data becomes available. Otherwise with multiple hydropower stations

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being constructed by India numbering 33 on the western rivers with cumulative storage can impose major reductions on water availability in Pakistan during the critical planting season.

- Since hydropower does not consume water, the only issue is timing, and timing is a crucial issue because agriculture in Pakistan depends not only on how much water comes but that it comes in critical periods during the planting season. Under normal and trustful relations India could increase low-flows during the critical planting season with significant benefits to Pakistan and small impacts on power generation in India.

- Presently there is a very uneven playing field. The regional hegemony is the upper riparian and has all cards in its hands. The Institute of Defense Studies in India has clearly and in unambiguous terms has identified India as the "epicenter of riparian politics". This asymmetry means that changes must start in India. India therefore would need to have some courageous and open minded Indians who realize and explain to the public why it is essential and vital issue for Pakistan.

- If there is goodwill, there are multiple ways in which the treaty could be maintained and interpreted so that both countries could win. Otherwise both countries would be dragged into unending processes of litigations. India looking for grey areas in the treaty and Pakistan on the offensive with development on both sides having negative impacts leading towards serious conflicts.

- Discussions on Indus Waters Treaty should be delinked from both historic grievances and from the other Kashmir related issues, both sides showing a sign of statesmanship, and moving forward considering water as catalyst for development and not a resource for conflicts.

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- Climate change impacts: Various models indicate that global warming can accelerate glacier melt with the result that additional water would flow in rivers originating from Himalayan ranges. Since treaty stipulates average flow to be released to Pakistan, India can easily divert this additional water either for direct uses or filling up the large number of storage dams without letting Pakistan to benefit from this additional water. This issue could be taken up with India with positive suggestions to work out a joint climate change adaptation strategy in combating droughts and floods where water shortages and surpluses are jointly managed with minimum negative impacts on both countries.

- Bilateral development of Kabul River: Similarly Pakistan and Afghanistan should also adopt a strategy in developing the water resources of Kabul River jointly and protecting Pakistan's historic rights on water uses. This is also a priority area where Pakistan must initiate dialogue with Afghan Regime as soon as possible.

Issues which can Attract International Support and Understanding[9]

- **Environmental Flows to Maintain River Biodiversity:** India, during low-flows, diverts almost 100 percent of the waters of three eastern rivers leaving vast stretches of rivers within Pakistan's boundary completely dry. This violates the International River laws where environmental flows and maintaining rivers health is mandatory for the riparian states. IUCN, WWF, GEF, UNEP, UNDP and many other organizations are strong advocates of such issues. Pakistan can raise this issue with these organizations and in the international forums.

- **Transboundary Aquifers:** Another emerging issue on water and benefit-sharing is the maintenance of Transboundary groundwater aquifer. India with low power tariff has encouraged installation of tube wells in

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Eastern Punjab and other bordering states with Pakistan with the result that ground water aquifers within Pakistan are over-mined by India. This issue can also be raised in the international forums with favourable reaction. International conference on Transboundary aquifers was recently held in Paris, France on 6-8 Dec 2010 organized by UNESCO to address issues of shared aquifers.

- **Transboundary Water Pollution:** The natural slopes facilitate the flow of untreated effluent from East Punjab to West Punjab. Under international water laws riparian states are required to ensure untreated effluent is not discharged into rivers, natural *nullahs* etc. This is again a justified issue and that Pakistan can raise in the international forums with favourable reactions.

National Water Management[10]

A point to be noted is that good geopolitical management however, is only possible when countries successfully manage their myriad domestic water challenges. Currently complex national level issues of food, water and energy tend to be addressed in a cylindrical fashion by sector focused ministries when cross sectoral analysis and solutions are urgently needed. Pakistan therefore, needs to address its domestic water challenges seriously in an integrated and coordinated manner. Every drop of water needs to be utilized most judiciously to achieve more food, more value and more jobs. Pakistan needs to correct its direction on top priority basis in managing national waters; else its position on Transboundary negotiation will remain on weaker wicket. The dismal water management statistics such as 132 cubic meter per capita storage against America's 6,150 m3, Australia's 5,000 m3; carry over capacity of only 30 days as against 1000 days of Egypt; Contribution of 34 cents by one cubic meter of water to the GDP against developed countries of US$ 30 to 40 and wasting precious water resources to the tune of 1334 billion cubic meter value at US$ 158 billion into sea over the last 32 years makes Pakistan's case extremely difficult for securing

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any international support. Pakistan is also one of the few countries in the world which does not have a National Water Policy. Pakistan's total hydro power potential is close to 100,000 MW. Pakistan has developed only 6500 MW i.e. 6 percent only. As against this India has constructed 4,700 medium to large dams and created a carry over capacity of 220 days. India's productivity is three time more than Pakistan and a unit of water contributes about US dollar 4 to Indian GDP. Total hydro power potential of India is 148,700 MW out of which India has already developed 31,000 MW and over 50 hydro projects are under different stages of development. India's share of coal in the overall energy production is 69 percent whereas Pakistan's share is only 1 percent in spite of having one of the largest coal deposits in the world. India plans to create additional 180 BCM of storage volume by constructing some 2,500 dams by the year 2050. Pakistan therefore, needs to have a paradigm shift in its overall water management strategy.

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SUSTAINING THE WATER DIVISION AND/OR SHARING THE BENEFITS: A CONFLICT-MANAGEMENT PERSPECTIVE

Dr. Zaigham Habib

Abstract

This paper is written in the context of national water security concerns, obligations of Indus Water Treaty (IWT 1960), increasing upstream developments leading to shirking downstream control on river waters and new challenges faced by Pakistan like higher uncertainty and climate induced changes. In the conflict management perspectives, Pakistan needs to carefully evaluate all possible options to protect and use trans-boundary water resources. The paper briefly reviews conceptualization of trans-boundary benefit-sharing. Despite much discussion, the concept remains loose (Phillips et al., 2006), procedure intensive and situation specific. The upstream and downstream benefits can be mutually conflicting and competitive. The benefits from the rivers (irrigation, hydropower, etc) and benefits to the rivers (water quality control environmental flows) are two key categories for trans-boundary collaboration. Their implementation mostly requires tradeoffs between upstream and downstream water users. The potential of sharing water use benefits within a particular basin depends upon physical opportunities, attached costs and the level of cooperation between riparian states. Global examples of benefits and costs sharing are summarized in the paper, highlighting the scope and complimentary mechanisms.

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Background and Context

More than 260 river basins are internationally shared. These basins have 60 percent of global freshwater surface flows and are home to some 40 percent of the world's population. As, demand for water grows in all countries, competition for shared resources increase to meet the needs of

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billions of people for drinking water, food, energy, and industrial production. A direct consequence is less water available for new uses, deterioration of water quality, threat to the ecosystems and impeding water security to the lower riparian. Even where historically robust water sharing and river basin management is practiced, the uncertainties of climate change are likely to pose new risks, mostly not understood and quantified yet. The global challenge to enhance cooperation is well understood. However, mechanisms to meet this challenge are subject to a wide range of conditions including existing trans-boundary agreements, nature of the water stress, willingness of the riparian to cooperate and to some extent role of the global institutes.

Pakistan and India signed Indus Water Treaty in 1960, after 9 years of negotiations mediated by the World Bank. The treaty is exclusive, simple and authoritative. The only treaty, which recommends to divide and diverting full rivers away from their more than 80 percent of users to establish sovereign water rights. Implementation of the Treaty resulted into large movement of water, i) major part of the flows of two river transferred outside their natural basin on the Indian side, ii) more than 20 cubic kilometers water transferred from the western to the eastern rivers to ensure irrigation supply to the most fertile land of Punjab. Diversion of the eastern rivers by upper riparian was easy, because downstream riparian was totally excluded. However, upstream developments in the western catchments raised the issues on the downstream impacts in terms of control over water volumes, reduced and modified flow patterns and environmental degradation of fresh water resource.

During the last twenty years, global institutes has move forward in agreeing on the principles of “fairness, no harm to other riparian and protection of water resources” (Helsinki, UN). The global declarations also acknowledge that a definite set of rules can not be recommended for all trans-boundary solutions. Collective regional drives are launched to address the environmental and climate change issues (EU, Africa). The

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"benefit sharing approach as a solution" is presented as a "win-win alternate, while it is practiced in limited cases.

To evolve a crises management approach, Pakistan should formulate pertinent trans-boundary problems faced as a lower riparian of the Indus Basin, identify possible solutions and procedures and then evaluate scope of the benefit sharing and water-division approaches to improve or add to the existing trans-boundary treaty.

Trans-Boundary Water Sharing Norms

Most of the 240 internationally shared river basins have a series of bi-lateral or multi-lateral treaties, representing stakeholders interest and hydro-development scenarios evolved with time. The trans-boundary contracts have been shifted towards regional commitments for protection of rivers and watercourses, joint management and water quality issues. The Oregon State University has compiled a Transboundary Freshwater Dispute Database (TFDD) listing 424 agreements signed between 1820 and 2007. The list includes 36 agreements on Rhine and 19 on Nile Rivers. The majority of the agreements, 91, target water quantity, 67 hydropower, 59 water quality, 44 joint management, 46 border issues and 24 each on flood control and navigation. A major addition in trans-boundary agreements during the last two decades is the regional agreements on water quality and joint management of water-ways. All large basins gradually have more riparian involved in the contracts as more countries started developing water resources (Nile, Rhine and Mekong).

Higher spirit of cooperation is shown by the EU and African nations to protect water ways, joint watershed management and maintenance of surface water quality. In 1997, twenty eight (28) EU states, Economic Commission of Europe and USA signed a document *"convention on environmental impact assessment in a transboundary context"*. In 2003, fifty (50) African countries signed *"African convention on the conservation of nature and natural resources"*. On the other hand, Middle East and South Asia could not progress towards better cooperation. Existing

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agreements remain subject to the implementation difficulties and water insecurity increased with time.

Water Division Rules and Principles

Extensive work is done by the global and local experts and institutes to classify existing trans-boundary agreements on the one hand and to formulate generally accepted principles for a fair division of shared water resources on the other. To provide a reference, this section briefly summarizes; i) four famous doctrines, ii) principles for equitable sharing agreed through UN and, iii) actual determinants of the water treaties.

Four Doctrines of Water Division

These doctrines try to conceptualize guiding rule of the trans-boundary agreements.

- The doctrine of absolute sovereignty is also called Harmon doctrine. According to the doctrine, each riparian state has the absolute freedom to utilize water flowing through its territory, regardless its impact on other riparian states. The "sovereign development" can leads to one-sided programs giving a privilege to the riparian having technical and economic potential to "develop first". The international agreements under this doctrine create de-facto sovereign conditions which, limits them to a non-integrated development regime with minimum sharing of information and no institutional coordination. "Cooperation in the development and conservation of international watercourses is based on sets of self-limitations to sovereignty (Solanes, 1992)". The doctrine is not accepted by the international water laws.
- The doctrine of limited territorial sovereignty evolved as an intermediate approach to resolving the international water disputes. It is a widely accepted principle in treaties and in expert's opinions. It conforms to the general legal obligation to use one's property in a manner which will not cause injury to

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others. According to Dellapenna (1999) restricted sovereignty leads to "equitable utilization".

- The doctrine of absolute riverine integrity expects that a state will not alter the natural flow of waters passing through its territory in any manner which will affect the water in another state, be it upstream or downstream. The doctrine is not considered very practical.

- The doctrine of joint basin management assumes a riparian collectivism of interests among the basin states, and treats the total volume of basin water as a shared resource. The theory of joint management stipulates that the entire river basin constitutes a single geographic and economic unit that transcends national boundaries, and therefore the basin's waters are either invested in the whole community or shared among the riparian.

Principles for Equitable and Reasonable Sharing

UN convention (1997) and other International Forums recommend few basic guiding principles for trans-boundary water sharing.

- International drainage basins or international water courses are an aggregate of surface and ground waters flowing into a common terminus (Caponera, 1995; Green Cross, 2000).

- The principle of equitable use requires that the interests of all riparian countries should be taken into account when allocating and developing international water courses. The principle has been applied by international and national courts. It was endorsed by Helsinki Rules and by the UN Convention in 1997. The primacy of the rule of equitable utilization was confirmed by the International Court of Justice in its ruling on the Danube River Case in 1997. The principle of equitable utilization emerged as the central concept in reconciling the various interests of basin states in

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development of their trans-boundary waters (Wouters 1992).

- The obligation not to cause harm requires preventive and cooperative actions. The duty to curb adverse effects applies to many aspects of international water law, but is particularly relevant in relation to water pollution. The 1988 Report to the International Law Commission suggests that appreciable harm resulting from water pollution is a violation of the principle of equitable use. The World Bank statement for projects in international waterways requires the assessment of potential significant harm before approving them (Solanes, 1992; Caponera, 1995; McCaffrey, 1996).

- **Joint Development of International Rivers:** Joint development, which is ideal for shared water resources, is difficult to achieve because of questions of sovereignty, ownership of waterworks, jurisdiction, financing, scope of cooperation, etc.

- **Protection of Natural Water Bodies:** The principle is not only stressed by all international declaration, it has become a key point for the regional cooperation.

Actual Determinants of Trans-Boundary Treaties

The trans-boundary water dialogues mostly focus on acquiring higher water shares and development rights by each riparian state. A combination of favorable factors and constraints determines to what extent a doctrine is relevant or to what extend recommended principles are applied.

Basin Hydrology and Geospatial Location of Rivers: The topography and location of the runoff source determine the local potential for development and control over river flows. Distribution of drainage runoff determines the level of physical control a riparian state can exercise. Locations for hydropower generation on the main and tributary rivers mostly provide an edge to the upstream states.

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In rare cases downstream states can have this edge like Egypt on Nile. "The dynamics between littoral riparian (who reside on opposite banks of a shared river) are likely to be substantially different from sequential riparian (who reside strictly upstream or downstream from one another) in terms of the way in which they view their interests and their alternatives to cooperative water management.

Already Developed Water Uses: These uses are normally protected by the traditional laws as "historical riparian rights or as prior allocations". Generally, treaties accept these rights. However, allocation of uncapped water resources hardly follow previous development pattern. In any large basin, emerging needs and development potential often lead to conflicts between "upstream and downstream" and "indigenous and developed water uses". Solutions are sorted in "equitable distribution".

Urgent Water Needs and High Water Demands: The actual water needs and planned development differently affect trans-boundary conflicts. In case of sufficient water available, treaties are easy and leave a room for future adjustments (Canada, US). While, in a water scarce situation, high water needs can delay the treaties or create implementation problems (Middle East region).

Asymmetry of the Political Power: Political asymmetry is a critical factor in shaping the trans-boundary water agreements. The powerful economy in shared catchments has higher potential to use and develop water resources, regardless of being upstream or downstream. Water resources developments in shared basins clearly show an influence of the larger economy and politically powerful country. For example Israel in case of Jordan river catchments, Egypt in Nile basin, China in Mekong Basin and India in case of Indus and Barhamputra. In the context of Middle East, 'most powerful riparian state manages to impose its own water policies and open conflict occurs in the interest of hegemonic (Lowi, 1993 Waterbury, 1994).

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The Environmental Security

High water scarcity and extreme pollution can lead to high risk of violent conflict "which are often accompanied by high population growth and a socially inequitable distribution of resources (Homer-Dixon, 1994a). The depletion of water resources because of climate induced changes can increase environment stress and water conflicts at the national and regional levels.

Benefits and Loss Sharing in a Basin

The concept of benefit sharing as an alternate to the river water division/sharing emerged only during the last decade. The trans-boundary agreements dealing with water quantity, water quality and joint basin management are not directly based on computed and legally allocated water benefits. The future water uses and benefits are subject to political and economic conditions, regional political harmony and ability of the riparian states to implement development schemes. The economic benefits of the allocated water shares are mostly realized, sometimes quantified and bargained in trans-boundary agreements. The "side payments" are also involved with water transfers. However, trans-boundary water division and distribution have three weak areas:

- Dis-integrated and inefficient use of water resources,
- Large regional inequalities, and
- Environmental degradation of water bodies and eco-systems.

The IWRM approach advocated by the international research and development organizations (GWP, WB, ADB, FAO) had severe limitations in providing management solutions for the shared basins. The transboundary treaties rarely consider groundwater and local rain runoff on the supply side. Similarly comprehensive water demands and future development potential at the best remain as background information. The water use efficiency within the

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riparian states could be different depending upon the physical and management factors. Needs for allocation of the environmental flows are normally not included in the treaties. In case of a long river, upper riparian are hardly convinced to reconsider downstream impact of extensive upstream developments.

The management desires for comprehensive planning and optimizing of water based benefits are reflected from the debate on benefit sharing. Sharing a basket of benefits derived from the basin development and to achieve a win-win situation are projected as achievable goals. Benefit sharing is generally defined as "the process where riparian cooperate in optimizing and equitably dividing the goods, products and services connected directly or indirectly to the watercourse, or arising from the use of its waters (SADC 2010)." The arguments in favor of "benefit sharing" claims:

- Approach is more holistic and allows managing river water resources as a "basin unit", considering benefits, different stakeholders and protection of water resources.
- Approach can "broaden the perspective of basin planners" (Sadoff and Grey, 2002 and 2005) for management and development of international shared rivers.
- Water can be used with high efficiency, developing optimal water schemes.
- It allows involvement of communities in planning and development of water resources,
- To implement the benefit sharing approach, political agreement among the Governments and communities is a prerequisite

Components of the Benefit Sharing Approach

Most of the international literature refers four types of benefits, which can be addressed by the benefit sharing

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approach. It will be idealistic for a treaty to address all types. The challenges and opportunities indicate the scope and constraints of the approach.

Table 1. Types of Benefits as Proposed by Sadoff and Grey (2002)

	The Challenge	The Opportunity
Type 1: Providing benefits to the river	Water shed, water quality, wetlands, ENV flows	Floods, droughts, erosion, sediment, climate
Type 2: Yielding benefits from the river	Water demand, development, sub-optimal use of water resources	Hydropower, agriculture, food security, tourism, ecosystems
Type 3: Reducing costs because of river	Management and operational costs	Cooperation, shift from food/energy self sufficiency to food/energy security
Type 4: Generating benefits beyond the river	Regional fragmentation	Regional integration, investment, trade, industrial development, market access

Type 1 benefits can provide optimal conditions for the management of watershed, water quality; water based environmental protection and biodiversity. To achieve the flood, draught and climate management opportunities, technical and financial inputs are required. Hence, the costs could be attached to these benefits. However, measures to provide benefits to the river (floods, sediment, environmental flows) are not equally relevant to all riparian and estimation of benefits may become a challenge.

The type 2 benefits are more relevant for the riparian states. However, accounting of the benefits is not a straightforward and one time exercise. The benefits tend to

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change with time and opportunities to develop these benefits are normally highly unequal for co-sharers of a river basin. The formulation of sustainable modes of sharing benefits is easy at the smaller or a single project level.

Under type 3, two types of costs could be reduced, operational costs (by building joint infrastructure) and conflict resolution costs. The approach assumes that a shift from food/energy self-sufficiency to food/energy security is possible. In an ideal situation, one country can grow food or produce electricity for the other, and at a reduced cost. The type 4, increasing benefits beyond the river, improves regional-interaction by providing cooperative environment for trade, markets and investment.

However, the question is what is required to be in a position of availing above mentioned potential benefits.

Implementation Conditions

Qaddami (1999 World Bank) identifies six conditions or mechanisms which support benefit sharing. According to him, benefit sharing is ultimately a question of political feasibility.

- **Issue Linkage**: Linking upstream-downstream issues to other issues where the downstream state holds power or control and the upstream state is requesting party (e.g Kazakhstan, Kyrgyz Republic, Uzbekistan, and Tajikistan in the Syr Darya basin).
- **Diffuse Reciprocity / Good Relations**: Accepting an agreement – even perhaps on less favorable terms in order to keep good relations and to create a 'reservoir of goodwill' (e.g. South Africa and Lesotho in the Lesotho Highlands Water Project).
- **Large Geographical Scope**: Extending the scope of an agreement, for example, include rivers where the downstream river is upstream, and vice versa (e.g., Mozambique, South Africa and Swaziland on the Incomati River basin and the Maputo River basin).

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- **Side Payments**: Providing financial compensation in return for a concession.
- **Slack Cutting**: Making use of international fora in order to introduce a more ambitious national policy than would otherwise be possible through national channels alone.
- **Exercise of Power**: Possessing other sources of power (economic, military) that compensate for an inferior (downstream) location (Egypt in Nile basin & Israel in Jordan basin).

Practical Examples of Benefit Sharing

Lesotho Highlands Water Project: The project on the Orange River is recognized as a successful example of benefit sharing. The agreement is signed between upstream water rich Lesotho and downstream South Africa. The project transfers water from the high land in Lesotho to South Africa for domestic and industrial uses. As benefits for Lesotho, about 200 MW hydropower is provided as royalties. South Africa has preferred the project over a local option because of its lower cost and high technical feasibility. Another similar project is planned on the river downstream between South Africa and Botsawana. The reduced river flows in Namibia, which is the last country of the Basin, are partly addressed by allocating environmental flows.

The orange basin countries, especially South Africa has a history of agreements with other riparian states. The Orange River Basin Commission (ORASECOM) has been expanded to include all sharing countries (Botswana, Lesotho, Namibia, South Africa). The ORASECOM agreement recognizes Helsinki Rules, the United Nations Convention on the Non-Navigational Uses of International Waters. It refers to the key concepts; “equitable and reasonable” and preventing significant harm (Earle et al, 2005). The Commission works as the main advisory body for the planning and development of the basin resources.

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The Zambezi Basin: It provides another example of benefit sharing around a hydropower project. The basin is shared by eight countries. Two major water users Zambia and Zambawi have a history of water sharing agreements signed. The Kariba Dam (1955-1959) of 70 km^3 capacity was jointly constructed across the boarder of Zambia and Zambawi to produce electricity. The dam displaced large population in both countries, 57000 people. A joint power company CAPCO is responsible for generating and selling electricity while dividing benefits on 50:50 bases.

This widely quoted success story on "benefit sharing without water allocations" is an excellent example to analyze possible conflicts. Five trans-boundary agreements have been signed after construction of Kariba Dam, the last one in 2003 among all basin countries to address three types of issues.

- **Generating and Costing Non-Hydel Benefits:** The original contract not includes the benefits generated by irrigation, fishries, domestic and other uses of water, which are generated downstream.
- **The Economic Disparity is Favoring Zimbabwe for the Hydel Power Benefits:** "With the two electricity markets being asymmetric, and with Zimbabwe having a higher growth rate, this situation favored Zimbabwe.
- **Impacts of the Reduced Flows on Downstream Countries**: The last basin-level treaty includes a real-time information system, synchronizing of flood control and environmental flows.

There are suggestions for "water allocations" in "Zembezi basin".

The Incomati River Basin: It is shared by three countries (Swaziland, South Africa and Mozambique). An agreement between three riparian was signed in 2002. Before that there were many bilateral agreements and an interim tripartite agreement. The agreement upheld rules and

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obligations for equitable sharing by Helsinki rules (1966) and UN Convention (1997). The basin provides an example of sharing water resources in a heavily used basin. The joint management focuses on the better management of water resources; increasing efficiencies, recycling of wastewater and demand management, and new developments. A computer model is used to estimate water needs and evaluate water saving options. The water is allocated for domestic, industrial and irrigation uses. The costs are shared based on water allocations.

The Mekong Basin Example: The Mekong River has annual average flows of 475 bcm. About 15 percent of the annual flows are currently developed. The members have bilateral agreements and different level of cooperation. The water sharing is based on quantitative allocations. The basin is shared by eight countries. Mekong River Commission (MRC) was established with active international support. Two upstream countries, China and Myanmar are only the observers.

The MRC is not an example of sharing benefits from a commercial project, but of cooperation for research, technical and institutional capacity building. The commission provides a platform to the basin states for information collection and sharing, management practices, development of guidelines and operational procedures, capacity building for issues like environmental assessments. For example, the MRC had adopted a wide ranging flood control program, which deals with emergencies as well as preventive measures. Numerous studies have been conducted on river protection and environmental issues. Under the MRC Agreement of 1995, there are three 'core programs', five sector programs and one support program.

The Nile Basin: The Nile basin is shared by ten countries. The Nile Basin Initiative (NBI), a partnership among the Nile riparian states was launched in 1999. The initiative "seeks to develop the river in a cooperative manner, share substantial socioeconomic benefits, and promote

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regional peace and security". Like Mekong Commission, NBI have launched programs to develop common analytical tools, flood warning system, environmental protection and protection of water bodies like lakes. NBI also developed a Benefit Sharing Framework based on the Transboundary Waters Opportunities Analysis (TWO) - *identify benefits costs and development potentials*. However, water division remains volumetric.

Historically, Egypt and Sudan heavily depends upon Nile for agriculture and domestic uses. Two major agreements signed between the two in 1929 and 1959 depend upon estimated water needs, which cover about 90 percent of the Nile water. The NBI has not been able to reach to a new riparian agreement, because an agreed sharing formula could not be devised. In May 2010, upstream states, Ethiopia, Kenya, Uganda, Rwanda, Burundi and Tanzania signed a Cooperative Framework Agreement to seek more water from the River Nile - a move strongly opposed by Egypt and Sudan. In 2010, Tana Beles dam conflict between Ethiopia and Egypt led to moving 'Nile file" from Water and power ministry to the National Security Authority. Egypt insists that projects such as Tana Beles station need to be approved by it first.

Key Conclusions from Existing Experiences

- Exclusive benefit sharing schemes are mostly small projects in hydropower and urban water use sectors.
- On long-term bases "the basket of benefits" can rarely be separated from water allocation under specific conditions.
- There are regional commissions not involved in water allocation, but in the issues like flood protection, knowledge sharing, joint planning and research.
- The joint projects use inter-dependency for the benefit of the basin states or communities. Good political relations and will of the riparian states is more important than the water division agreements.

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- Bilateral treaty is a preferred mechanism even among the countries member of a "benefits sharing initiative among a group of riparian".
- Principles for equitable sharing, fairness and no harm to other party by Helsinki and UN conventions are referred by both types of treaties.
- Generally, global water and finance institutes are involved in the benefit sharing projects.

Current Status of the Trans-Boundary Conflict Resolution in the Indus Basin

India and Pakistan share all large rivers of the basin, Indus and its five tributaries. A well reputed treaty (IWT 1960) exists between Pakistan and India dividing trans-boundary rivers with some exceptions. Disagreements on implementation of treaty have become frequent and stronger with time, as upstream developments, high water stress and climate change create serious challenges for Pakistan. Pakistan shares a large tributary river of Indus with Afghanistan, where there is no water agreement yet.

The implementation of IWT has become a key issue between India and Pakistan. Despite following expensive procedures of hiring independent experts through World Bank, Pakistan has failed to achieve its objectives. No convergence can be seen from the positions taken by both countries. Technical aspects of the trans-boundary issues of Pakistan are not discussed and analyzed among the water experts of Pakistan. Similarly, suggestions to adopt a different approach (see background section) are floated without any proper analysis. Before a discussion on future options, this section briefly describe relevant features of the IWT, current Indian approach and the issues Pakistan is facing.

Salient Features of the Indus Water Treaty

- **Start of Trans-Boundary Water Conflict:** The Indus water dispute started within few months of the

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independence and partition of the subcontinent. India blocked water to two key canals of the Punjab from their head-works at the start of wheat sowing period. These supplies were critical to avoid a famine and support settlement of millions of refugees. Ironically, this water had to flow through 1200 km long river reaches in Pakistan. A stand-still agreement was signed in September 1948. Pakistan agreed to pay water-cost for a year and construct new structures during this period.

- **Joint Management was Rejected in 1960:** The international boundary drawn in 1947 by the British Government did not consider the location of rivers and canals system. The upper catchments of all rivers were on the Indian side (Kashmir territory), while the large agriculture areas using 90 percent of the developed river flows were towards Pakistan side (Kashmir and all four provinces of Pakistan). A historical conflict about diversions of water from the Eastern rivers existed in the basin from 1912. Because of high integrity and high dependency of downstream areas on river flows, joint management of the basin was the first recommendation by WB president. Both countries rejected joint management concept, first India then Pakistan.

- **Upstream Versus Downstream Control Disparity:** Upstream topography of the basin provides large potential of small or big storages and diversion structures on river tributaries. While, downstream topography has limited potential for storage and run of the river projects.

- **An Authoritative Division of River Water without any Specific Standards: T**he Indus Water Treaty divides five large tributary rivers of Indus physically, without any obligations for environmental, water resources conservations and protection of drinking water rights. The major part of the Treaty is about operational procedures and conflict handling. An

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expensive and lengthy conflict management mechanism was agreed. The principles of fairness agreed by Helsinki Rules and UN Convention were not acknowledged by IWT (both countries are not signatory to these declarations). The IWT does not consider:

- Actual uses of water or population based water needs.
- Groundwater aquifer and source of recharge.
- Environmental flows for ecological safeguard.
- Minimum river flows to keep eastern water ways operational, which have to carry over the flood flows.
- Pollution and environmental degradation.
- Future issues like climate change.

- **Side Payments:** India and international community contributed for the physical works carried out to build two reservoirs, inter-river link canals and new canal head-works. Out of the total Indus Basin Development Funds (IBDF) which consisted of US $ 900 million. India contributed US $62 million, in ten annual installments during the transition period.

- **Institutional Arrangement for Water Security and Dispute Resolution:** The Indus Commissions were formed in both countries to supervise implementation of IWT and dispute handling. India is bound to inform Pakistan and get its consent before start of any project on the western rivers. India is bound to provide upstream flow data, specified -- . Both sides will avoid building any man made structure which can change natural course of water. Both sides will be responsible for maintaining Indus basin by adopting best practices available. If India constructs any work on Western Rivers, it will supply water downstream within 24 hours. In case of disagreements, two commissioners

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will work closely to plug in the difference. However, if the difference turns out to be a dispute, World Bank will appoint a "neutral expert." If the neutral expert fails to resolve the dispute, negotiators can be appointed by each side to meet with one or more mutually agreed-upon mediators. If either side views mediated agreement unlikely, provisions are included for the convening of a Court of Arbitration.

Current Approach of India

India has started a substantive campaign to build hydropower projects, develop recreational facilities including water-based tourist points at high altitudes (-- artificial lake in Jhelum catchment) and recently water-transfer structures (70 km tunnel diverting flows of the Jhelum tributary -- for the Kishanganga project) on the western rivers. India's dominant approach is reflective from the recent strategic studies.

- Continue developing diversion structures, small dams and water bodies on the western rivers, which could provide higher direct control on river flows. Use the "clean energy" and "local development" arguments. Recent climate-credit on two hydropower projects on the Chenab River without Pakistan's knowledge is an example in point.

- Increase agriculture water uses from the western river tributaries in all upstream catchments using farm level mini-dams, local flood channels, tube-wells and formal irrigation schemes wherever possible. Subsidized groundwater use in western and eastern watersheds is causing aquifer depletion and stopping normal recharge downstream.

- Maximize direct water benefits through all types of schemes, could be designed as "non-consumptive water uses".

- A comprehensive and multi-dimensional approach is adopted by India, to manage trans-boundary conflicts

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with better technical and legal preparation. Some of the steps include:-

- Interpretations of IWT on the name of new technologies (dead-storage for run of the river reservoirs) successfully achieved,
- Clean-energy argument to get international support for new hydropower projects,
- Local developments and water rights for Kashmir are used as key arguments,
- The extreme positions within India are projected like one sided abolition of the Treaty (Indian Defense Forum).
- Pakistan's objections on Indian projects are linked with the political tension with Pakistan.

Pakistan's Trans-Boundary Water Case

Boundary Conditions

While evaluating future trans-boundary options, Pakistan needs to consider few boundary conditions evolved from existing status of the Indus Basin water resources inside and outside the country. These conditions set constraints for future strategy, negotiations and collaborative arrangements because:-

- Existing national water scarcity.
- Already dis-integrated Basin of Indus and its tributaries.
- Prior allocation of river flows inside the country.
- Indus tributary rivers facing serious environmental shortages and finally.
- Pakistan has not developed protections against climate change impacts.

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Major part of the country has negative demand-supply balance during whole non-monsoon period. During draught years of 1999-2002, annual water availability was 900 cubic meters per capita, 10 percent lower the water scarcity threshold by UN (1997). The sensitive water use sectors like drinking and domestic supply face serious water shortages.

The Indus Basin is already a disintegrated basin with a substantial transfer of water outside the basin. The 100 percent normal river flows of the eastern rivers and 70 percent flows of the western rivers have been already utilized. At the current implementation level of IWT, both countries are not in a position to go for a "fresh start". The flows of Indus and tributary rivers have been divided between the provinces/states within both countries through internal water division agreements.

The period of dry river reaches (Habib 2009) is increasing for all Indus tributaries despite flood and heavy monsoons. The eastern rivers remain dry for more than ten months of a year and then could receive heavy floods. The flood damages of 2010 and 2011 strongly suggest the need of minimum (maintenance) flows to keep the river reaches and flood protection system intact. Lack of appropriate measures to address climate change impacts is another weak area for Pakistan.

Pakistan has sufficient space to straighten its national water scenario at two levels. A persistent delay in planned development of water resources in the energy sector even at a high and regionally distributed economic cost is a key failure of the sector. The water use efficiency is another area of low performance. Unfortunately, under reporting of actual water uses have increased due to multiple reasons (Habib ICID2009) especially the lack of accounting in non-agriculture sector, informal agriculture uses and monitoring inaccuracies. The water allocation procedures have become multilayered and non-transparent with a consistent increase in unaccounted water resources.

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Evolving Future Approach

The trans-boundary water challenges faced by Pakistan are not only due to implementation and interpretation of IWT but there are typical issues of hydrological water stresses faced by a lower riparian against upstream privileges in a water intensive basin economy. There are wide consequences of adopting a non-basin approach in 1960. There are consequences of providing limited securities downstream and ignoring the groundwater aquifer, environmental river flows and mechanism for long term protection of water resources and their eco-systems. There are consequences of adopting a division of rivers without a mechanism to address consistent or sudden hydrological changes like the climate change, extreme events of floods and draughts. There are also consequences of adopting a non-consultative, expensive and narrow process of dispute resolution.

Hence, Pakistan needs to adopt an inclusive approach to work in three domains; implementing existing IWT, identifying and proposing solutions to address emerging gaps in water division mechanism, and pursue collaboration for sharing benefits of joint research and knowledge generation to address the climate change threats and environmental degradation of the water resources. The recommended steps include:-

- Implementation of IWT as conceived by Pakistan in 1960. The strategy will require addressing Indian approach of making interventions with new techno-legal interpretations, and seeking new valid interpretation for Pakistan.
- Addressing negative impacted of IWT and gaps emerged in the Treaty within water division approach. A case under clause 7 --- should be developed
- Developing bilateral and regional collaboration to protect overall natural water resources of the basin and to manage new hydrological scenarios caused by the climate change and environmental degradations.

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Scenario I: Strategy to Implement IWT

Full acceptance of the IWT by both countries gives it a strong survival footing. India and Pakistan have not signed declarations of the Helsinki and UN Convention to remain committed to IWT. Both countries consistently disagree on few issues:

- Numerous hydropower projects planned by India on western rivers and control potential of these works.
- Technical specification of Indian hydropower projects, especially legitimacy of the storage component.
- Data sharing and exchange of information.

Pakistan's commitment with the Treaty is obvious from a "letter and spirit" implementation approach. Pakistan never raised any objection during Indian works for the storage and diversion of eastern rivers. The objections on the western developments are raised within the framework of IWT. The national water security was the main objective of Pakistan in 1960. Pakistan gave a unique sacrifice of 20 maf (25 bcm) water, total flows of two eastern rivers entering into its territory to achieve this security. By signing the IWT, Pakistan believed securing exclusive rights on 97 percent flows of the western rivers, unperturbed and uncontrolled upstream. Pakistan believed achieving this target up till recently. The Bagliar Dam decision by India in 2008 was a turning point for Pakistan, which allowed India to enter into the control of western rivers and to develop a potential for direct diversions upstream.

New situation has left Pakistan with only option to revisit the water division concepts adopted in 1960, consequences of the assumptions taken in a narrow perspective and interpretation issues emerged with time. Today, Pakistan has to look into a different scenario of upstream control, new needs for correct assessment of water quantities (allocates, used, available for the short or long durations) and new monitoring challenges in the watershed and across the basin.

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For the business as usual, there is a bigger ground for disagreements because of a wider gap in interpretation of the Treaty clauses and addition of new climate uncertainties. The frequency to approach World Bank can increase though, expensive process of WB mediations has no history of permanently resolving the basic issues regarding IWT.

Within the scenario of IWT implementation, Pakistan needs to evaluate following options and formulate its case on the long term bases:-

- Technical studies to simulate combined impact of all structures on Chenab and Jhelum rivers on flow hydrographs under all possible operational scenarios.
- Estimation of water losses, evaporation, infiltration and operational losses, from run of the river storages in western rivers water sheds. The Indian research also provides a good reference for these estimations.
- Estimation of losses to the rain runoff discharges or drainage-inflows into a river due to diversion of the water ways, especially tunneling of the flows.
- Comprehensive methodology to independently estimate upstream water uses from the western rivers. The remote sensing can be effectively used to estimate net water losses, cropped areas and actual evapotranspiration for the post treaty period.
- Making a case for "appropriate interpretations of IWT clauses/concepts" on three issues:
  - Upstream storages should include all mini and micro storages for agriculture, domestic or industrial purposes.
  - Water consumed by evaporation and seepage losses from the so called "non-consumptive structures" must be measured (India should provide data for that). These losses should be considered as "water utilized from the river".

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  - Definition of "irrigation" needs to be "standardized" to include artificial water use from any source (flood canal, tube-well and water tank).

- Carry out comprehensive case studies of few prominent trans-boundary cases considering all techno-legal aspects and work on the gaps and lessons learned from these experiences.

- Identify limitations of IWT to accommodate Pakistan's concerns evaluated above. Develop strategies to address these concerns under both approaches, "water division" and "benefit sharing".

Scenario II: Expanding Water Division to Address Emerging Concerns of Pakistan

Can Pakistan move forward within the existing framework of water division to address emerging gaps and some of the negative impacts of IWT? There are numerous examples of improvements and additions in water treaties with time. The convergence of interests and consent of the riparian are determining factors in improvement or enhancement of the old treaties. A strong and justified case by one of the riparian and opinion of the international water community helps in building a potential case. In continuity of the previous section, Pakistan should build a case to combat new water challenges faced by the downstream. All trans-boundary issues with India need to be evaluated and prioritized under water division approach. The issues like water quality, groundwater, unaccounted uses upstream and environmental protection are linked with the mechanism adopted to divide the rivers without making sure that no harms are transferred downstream.

Two relatively general clauses can be explored; no harm downstream – and clause VII of future cooperation. In the continuity of IWT, Pakistan needs to start mentioning general principles of fairness and no harm downstream. Even if the benefits of these concepts for a downstream riparian were not envisaged in 1960.

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- The quality of river flows during low flow periods should be monitored and maintained. Upstream water-intensive recreational, commercial and agriculture activities not only "consume water" through increased evapotranspiration, pollute the river flows as well. The pollution is expected to increase with an increase in population and business. Pakistan needs to work on a monitoring setup, estimation of costs under the concept of "pollutant should pay" and identification of permanent solutions.

- Depletion of groundwater aquifer in the eastern catchments is going to seriously affect multiple sectors. Transfer of huge quantities of water outside the Basin has substantially disturbed the groundwater aquifer in eastern sub-basins. The critical issue of drinking water availability to 50 million people is already emerging. Deteriorating groundwater quality has direct health impacts. Pakistan will face high costs to ensure domestic supplies to a large and scattered rural population. Soon, there will be a need to bring more fresh water into the eastern region. The IWT does not include any protection for groundwater aquifer, but, clearly a cause of disturbing it.

- Allocation of minimum/environmental river flows to all rivers of the Indus basin including Ravi and Sutlej rivers. The concept of environmental flows did not exist in the basin before 1960, but has been globally accepted today. A recent study by the Federal Flood Commission (Environmental Concerns of All Provinces 2005) has calculated these flows for all five rivers courses. The minimum base flows for Rivers Chenab and Jhelum will be an important safety benchmark for these large rivers. The environmental flows have been estimated for the Indus River, which are not available during low flow periods. These allocations provide an important slot when estimating water demands and existing river water shortages during non-monsoon periods.

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- Heavy flood damages during 2010 and 2011 have been most disastrous events of Pakistan's history. During 2000-01 a large part of the country faced most extended draught of the history. These pattern are yet not properly understood, but are expected to be repeated. Pakistan needs to build defense against extreme events with multiple actions including better water shed management, better information and research.

Scenario III: Benefit Sharing and Protection of Indus Basin Water Bodies

Despite limited success of the approach in large shared basins, trans-boundary collaboration has its scope. The institutes involve in the climate change research face gaps in information and data from the shared catchments, and stress the benefits of joint research and watershed management. The approach is also attractive because of higher involvement of stakeholders and sharing of development responsibility from the beginning.

Pakistan needs to evaluate scope of the "benefit and the loss sharing approach" in its full context. Such an analysis should consider existing allocations, division and divertion of rivers. The nature of water shortage and stress faced in different sectors does not allow Pakistan to compromise on water quantities or on the upstream control on river flows. Pakistan faces planning and management challenges to protect the water bodies and address climate change issues.

The modes of collaboration for better understanding and improved management of the watersheds needs to be evolved in a neutral environment. The joint/shared planning can bring forward downstream concerns at an early stage. The global climate research institutes (like ICIMOD) are already carrying out research in shared water sheds. Current climate change events in the region provide an opportunity for the larger forums. Initiatives to enhance regional cooperation by involving other riparian are important.

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Pakistan's case for benefit sharing must adopt a comprehensive and analytical approach to understand its scope, limitations and constraints. While formulating its own case, proposals by different quarters needs to be evaluated. Experiences of Nile, Mekong and other basins provide good reference for the Indus Basin. In addition, following may also be considered:-

- The benefit sharing and water division are not alternative of each other, not in any large basin. In majority cases, apportionment/allocation of the river flows provides bases for computation and sharing of benefits.

- All benefit sharing agreements follow International Principles (UN 1997) of equity, no harm downstream, protection of water resources and transparent sharing of information. Any proposal without these principles is not acceptable to Pakistan.

- All types of agreements face implementations problems and have to develop operational guidelines and dispute resolution mechanism. The benefit sharing needs joint working, higher trans-boundary cooperation, mutual trust and fair-play by the riparian is pre-requisite.

- While developing "benefits from the rivers" schemes, "benefits to the rivers" must be taken care of.

- A joint management of the Indus Basin was technically a better option in 1960 to protect and optimally use water resources of the Basin. It was more in favor of the lower riparian and communities heavily depending upon river flows for livelihood and drinking. However, even in 1960, it was a difficult development scenario because of conflicting development options. The political relations between India and Pakistan would have not allowed fruitful collaboration just on the water issues.

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- Pakistan faces not only demand-supply, but also allocation-availability gap during major part of a year and most of the years. The provincial allocations are legally protected, while the draft water policy provides sectoral water demands. Hence, Pakistan cannot commit any further consumptive uses from its share outside its boundary.

- Pakistan needs good quality data and research to protect against climate changes, which could be a major area of transboundary collaboration. The climate induced changes are affecting Pakistan in two distinct manners. As a downstream country, Pakistan has to take bigger share of the extreme events and hydrological changes, as already happened during the droughts of 2001 and floods of 2010. The upstream responses and adaptation measures can further influence hydrological and eco-systems downstream. India's carbon credit on two hydropower dams in western catchments without Pakistan's approval is an example in point.

- Good analytical studies are required on the opportunity cost of water in different regions of Pakistan. These studies must use primary data collected through proper monitoring procedures.

Author

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