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“Pakistan’s Water Security Dilemma:
Re-Visiting the Efficacy of Indus
Waters Treaty”

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

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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

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

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. Water 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.

Is Indus Water Regime Withering Away?

The Indus river basin comprises Ravi, Beas, Chenab, Jehlum, Sutliji 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

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 protracted 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

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.

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

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

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 scientific 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

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

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 percent²⁸ which will adversely affect the agriculture usages in the Neelum valley and Muzaffarabad district, besides affecting the power generation capacity of the Neelum-Jhelum 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

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 shows 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

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,

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

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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 starting 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 its 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

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

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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.

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

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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

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) Convention⁴⁵ sets out the obligations of parties to

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

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

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

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 manner⁵¹ 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

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

domestic uses. Changing mindset of people on both sides to water conservation, civil society stakeholders' dialogue, especially between farmers leaders and associations on both sides can help in bridging the trust gap and raising awareness about the diminishing water resources. Interaction between water institutions of the two countries is also very critical in sharing vulnerabilities and adopting best practices.

Conclusion

Indus Water Treaty is considered a model of conflict resolution that withstood wars and volatile spells of Indo-Pak relations is coming under normative and functional stress due to new climatic, demographic, developmental and environmental threats in the basin. The sustainable management of Indus waters resources is emerging as the biggest challenge to the riparian states. Pakistan's dilemma for reinterpreting IWT stems from inbuilt constraints stemming from its lower riparian status and the fractured character of the Indus basin. Growing water scarcity in India and Pakistan, the stress in the Indus basin and India's ambitious plans to exploit western rivers is going to increase strain on the functioning of the Indus water regime.

Cooperation in harnessing Indus waters is possible within the existing parameters of the Treaty by strengthening data sharing mechanisms under Article VI and expanding the scope of Article VII on future cooperation. Article VII on the future cooperation of the Treaty largely remains unutilized. Not a single project has been undertaken under this clause. The trust gap in water relations need to be addressed at the political and diplomatic level by depoliticizing water discourse in both countries. Practical steps should be taken to ensure communication of real time flow data by way of installation of telemetry system on the western rivers and India observing transparency in communicating information regarding planned projects to Pakistan. Strengthening of the Indus Water Commission in terms of its mandate, scope and capacity will save Pakistan from frequent recourse to NE or court of arbitration.

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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