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.

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

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

"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

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

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

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.

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).

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

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

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

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).

- **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.

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

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

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.

- 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

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

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

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

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.

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.

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.

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.

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".

- 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.

- 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.

- 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.

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.

- 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

Dr. Zaigham Habib has worked in the water sector of Pakistan as a development and planning consultant, a researcher, and an advisor on policy issues. Currently, she is an adviser of National Disaster Management Authority (NDMA) on livelihood. She is a member of Think Tank Committee on Water Resources, organized by Pakistan Engineering Council and has contributed towards the task force on climate change, hosted by the Planning Commission Pakistan. Dr. Habib has participated in many development planning and evaluation studies funded by Government of Pakistan, ADB, WB and FAO. She has worked with International Water Management Institute (IWMI),

Planning Commission Pakistan and other National Institutes.

References

- Arjen Y. Hoekstra 2011 The Global Dimension of Water Governance: Why the River Basin Approach Is No Longer Sufficient and Why Cooperative Action at Global Level Is Needed; Water, ISSN 2073-4441
- Ayşegül Kibaroğlu, 2004, Transboundary Water Issues In The Euphrates-Tigris River Basin: Prospects For Cooperation
- Jesse H. Hamner and Aaron T. Wolf 1998, Patterns in International Water Resource Treaties: The Transboundary Freshwater Dispute Database, Colorado Journal of International Environmental Law and Policy.
- Phillips, D.J.H., M. Daoudy, J. Öjendal, S. McCaffrey and A.R. Turton. (2006). Transboundary Water Cooperation as a Tool for Confl ict Prevention and Broader Benefi t-Sharing. Stockholm: Swedish Ministry for Foreign Affairs. Accessible at: www.egdi.gov.se
- Sadoff, Claudia W. and David Grey. (2002). "Beyond the river: the benefi ts of cooperation on international rivers" in Water Policy, 4, 5: 389-403.
- Wolf, Aaron T. and Hamner, Jesse H., 2000. 'Trends in transboundary water disputes and dispute resolution', Water for Peace in the Middle East and Southern Africa. Geneva: Green Cross International.
- David Phillips, M. Daoudy and others, 2006, Trans-boundary Water Cooperation as a Tool for Conflict Prevention and for Broader Benefit-sharing, Ministry for Foreign Affairs, Sweden
- Indus Water Treaty. 1960. The Indus Waters Treaty. Signed at Karachi on September 19 1960 (entry into force: April 1 1960). (Source: United Nations 1963. Legislative Texts and Treaty Provisions Concerning the Utilization of International Rivers for Other Purposes than Navigation, pp. 300–65. United Nations Legislative Series, New York.
- Halla Qaddumi, ODI , Practical approaches to transboundary water benefit sharing; Working Paper 292 Results of ODI research presented in preliminary form for discussion and critical comment