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TECHNICAL, ECONOMIC AND LEGAL ASPECTS OF MANAGEMENT OF TRANSBOUNDARY WATER RESOURCES – A CASE STUDY OF INDUS WATERS TREATY 1960

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ABSTRACT Sustainable management of some 263 transboundary rivers and lakes and hundreds of aquifers, basins of which contain more than half of the population of the world presents a major challenge and holds a strategic importance in the immediate and long-term future. There are nine transboundary river basins in Africa alone, counting towards 80% of the continent's surface water resources. Management of this essential shared resource is crucial for poverty reduction strategies and for related international memoranda of understanding. Agreements among water sharing nations/states are required to protect the respective water rights and to properly manage the limited water resources while attempting to balance the recurring floods and droughts. Such agreements would be effective as well in so many other ways as in reducing the risk of pollution, protecting the environments, establishing the fair and sustainable allocation of water between states, encouraging the regional cooperation and exchange of information for the benefits of all regarding river sharing and to prevent possible conflicts over water. The paper under reference hints on the technical, technological, economic and legal aspects of such a development/management and the use of water resources of transboundary (interstate) rivers while discussing the guidelines to this effect. Indus Waters Treaty signed between India and Pakistan in 1960 has been taken as a case study for this paper.

KEYWORDS: Indus waters treaty, transboundary water resources.

Introduction the development and management of international water resources is a complex process. It may potentially lead to tension and stress between countries and it may also provides opportunities for co-operation to maximize the mutual benefits of resources. This generally asks for both the political and technical considerations usually involving protected legal instruments. The issues such as water utilization and abstraction, the construction of hydraulic structures such as dams, hydro-power generation and the flood management get addressed through such instruments.

If crafted while keeping in view all the necessary aspects of development/management and use of international water, such international agreements would effectively be able to

improve the common understanding between the neighbours, while clarifying the responsibilities of each side. These would be of help in promoting bilateral and multilateral economic development too. Side by side these would not only be effective in reducing the interventions but would assist in improving the mutual relationships and in resolving the other political issues. Moreover, they would encourage and increase the investments in water sector by international donors, financial institutions and neighbouring countries.

Through the technical, technological, economic and legal aspects appropriately addressed, the sharing nations/states would, therefore, be able to ensure proper conservation, development/management and protection of transboundary waters. The legal and protected agreements would thus be the most effective tool for promoting the optimal and sustainable utilization of the water resources for the present and future generations.

Water is the most precious and essential resource for sustaining life on earth. Being a vital constituent of life water with its diverse uses continues to play a major role in reaching the broader development objectives of achieving the food security, poverty alleviation and improvement of quality of life in the world. International freshwaters, for instance, a river or a lake, which may serve as a boundary between two or more states or traverses through the territories of neighbouring countries quite often have become a source of conflict. Such conflicts stemmed both from the dependence of people upon shared waters and from the potential uncertainties about the applicable principles of international law in the area. The resulting interdependence on the other hand stem from the fact that states exercise control on such waters only temporarily or partially. Hence each co-basin state's utilization or development through shared waters remains liable to get affected in terms of the quantity and quality, particularly to the lower riparian, or may remain prone to have further detrimental results.

The implied considerations at the outset, while endeavouring for mutually beneficial development/management and use of international waters, include:

- the social and economic needs of transboundary waters;
- the dependence of population on transboundary waters;
- the need for water conservation, protection, and sustainable development;
- the economic and efficient use of water resources;
- the development of alternative water supplies based on the principles of cost;
- the recovery and the sharing in proportion of the benefits received; and
- the protection and enhancement of natural ecological resources.

For materialization of objectives as noted above it remains imperative that sharing nations adhere well to their agreed protocols, as well as to the international norms. Utilizations out of this important commodity would, otherwise, remain offensive.

FROM 'WATER WARS' TO ASPECTS OF DEVELOPMENT It is a point to note that freshwaters are subject to considerable variation in terms of water use pattern. For example, in Europe 37 per cent of freshwater withdrawals are for human consumption or use in agriculture, whereas in Africa and in Asia this use represented 90 per cent of withdrawals during 1980s. Such factors also form the reason for varying geographical and cultural perceptions with respective preferences for legal solutions of water disputes. Geo-political reasons also count towards conflict potentials and management. In 1971, a total of 214 freshwater systems were identified as being situated in drainage basins extending through the territories of two or more states. In the year 2000, the WCD noted that there are 261 watersheds that cross the political boundaries.

There are notably three dry areas in the world; the Middle East, Africa and South Asia. In all these areas water conflicts between the countries exist. Due to the population pressure numerous disputes on distribution of waters within these regions have been witnessed. For instance:

- there is a dispute on Jordan River between Israel, Syria, Jordan, Lebanon and the West Bank.
- there is a conflict about distribution of water between riparian countries on the use of Euphrates and Tigris. The Euphrates originates in Turkey with 95% of its total flow and it flows through Syria with 4% addition only.
- the Nile and its head waters flow through nine African states, viz. Burundi, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda and Zaire. In 1955, the Nile Waters Agreement formed the basis for sharing the waters of Nile River between all the riparians.
- international cooperation was developed between South Africa, Swaziland and Mozambique for resolving water dispute of Komati River in November 1991.
- Indus Waters Treaty was signed between Pakistan and India in 1960 after the protracted negotiations of 12 years.

Over the last two decades, the debate on the water sharing issues matured significantly and has started to swing towards the options of cooperation and amicable sharing of benefits resulting from professionally developed and managed watersheds; while adequately covering the technical, economic and legal aspects. The process assumes the path of the concept of 'desecuritization of water resource management' and opens the way for negotiated agreements between states.

USE OF TRANSBOUNDARY WATER RESOURCES – THE GUIDING PRINCIPLES In view of what has been discussed, the following guiding principles and

recommendations may be found steering for regional cooperation in Transboundary River Basins:

Benefit Sharing The concept of 'benefit-sharing' has been pursued as a policy tool especially at international conferences and workshops, where it appears to be more frequently cited than within academia. It would, however, be more useful if discussions on transboundary cooperation be based on a recognition of interdependence. The myriad of benefits of integrated management of rivers, lakes, basins, and aquifers for the states involved requires to be highlighted. Redistribution of these shared benefits at the national level needs the participation of stakeholders and integration of poverty reduction strategies.

Participation and Capacity Building The value and importance of involvement of stakeholders in decision-making should be accepted. Transparency and information sharing would help them to gain full participation in the development of basins. Awareness raising and education, including training of mediators requires to be put to place to ensure that all the stakeholders may learn the best way to take up the challenges of sharing water. But side by side, in order to develop an effective integrated water resources management in a river basin and to break the links between social development, economic growth and environmental damage, the different stakeholders and their interests would be required to be adequately identified and weighed.

Facilitation and Mediation Access to water mediation needs to be established to avoid or resolve conflicts in collaboration with basin organizations, governments and other stakeholders. To serve this end well it would be important that sharing nations/states set an effective mechanism to cover the following:

- a. regular exchange of data and information on hydrology, meteorology, the environment, water quality, flow monitoring and projections and other factors;
- b. information for effective protection, preservation and management of ecosystems;
- c. information regarding regulation of flows and withdrawals from surface and ground water resources, where applicable; and
- d. sharing of data regarding the costs and analyses for dams, reservoirs and the control structures needed to preserve and manage the transboundary waters.

Intra-Sectoral Allocative Efficiencies Many countries utilize water inefficiently in the 'thirstiest' sector – agriculture – even though they are located in arid regions and/or are water-stressed. The reason for this extends from a simple lack of education or reliable information through a paucity of available (often minimal) front-end investment to a misplaced reliance on historical methods of agriculture. Considerable improvement in intra-sectoral water use efficiency is, therefore, possible. This, however, involves a series of linked activities, including use of improved methods of irrigation, the selection of more appropriate crops and the development and use of crops with higher yields. This

may be pursued with vigour by the countries experiencing water stress (and indeed, others). The international financing agencies may assist this sector at high priority.

Environment One of the most controversial issues in water management at present is the linkages between water resource development, including large dam structures for water storage, and their social and ecological impacts. Reservoirs are particularly important in arid regions where differences are large between wet and dry years, thus incorporating the importance of the integrity of ecosystems within interstate and basin agreements. Healthy and functioning ecosystems are vital for safe and clean water supplies and risk prevention. Moreover, the biodiversity of rivers and lakes is a vital element for food security in many parts of the world. A goal for an equitable water access and cooperation would remain at the lower ebb if investment in the health of rivers as the source of water for people and nature is ignored. Implementation of environmental flows, where sufficient and non-polluted water is allocated to maintain healthy river systems, estuaries and coastal areas for the benefit of people and the environment, therefore, remains must.

Sustainable Economic Development Sustainable development presumes fair and equal social and economic development while protecting the long-term carrying capacity of life support systems. Water plays fundamental role in sustainability of areas – indisputable at least to water professionals! Without access to clean and adequate amount of water resources, there cannot be any social or long-term economic development. But unfortunately, water management issues are generally dealt in fragmented and rudimentary manner, dominated by sectoral perspectives and neglecting its role as the bloodstream of the biosphere as a whole and ultimate resource for any economic development to take place.

Financial Support International assistance can promote cooperation in transboundary river and aquifer basins by financing and facilitating communication and the creation of joint institutions, or through reinforcement of existing ones. In any region of developing world there is no infrastructure even for collection and exchange of data among the neighbouring countries. International financial commitments are vital and should be increased while covering this aspects. For instance, if 50 transboundary rivers, lakes and aquifers basins are identified on priority basis for international security, US\$ 1 billion would be needed per year over ten years to establish permanent and stable mechanism for reliable cooperation.

International Water Law International conventions and international water laws should become more powerful in transboundary water conflict resolution and environmental protection. There is a need for integrated and more effective management agreements among states in all transboundary rivers, lakes or aquifers. Additional measures are needed to clarify and strengthen the protection of water systems from armed conflict and

terrorist attacks.

Joint Water Management and Transboundary Institutions Joint water management is a desirable objective in trans-boundary basins. However, its precise form may vary depending upon a number of factors which are basin-specific. The issue is also tied to the securitization-desecuritization scenario, which tends to prescribe the form of interface preferred by the basin states. For example, the co-riparians of the Jordan River basin have a primary interest in volumetric allocations rather than benefit-sharing and any joint management agency established in that geography would be likely to be limited to the monitoring of hydrological characteristics, abstraction rates, and other such technical matters. By contrast, the Kagera Basin Organization established previously was given a very broad mandate extending well beyond the water resources per se and this is likely to be repeated shortly in reinvigorated efforts in that basin. The Mekong River Commission falls between these two extremes and suffers primarily from absence of two of six co-riparians in the basin. An appropriate decision on the form and function of a joint management institution is thus important, being linked also to the matters of sovereignty and jurisdictional competence.

SHARING OF INDUS BASIN – A CASE STUDY As said, the water is a mobile resource which crosses the political boundaries. Water fluctuates in both space and time which makes its management more difficult. Use by upper riparian clearly can effect both its quantity and quality available to the lower riparian.

Pakistan shares the rivers of the Indus Basin with India. For redressal of aforementioned aspects, an international legal mechanism exists by the name of Indus Waters Treaty 1960.

INDUS WATER TREATY – 1960 In 1947, Indian Sub-Continent was partitioned and the two countries India and Pakistan started their independent existence. The boundary between India and Pakistan was cut right through the Indus Valley, dividing the Punjab into two parts, the western being partitioned to Pakistan and the eastern to India. Before the partition, the western part of Punjab, with Indus and its five tributaries permitted the developing of the world's largest irrigation system. The eastern Punjab, where mountain foot hills predominate was less developed agriculturally, but was the industrial and manufacturing part of the province.

Not only the assigned border cut the Indus river system and a number of canals, it also left Pakistan as the downstream riparian on all the tributaries and the division of the water was transformed into an international problem. As India remained adamant on her stance, the scenario became more and more stiff. The good offices of the World Bank

were ultimately offered to India and Pakistan in 1951 for resolution of the issue and the offer was accepted in 1952. In 1954, the World Bank forwarded a proposal that:

the waters of the three western rivers – Indus, Jhelum and Chenab – be allocated to Pakistan, and the waters of the three eastern rivers – Ravi, Beas and Sutlej – to India. Requirements of the areas within Pakistan, hitherto fed by the eastern rivers, would in future be met by waters to be transferred from the western rivers by means of a system of replacement works. It was estimated that some 14 MAF would be required, ultimately, to replace the water designated for use in India;

After several years of difficult negotiations, India and Pakistan signed the "Indus Waters Treaty" in September 1960.

The engineering plan of the Indus Basin Project involved the works consisting of following: -

- an earth fill dam on the Jhelum River (Mangla Dam) with a live storage capacity of 5.34 MAF, including hydro electric power equipment with an installed capacity of 300,000 Kw;
- a series of new major inter-river link canals joining river Indus to river Jhelum, Jhelum to Chenab, Chenab to Ravi and Ravi to Sutlej. The net volume of water to be transferred from western rivers (excluding conveyance losses) amounts to 14 MAF annually, while irrigating about 5 Million Acres;
- five new barrages and an inverted siphon;
- remodeling two existing barrages, three existing inter-river link canals and existing canals affected by the construction of new links.

Though, once a water surplus country due to sizeable water resources of Indus River System, Pakistan is now a water deficit country according to the criteria developed by Malin Falkenmark, a Swedish hydrologist. The criteria suggest that a country whose renewable fresh water availability is below 1,700 m³ per capita per annum suffers occasional water problems. Countries with water availability between 1,000 m³ and 1,700 m³ pcpa, however, would be water stressed. Below 1,000 m³ pcpa countries experience chronic water stress (Population Action International, 1993). Current water availability in Pakistan is about 1200 m³ per capita per annum, which indicates conditions approaching chronic water stress.

Pakistan is thus sliding into that zone where it would be using all the water resources available to it. It has only 20 to 25 years left before its agriculture, and ultimately its food security is the threatened and any negative change in the availability of its present surface water resources would become unaffordable.

ADVANTAGES/DISADVANTAGES OF INDUS WATERS TREATY The positive outcome of the Treaty for Pakistan was the attainment of water security through construction of the works that made its irrigation system and hydropower generation facilities independent.

Beside the environmental aspects due to the stipulated mode of sharing the Indus Basin, the other major disadvantage of Indus Basin Treaty is that Pakistan did not surrender its right on the waters of Sutlej, Beas & Ravi (26 MAF), but has also lost for all time to come the capability of these rivers to continually recharge the ground water aquifers in the areas on either side of the courses. Before the Indus Water Treaty, the flow in these rivers was perennial which kept recharging the ground water aquifers. After signing of the Treaty, India controlled the flow of these rivers by building reservoirs and as a result the flow of these rivers has become highly seasonal. For 10 out of 12 months, these rivers remain dry and thus, not capable of recharging the ground water aquifers. There are thousands of tube wells installed in the river flowing areas of the Sutlej and the Ravi which keep pumping throughout the year to irrigate hundreds of thousand of acres of fertile land on both sides. Millions of acres feet of water is being pumped annually from a limited groundwater reservoir with relatively very little annual recharge. The fate of thousands of tube wells installed along either bank of these rivers and thousands of acres of land being irrigated with these tube wells has been spoiled and water table in the areas is declining. The farmers are required to deepen the bore-holes of these tube wells and also to increase the length of the strainers resulting in reduced discharge and more expensive water. The water table is liable to decline to a point where further pumping of water would not be economical. In addition, groundwater reservoir may be depleted to such an extent where annual safe yield would drastically be reduced and the quality becomes unfit for irrigated agriculture. Eventually, the infinite ground water reservoir may be fully exhausted and thousands of tube wells, which are now supporting irrigated agriculture in these areas, may have to be abandoned which will be a tremendous loss. The environmental degradation going side by side is certainly obvious. The issue at this point of time, therefore, asks for immediate attention to all the related aspects.

LESSONS LEARNT FROM THE INDUS WATERS TREATY Beside the irrigational advantages, Indus Waters Treaty-1960 fostered bilateral cooperation between Pakistan and India despite two wars. The creation of an institution/Permanent Indus Commission composed of Pakistan and India to oversee the Indus Waters Treaty played a vital role in conflict mitigation.

The lessons learnt from the course to the Indus Waters Treaty 1960 and its implementation includes following:

- Power inequities may delay negotiations.
- Time bound and “either party” activated resolution process is essential for safeguarding the interest of downstream riparian
- Positive and active third party involvement is vital for settlement.

- As water stress increases, the chances of agreements decrease.
- Historical evidences point towards a conflict in basins lacking such institutions, which can accommodate political, hydrological and other basins stressors.
- The creation of joint water institutions plays a vital role in conflict mitigation. Water management by definition is conflict management.

CONCLUSION Regional cooperation in transboundary river basins is one of the widest spheres of deliberations among current global issues. Sustainable Water Resource Management has emerged as an essentiality for achieving the goal of millennium development. Ecosystem protection, social and political stability, harnessing the dream of wider equality, etc., invariably traces its development to the amicable evolution of cooperation in sharing the waters distributed over river basins across the political boundaries.

Hence, not only the water is seen as a possible cause of tension in so many instances, but more importantly, it has also been seen as a powerful source of cooperation. Though much longstanding water related disputes still remain unresolved and growing demand from the finite freshwater resources is heightening the risks of conflicts but the beacon of hope is also ricocheting.

In order to ensure the sustainable transboundary water resource management we are to address and acknowledge the following basics:

- (a) sharing water-related benefits among nations for regional economic integration rather than polarized claims for water;
- (b) balancing the competing uses from the basins and aquifers, especially upstream and downstream uses, in a transparent and participative way for local and regional sustainable development;
- (c) focusing on poverty reduction, public participation and gender balance to ensure equitable access to water for livelihoods;
- (d) recognizing the fundamental need of freshwater ecosystems for resource protection and natural risk prevention;
- (e) protecting watercourses during wars and conflicts and post-conflict rehabilitation of water resources;
- (f) improving our knowledge about the causes of conflicts and potential policy responses to prevent conflicts triggered by competition for the resources among different users and about the environmental concerns such as pollution; and
- (g) developing the capacity building in Integrated Water Resources Management (IWRM).

With an agreement or compromise on advantages and disadvantages of water accords around the world, we look forward to the globe as a place of peace-waters, with an honour and compendium to all such treaties, which have been brokered among the co-sharers. Though much is yet to be spread about such an approach, our maturity in the era of current diligence falls nonetheless short of perception to conceive the perspective of peaceful nurture amongst the nations who share the common waters with the aim of mutual benefits.

For our persistent desire to work for global peace, we conclude to better be striving for cooperation and harmony in sharing our water resources. May, we would be presenting this desire as an urn and not as Achilles' heel.

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