Water is a prerequisite, and one of the two fundamentals (other being air), for the existence of all forms of life. In the case of humans, it has the additional importance of being crucial for each and every facet of their lives. Scarcity of water affects livelihood, health and environment, its pollution translates into disease while its excess results in floods and loss of life and property. The poor are particularly vulnerable to scarcity, ill-disposal of sewerage, pollution of water resources, droughts, flooding and a myriad of other water-related problems. According to UNESCO, in the past one hundred years while the world population has tripled, the demand for water has risen seven times¹ Rivers and fresh water aquifers that are the life blood of mother earth are under severe threat from over-exploitation. Conflicts arising out of competing control and usage of water resources are, therefore, imminent.

The United Nations Human Development Report (2002) estimated that 1.1 billion people in the world lacked access to safe drinking water and 2.4 billion lacked adequate sanitation. More than 80 percent of these are poor people who live in rural areas. In Asia the picture is stark, since one in three people does not have access to a safe drinking water source within 200 meters of dwelling and one in two people does not have access to adequate sanitation. Of those without access to safe drinking water, more than 700 million live in rural areas and more than 90 million in urban areas. According to some estimates, 1.7 billion people in rural areas and about 300 million in urban areas do not have adequate sanitation.²


South Asia, with one-sixth of the global population, has the lowest level of water resources per capita. India and Pakistan, the two largest countries of the region are fast approaching the threshold of 1000 cubic meters of water per person per year which puts them into the water stress bracket. Pakistan, at 1200 cu meters per capita, is slightly above this water stress threshold at present. However, unless drastic measures are taken towards better water management and more efficient usage, it will cross over into crisis mode in the near future. In any case, by 2025, the demand for water in South Asia will far outstrip the supply, the enormous burden of which will mostly be borne by the poor. Sustainable water resources development, management and efficient usage are, therefore, the major challenges for mankind in general, and countries of South Asia, especially Pakistan, in particular, in the immediate and long term future.

Global warming and the consequent changes in weather patterns have further added to the urgency. For the subcontinent, the major rivers which are mostly dependent upon snow melt rather than rain, the urgency will reach catastrophic proportions when in the next 50 years or so, the glaciers in the Himalayas, melting fast at present, shrink by one fourth, as is being apprehended.

According to the Federal Minister for water and power in his presentation before the Pakistan Development Forum in Islamabad on 18 March 2004.

In popular usage, “scarcity” is a situation where there is insufficient water to satisfy normal requirements. However, for policy makers and planners this definition is of little use. Therefore most hydrologists, World Bank, Population Action International (PAI), UN Food and Agriculture Organisation (FAO) and other such institutions use the concept of water stress and scarcity developed by Malin Falkenmark based on an index of per capita fresh water needs. She estimated a minimum need of 100 litres per day per person for household use and from 5 to 20 times as much for agricultural and industrial uses. Calculations of water stress and scarcity are based on estimates of a country’s renewable fresh water supplies that does not include water withdrawn from fossil groundwater. A country is said to be in a situation of water stress when its per capita renewable water availability falls below 1700 cu meters and it enters the stage of water scarcity when the per capita water availability falls below 1000 cu meters. (Managing water scarcity for water security, prepared for FAO by J.T Winpenny, in “Water – More nutrition per drop”. SIWI – IWMI 2004, Stockholm International Water Institute, Stockholm. The report may be downloaded from www.siw.org.)

Pakistan’s population is 139 million (1998) and the projected population in 2025 is 208 million. At 172.2 BCM (140 MAF) average annual flow in its rivers, Pakistan’s per capita water availability is 1200CM now but is expected to go down to 800CM in 2025 pushing the country into water scarcity at 800CM per person per day. The Indian population at 915 Million (1995) is expected to reach 1313 to 1392 Million in 2025. Its annual surface flow is 1869BCM (utilizable surface and ground water 1121BCM) making its per capita water availability (1995) between 2000 to 1200cm, which is bound to decrease to 1400CM (800CM if utilizable surface and ground water is considered). Note: BCM = Billion Cubic Meters; MAF = Million Acre Foot; 1 MAF = 1.23 BCM. South Asia Regional Water Vision 2005. www.gwpforum.org/gwp/library/south_asia_jan06.pdf.
There is some hope, however, as the world comity of nations is slowly waking up to face the task ahead. Despite the unilateral war imposed by the USA and Britain against Iraq in stiff opposition to world opinion, despite the developed world’s, especially USA’s, refusal to take corrective measures to reduce green house effect, and despite many other disagreements between countries and within peoples, the world community is moving in the general direction of treating water as a common good of the whole human kind and towards rational and commonsensical approaches in resolution of water-related conflicts.

5.1 RECOGNITION OF WATER AS A SOURCE OF COMMON GOOD

Although water occupies a basic and fundamental place in human life, its availability, until the recent past, has been more than demand for it. Only recently, to be specific, only after World War 1 (1914–1918), when ideas about human beings and their fundamental rights first started to be aired and brought to the notice of nations, did it begin to dawn on the concerned citizenry of the world, that unlike the other fundamentals of life, air, the renewable resources of water were finite and under threat due to two main reasons: first, over exploitation from the exponentially growing human population and secondly, and more importantly, hegemonisation of water resources within and between countries for political gains and power. Realising that there are close to 261 international rivers, covering almost half of the total land surface of the globe, and untold numbers of shared aquifers, and that the intensity and the frequency of conflicts within and between countries over these resources for political gains and power are bound to increase, the international community hesitatingly began to take steps towards formulating guidelines for water sharing and to develop legal and economic framework of conflict resolution. But the path has not been easy. For example, it took 14 years (1970–84) for the UN’s legal advisory body, International Law Commission (ILC), to adequately define the term “international water course.”

Similarly, the concept of “drainage basin” was mooted and finally accepted by the International Law Association (ILA) in the Helsinki

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Rules in 1966, which also provided guidelines for “reasonable and equitable” sharing of common waterways. These guidelines list no less than 11 factors that must be taken into account for defining “reasonable and equitable.” When the United Nations considered the Helsinki Rules in 1970, more differences cropped up over adequacy of definitions. For example China, Brazil, Belgium and France objected to the prominence of the “drainage basin approach”, arguing that such an approach infringed upon states’ sovereignty, as a drainage basin is likely to be spread over more than one country’s geographical boundaries.

On December 8, 1970, the UN General Assembly entrusted the International Law Commission (ILC) with the task of studying “Codification of the Law on Water Courses for Purposes other than Navigation.” After 27 years in May 1997, the UN General Assembly finally adopted the “Convention on the Law of the Non-Navigational Uses of International Water Courses”, the only universal treaty to date dealing with the use of fresh water resources. The convention has 37 Articles and its language is very similar to the Helsinki Rules since it lays emphasis on the judicial utilisation, development, conservation, management, protection and preservation of the trans-boundary watercourses and their environs and marine eco-system. The Convention obliges riparian states to exchange data and information and notification of possible adverse effects and emergency situations.

Much of the discussion leading to the Convention centered on “reasonable and equitable use” within each water course state, “with a view to attaining optimal utilisation thereof and benefits therefrom”. But this was qualified with an obligation not to cause “significant harm.” Reasonable and equitable use was defined in a manner similar to the Helsinki Rules, but it was to be based on a list of “seven relevant factors.”

9 The factors include a basin’s geography, hydrology, climate, past and existing water utilisation, economic and social need of the riparian population, comparative costs of alternative resources, availability of other sources, avoidance of waste, practicality of compensation as a means of adjusting conflicts, and the degree to which a state’s needs must be satisfied without causing substantial injury to a co-basin state.
12 The seven factors include:-
   i. Geographic, hydrological, hydrographic, climatic, ecological and other natural factors,
Simultaneously and parallel with the efforts of the United Nations, several other initiatives were taken around the globe to address the problem of managing water. One such effort resulted in the Global Consultation on Safe Water and Sanitation for the 1990s, held in New Delhi. Another resulted in the widely accepted Dublin Statement on Water and Sustainable Development, 1992, also known as Dublin Principles.\textsuperscript{13} The Earth Summit held in Rio De Janeiro in 1992, added recognition of the social nature of water to the Dublin Principles. Yet another noteworthy attempt was the Stockholm Principles,\textsuperscript{14} adopted at the Stockholm Water Symposium, 2002. Much like the Dublin Principles, the Stockholm principles also received wide acclaim and acceptance.\textsuperscript{15} There are, therefore, significant numbers of multilateral, regional and basin-wide agreements, apart from the 1997 UN Convention on the Law of the Non-Navigational Uses of International Water Courses (1997 UN IWC Convention), The most important of them are:

- The 1992 UN Economic Commission for Europe Convention on the Protection and Use of Trans-boundary Water Courses and

13 The Dublin Statement enunciated the following four principles:-

\begin{itemize}
  \item Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment.
  \item Water development and management should be participatory, involving users, planners, and policy makers at all level.
  \item Women are central to providing, managing and safeguarding water.
  \item Water has an economic value in all its competing uses and should be recognised as an economic and social good.
\end{itemize}

14 The Stockholm Principles also number four are as follows:-

\begin{itemize}
  \item Water users must be involved in the governance of water resources;
  \item We must break now the link between economic growth and water degradation;
  \item Urban water services are crucial for urban stability and security; and
  \item Policy, planning, and implementation must move towards integrated solutions;
\end{itemize}

15 Organisations that endorsed the Statement included, the Global Water Partnership (GWP); International Water Association (IWA); International Water Resource Associations (IWRA); Stakeholder Forum; Stockholm International Water Institute (SIWI); Water Environment Federation (WEF); World Business Council for Sustainable Development, and the World Water Council (WWC).
International Lakes, held in Helsinki (1992 UN ECE Helsinki Convention)


In 1997, the Institute of International Law in Salzburg adopted three resolutions. The term ‘environment’ was defined to include “abiotic and biotic natural resources, in particular air, water, soil, fauna and flora as well as the interaction between these factors.” Through such a wide definition, all trans-boundary watercourses were subjected to internationally accepted environmental laws dealing with ecology and environment. Together with numerous bilateral treaties on utilising and managing shared water courses and aquifers, these attempts at settling water conflicts and of formulating guidelines for developing a legal framework for doing so in the future, are initiatives that give hope that mankind may well be able to avert horrendous conflicts in the near future and learn to share what is essentially a common good water.

5.2 WATER AND HUMAN SECURITY NEXUS

The nexus of fresh water resources to human security\(^\text{16}\) cannot be adequately understood, or addressed, without recognising the inter-

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\(^{16}\) Over the years of the term “human security” has been defined variously. The UNDP formulation is: freedom from want (UNDP, 1994a, 1994b), and the Canadian Department of Foreign Affairs and International Trade is: freedom from fear (DFAIT, 1999). In defining “human security”, the Human Development Report 1994 distinguishes two main meanings of the term, firstly, safety from such chronic threats as hunger, disease and repression and secondly, protection from sudden and hurtful disruptions in the pattern of daily life, whether in homes, jobs or in
relationship between the multiple functions of water and its overwhelming significance to human life, the marine ecosystem and a myriad of other related factors which impact on humans and everything else living and which is considered important for sustaining the balancing facets of nature. At the United Nations Conference on Environment and Development (UNCED) in 1992, the international community emphasised this inter-relationship, especially in the context of human well-being by stating that "the extent to which water resources development contributes to economic productivity and social well-being is not usually appreciated, although all social and economic activities rely heavily on the supply and quality of fresh water (Agenda 21, Chapter 18; Protection of the Quality and Supply of Freshwater Resources).

The relationship between access to water and poverty is particularly crucial. The poor are the most vulnerable when the water they consume is unclean or in short supply. Lack of access to water is inherently linked to ill health, poverty, unemployment, displacement of peasants and insecurity of land tenure. Women bear the brunt of the water crisis, travelling farther to get water for the household which is often polluted and unfit for human consumption. Poor families are forced to prioritise between water, food and healthcare. Uneven distribution or lack of access to water threatens to further exacerbate socio-economic disparities in developing countries.

Water shortages and environmental degradation (water-logging, pollution of surface and ground water resources, soil erosion) coupled with landlessness and archaic farming methodology and practices make farmers' income and livelihood uncertain, further entrenching rural poverty. For South Asia and especially for Pakistan and India, where more than 34 percent of the population subsist below the poverty line and more than 70 percent are in one way or the other connected to agriculture for livelihood, decreasing freshwater resources, coupled with runaway increase in population and rapid industrialisation, and competition for access to water has the explosive potential of increasing poverty and greatly worsening existing socio-economic differences in society.

In fact, the Asian Development Bank (ADB) estimates that between 1950 and 1995 the per capita availability of water resources in South

17 UNDP 1994, Ibid.
Asia dropped by almost 70 percent. And with one-sixth of the global population, water resources per person in this region have reached alarming levels.\(^{18}\)

The multiple, inter-related and overlapping effect of water, or lack of it, impacting on human beings can be summarised as thus:

- **Primary (social) impact**: consumption (for drinking and food), sanitation, health, washing, bathing, cultural and religious rituals;
- **Economic impact**: agriculture, aquaculture, livestock, industry, transportation, tourism, water-logging, salinity, all types of soil degradation;
- **Environmental impact**: ecosystems, mangroves, wetlands, Katcho (riverine flood) areas, deltaic coastal estuaries, droughts, floods, and sea intrusion.

If a hierarchy of the effects of water on human life were to be structured, the single most crucial factor would be safe drinking water, closely followed by treatment and disposal of domestic sewage and industrial effluent. Both impact on the health and well-being of people, the burden falling overwhelmingly on the poor. Unfortunately, in Pakistan, not a single person is assured of having access to safe potable water except for those of the upper crust who can afford to use costly bottled water, for about Rs.5 (US$ 0.08) per glass. All tap water available in the cities of Pakistan is, by and large, un-potable. For those with access to water within 200 meters of their homes, it is downright filthy. Gleik (2002) indicates that an estimated 80 percent of diseases in developing countries are water related.\(^{19}\) These diseases, known as water scarce or water washed, because they thrive in conditions where fresh water is scarce and washing of hands and body parts is poor, include such devastating ailments as leprosy, trachoma, tuberculosis, whooping cough, tetanus and diphtheria.

In the 5 lower districts of Sindh, one of the four provinces of Pakistan inhabited by a population of over 8 million, one in every five persons suffers from hepatitis,\(^{20}\) the primary reason of which is unclean

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20 Pakistan Medical Association's 2006 annual report says that Hepatitis B and C are “a time bomb waiting to explode unless the government takes drastic measures to control it.” Almost 10 percent of the nation's 155 million people are infected with hepatitis, the report said, and life expectancy has declined from 63 to 60 years.
drinking water. In Hyderabad, the second largest city of Sindh province after Karachi, 43 people died in 2004, and thousands were hospitalised because the water supplied by the Water and Sewerage Authority (WASA) was mixed with saline effluent and agricultural runoff of the Indus Right Bank Outfall Drain (RBOD), a spinal drain for reclaiming waterlogged areas of Balochistan and upper Sindh.

Waste water is a constant hazard affecting the health of the people of Pakistan. Right from the north where the pristine snow melt turns into rivers of the country, all big and small cities and settlements drain their raw sewage into the fresh water streams that are subsequently consumed by the people downstream. Agricultural run offs and industrial effluent join the human excrement to turn the water streams into poison. In the cities, fresh water pipes passing through sewage channels have much the same effect.

In September 2005, 13 people, mostly children, died in 2 localities of the largest cosmopolitan city of Pakistan, Karachi, because of drinking water mixed with sewage. Later, when water was sampled at about 144 places in the city, e-coli bacteria, identified with human excrement, causing extremely hazardous intestinal illness, was indicated in 102 of the samples checked.

In Lahore, the capital of Punjab, the most rich and powerful province of Pakistan, about 30,000 people are hospitalised every year due to water-borne diseases. In 2005, 28 people lost their lives by July. The same was the case in Rawalpindi, the twin city of Islamabad, the capital of Pakistan, where 25,000 to 30,000 people are hospitalised every year from diseases caused primarily by contaminated water.

Such is the menace of unhygienic drinking water in all the four provinces of Pakistan that the health authorities, through government sponsored advertisements, the health authorities advise people to boil...
water before consuming. Here also the poor, living in rural areas, or such cities that do not have natural gas connection, have to pay a very heavy price because boiling water on firewood is a luxury they can ill afford, firewood being three times more costly for cooking than natural gas.

According to statistics, 50 percent of the rural labour force is employed by agriculture and 70 percent of all Pakistanis’ livelihood depends directly or indirectly upon it. An overwhelming majority (70 percent) among these are small khatedars (client) and poor farmers with land holding of less than 8 acres (3 ha). For these people, to be able to obtain irrigation water for watering their fields is an arduous task. Powerful landlords force or bribe officials into getting more than their share of water, leaving little for the small khatedars. One basic principle of irrigation is the delivery of a reliable supply of water. Without such a supply, farmers do not know when the next irrigation water will come from. They do not know how much water will get and if there will be enough water for their crops. In this uncertain environment, farmers will not invest in seed, fertiliser and land preparation. Consequently, yields and productivity suffer and agriculture, already a risky business because of the vagaries of weather, will become even more risk prone for the poor.

Political score settling is yet another reason that poorer farmers suffer. In many cases, powerful feudals stop water flowing downstream by erecting barriers, since the lower riparians did not vote for them in the previous elections. Since such feudals are almost always aligned with the incumbent government, which itself is intolerant of dissent, the government departments concerned (police, irrigation, election commission) look the other way.

The menace of water-logging and salinity is yet another negative consequence of abuse of the water supply system, impacting on soil fertility and production, and greatly contributing to incidences of poverty. Among the four provinces of Pakistan, namely, the North West Frontier, Punjab, Sindh and Balochistan, and Azad Kashmir and Northern areas, the drainage of NWFP, Northern Areas, north and central Punjab and Azad Kashmir is excellent. The lands here are fertile, along with subsoil aquifers of rechargeable sweet water. Balochistan is a parched land with scarce water resources and minimal rainfall (less than 125 mm per year). Southern Punjab and the province of Sindh have fertile lands, insufficient drainage and exceedingly brackish subsoil water.

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It is here that the Indus Basin’s canal network, the largest contiguous man made irrigation network in the world, comprising of 64000km of canals and minors and 105,000 watercourses, has played havoc. The constant seepage from the canals, watercourses and farms has raised the water table of 80 percent lands of Sindh and southern Punjab to 0-3 meters. These lands are threatened with water-logging, and 100,000 acres each year become unproductive. About 2.8 million acres in Sindh alone have highly reduced productivity due to water logging and salinity.26

Be it water-logging, floods, droughts, soil degradation, sea intrusion or destruction of mangroves and wetlands and other such manmade and natural disasters, the poorer sections of society suffer far more because of the lack of means of coping. Needless to mention, women bear the brunt, whether that be health, livelihood, pollution or any other negative water related impact. For example, in all of the parched Balochistan province, in the desert of Thar and the hilly areas of Kohistan and most of the rural Sindh, in southern Punjab and Cholistan desert and in almost all the hilly areas of NWFP and Kashmir, women trek long distances to fetch water, wasting precious time which could otherwise have been used for schooling the girl child and for productive enhancement and emancipation of women to contribute to the already formidable gender inequality existing in Pakistani society.

5.3 THE PAKISTAN-INDIA WATER CONFLICT

For eons, the Indus River Basin constituted a unified geography spread over almost 1.2 million square km in what are now Tibet, India, Pakistan and Afghanistan. In undivided India under British rule, the vast plains of the arid and semi-arid provinces of Punjab and Sindh were transformed into major food growing areas by diverting waters of the Indus and its tributaries into a huge network of canals and minors. The division of the Sub-continent and the subsequent discord over water culminated in the Indus Water Treaty of 1960, under which three eastern rivers, Ravi, Beas and Sutlej were gifted to India, whereas three western rivers, Indus, Jehlum and Chenab, were given for the exclusive use of Pakistan.

From the diverted rivers, the state of (Indian) Punjab gets 12 MAF (million acre feet) water for its 10 million acres of cultivable land while Haryana gets 14.5 MAF for its 8 million acres. Nevertheless, India’s overall per capita water availability has declined from over 5000 cubic

meters in 1950 to 1800 cums in 2005. It is apprehended that the threshold of water stress of 1000 cums per year will be reached by 2025.\textsuperscript{27} Already, the northern states of Kashmir, Himachal Pradesh, (Indian) Punjab and Haryana are bracing for impending squabbles over water sharing and the (Indian) Punjab Assembly has passed a resolution annulling all its treaties with the neighbouring states. Likewise, as the co-sharer of the Indus Basin, Pakistan's per capita water availability has declined from 5600 cubic meters in 1947 to 1200 cums in 2005. It is predicted that the country will reach the water stress threshold of 1000 cums as early as 2007.\textsuperscript{28}

In this scenario, major water-related disputes are bound to erupt between India and Pakistan if the Indus Water Treaty does not hold or is circumvented. India is in the process of building the 330 MW Kishanganga dam on the Jhelum and the 450 MW Baglihar dam on the Chenab for hydel power generation, beside Tulbul (Wollar) barrage on Jhelum for navigational purposes. In addition, the Uri II hydro-electric project on Jhelum, and the Pakul Dul and the huge, 1020 MW Burser hydro dam, both on Marusunder, a tributary of the Chenab, are in various stages of planning and execution. The Pakistan government, which has been severely criticised by the people of Sindh in the past for meekly and criminally surrendering the three rivers, Sutlej, Beas and Ravi to India, without the shareholder Sindh's consent, is now reacting post facto by perhaps unfairly raising too many objections to the resources poor Kashmiris possess who are getting cheap electricity from a natural resource flowing through their homeland.

The simmering dispute of Kashmir has its roots in the act through which Maharaja Hari Singh, ruler of Kashmir at the time of Partition, signed an instrument of accession in favour of India, in violation of the understanding that all Muslim majority provinces of northwestern India would join hands to form the new state of Pakistan. Since then, India and Pakistan have gone to war three times, the last of which, in 1971, resulted in the dismemberment of Pakistan, its east wing seceding violently to form Bangladesh. For all the three wars, the underlying cause was Kashmir a region that has become the cornerstone of Pakistan's foreign policy and its all-consuming obsession.

Perhaps India knew all along the importance of Kashmir and therefore, it told the United Nations that it was prepared to hold a

\textsuperscript{27} The Final Settlement: Restricting India-Pakistan Relations International Centre for Peace Initiatives, Strategic Foresight Group, 2005.

\textsuperscript{28} Ibid.
plebiscite in the valley but continued to hang on to Kashmir, despite the unfairness of its stand. (It had attacked in 1948 the state of Hyderabad Deccan, the majority population of which was Hindu but its ruler a Muslim, who was willing to accede to Pakistan, citing exactly the opposite reasons to that for holding on to Kashmir). But in Pakistan, the realisation only dawned in the last decade of the 20th century that except for the main Indus and Kabul rivers, all the five vital tributaries of the Indus river system (Jehlum, Chenab, Ravi, Beas and Sutlej), originate in Kashmir and that even the Indus traverses a long distance in the upper reaches of the valley before emerging in the north of NWFP. This realisation has given a new, and a dangerous twist, and an urgency, to the Kashmir dispute.

Sundeep Waslekar narrates a story in the Final Settlement. In 1990, General Pervez Musharraf, then a brigadier under training at the Royal College of Defense Studies in London, submitted a dissertation in which he argued that there are three core issues to the security implications of South Asia. One was the divide between the Hindus and Muslim. Another was the issue of Jammu and Kashmir and the third was the distribution of the waters of the Indus river system between India and Pakistan. He went on to suggest that the issue of Indus waters had the “germs of future conflict”. This diagnosis totally differed from the public stance of successive Pakistan governments that declared that Jammu and Kashmir was the unfinished business of the Partition. Perhaps for the first time, it was being suggested through the paper that there existed a link between water and wars in the Subcontinent.

These statements may or may not be true, but a spate of statements and newspaper editorials, appearing in recent past, added credence to the theory that the dissertation presented by the young brigadier then, had attained wide acceptance since his presentation. On 8th February 2002, the daily Jang, a widely read Urdu (national daily) newspaper, editorialised that Pakistan’s water scarcity could threaten relations between provinces and lead to a nuclear war against India. On 18th June 2002, Syed Salahuddin, chairman of the United Jihad Council and the leader of Hizbul Mujahideen was more explicit when he was quoted as saying in another Urdu newspaper, Ausaf, that “Kashmir is the source from where all of Pakistan’s water resources originate. If Pakistan loses its battle against India, it will become a desert.”

29 Ibid.
Sardar Mohammed Anwer Khan, the then president of Azad Kashmir, joined the debate when he was quoted in most newspapers of October 21st 2002, as saying that “Pakistanis who believe that they can survive without Kashmir are wrong. The Pakistan economy is dependent on agriculture and hence on water and therefore on Kashmir.” Two weeks later he publicly declared that “Kashmiris are fighting for the security, strength and prosperity of Pakistan. Building dams in Kashmir can irrigate Punjab and Sindh. Kashmir is important as Pakistan’s water resources originate in Kashmir. Even peace between Punjab and Sindh depends on water, and therefore on Kashmir.” Sardar Sikandar Hayat Khan, the Prime Minister of Azad Kashmir, noted in a seminar on March 6 2003 that “Without the rivers of Kashmir, Pakistan will become a desert. The freedom fighters of Kashmir are in reality fighting for Pakistan’s water security and have prevented India from constructing a dam on Wollar barrage.” The thinking in the Pakistan army, the fountainhead of all power in Pakistan, and the institution that formulates the country’s domestic and foreign policies, is evident in the then corps commander of Lahore, Lt. General Zarar Azm’s statement in Khabrain an Urdu newspaper, on March 27, 2003, that “Kashmir is our lifeline and its importance increases in view of our water security.”

The recently mooted “Chenab formula” for the settlement of Kashmir dispute, in which the Chenab is proposed as the dividing boundary of Kashmir, has its basis also in the same thinking. River Chenab is the source of irrigation water for two of the most fertile and productive plains of Punjab, the Bari and Rechna doabs, (meaning two waters, or land between two waters). Bari doab is located between the rivers Ravi and Sutlej and is spread over seven million acres. The Rechna doab falls between the rivers Chenab and Ravi and is spread over six million acres. Together, both doabs virtually form the heartland of Punjab’s agriculture. The 33 million acre feet (MAF) average water flowing annually through the Chenab is the primary source of irrigation of these fertile lands. Hence, the overwhelming importance of the river to Punjab, and therefore to Pakistan.

After having expropriated Sutlej, Beas and Ravi, India under pressure for more water from its northern states of Kashmir, (Indian) Punjab, Haryana and Himachal Pradesh, is toying with the idea of diverting the waters of Chenab. The thought that technically it is possible to divert the waters of Chenab through a 1.5 km tunnel at Maru, where the Ravi comes nearest to the Chenab, must be quite tempting. If somehow,
Indus Water Treaty, 1960, could be circumvented, a serious threat of war with Pakistan could be prevented if India could obtain long term water security through this method. The ease with which India was allowed to grab the three eastern rivers initially must also be weighing in favour of undertaking such an action.

At the time of Partition, the government of (British) India set up a Division of Assets committee, also known as Committee B, to oversee division of assets between the two dominions. An Arbitral Tribunal was headed by the then Chief Justice of India, Sir Patrick Spence, to adjudicate in case of irreconcilable differences in the Division of Assets committee. But for inexplicable reasons, the item of the division of irrigation department's assets was not taken up in the committee. In his book, The emergence of Pakistan, Chaudhri Mohammad Ali narrates the episode succinctly:30

The partition of the Punjab cuts across the rivers and canals of the Indus Basin irrigation system, making India the upper and Pakistan the lower riparian. Among the official committees appointed to deal with the various problems arising out of the partition of the Punjab was Committee B. This committee consisted of an equal number of officials from East Punjab and from West Punjab and was charged with settling questions of the future management of joint assets, the division of other physical assets and their valuation. In paragraph 15 of its report, Committee B, with the unanimous agreement of its members, stated: “The committee is agreed that there is no question of varying the authorised shares of water to which the two zones and the various canals are authorised.” The committee thus agreed on the maintenance of the pre-partition division of the water resources, but it could not agree on the valuation of the canal systems through which the water was distributed, nor could it agree on the value of the crown wastelands brought under irrigation.

The report of Committee B came up before the Punjab Partition Committee, presided over by the governor and consisting of ministerial representatives of East Punjab and West Punjab. The Partition Committee accepted the matters on which committee B was in agreement, namely that the pre-partition shares of West Punjab and East Punjab in the canal waters would be maintained.

All this happened during the partition days, before august 15, 1947. When the boundary award was announced on August 17, 1947, it was seen that Radcliffe had not only given away large Muslim majority areas to India but had so drawn the boundary as to leave on the Indian side of the border both Madhopur headworks on the Ravi river and the Ferozepore headworks on the Sutlej river. The former controlled the Upper Bari Doab canals, of which Central Bari Doab canals in West Punjab were only a continuation. The latter controlled the Dipalpur canal in West Punjab and the Eastern Grey canal, which irrigated part of Bahawalpur State.

Despite the fact that the Radcliffe Award had placed the control of headworks vital for Pakistan in the hands of India, the West Punjab government remained content because of the agreement reached by Committee B and the Punjab Partition committee, that the pre-partition shares of water would not be varied. No formal document specifying the precise shares of East Punjab in irrigation waters was drawn up and signed. The West Punjab ministers and officials felt assured by the repeated declarations of their counterparts in East Punjab that there was no question of any change in the pre-partition arrangements for canal waters. The same declarations were also made by East Punjab representatives before the Arbitral Tribunal, when the disputed question of the valuation of the canal system came up for a hearing. Actually, as events showed, East Punjab ministers and officials were planning a deadly blow against Pakistan and were lulling West Punjab government to sleep with sweet words. They were waiting for the day when the life of the Arbitral Tribunal would come to an end on March 31, 1948. On the side of East Punjab, there was Machiavellian duplicity. On the part of West Punjab, there was neglect of duty, complacency, and lack of common prudence, which had “disastrous consequences for Pakistan.” On April 1, 1948, the day after Arbitral Tribunal ceased to exist, East Punjab government cut off the water supplies in every canal crossing into Pakistan. These consisted of the Central Bari Doab canal system, the Dipalpur canal system, and the Bahawalpur state distributary. Of this action, Sir Patrick Spence, chairman of the Arbitral Tribunal, said before the joint meeting in London, of the East India Association and the Overseas League on February 23, 1955: “I remember very well suggesting if it was not desirable that some order should be made regarding continued flow of water.... But we were invited by both the Attorney-Generals (of India and Pakistan) to come to our decision on the basis that there would be no interference whatsoever with the then existing flow of water, and the award which my colleagues made, in which I had no part, they made on that basis. Our awards were published at the end of March, 1948. I am going to say nothing more about it except that I was very much upset that almost within a day or two there was a grave interference with the flow of the water on the basis of which our awards had been made.”

As soon as the Arbitral Tribunal ceased to exist, all promises made before it by the representative of India that there would be no interference whatsoever with the then existing flow of water were forgotten and

31 Ibid.
water was shut off from Pakistan canals on which the irrigation of 1.66 million acres depended. East Punjab now contended that Pakistan had no right to any water and demanded seigniorage charges as a condition for reopening the canals. There was acute distress which, with every day that passed, became more and more intolerable. In large areas where the subsoil water is brackish there was no drinking water. Millions of people faced the ruin of their crops, the loss of their herds, and eventual starvation due to lack of water. Under these distressful circumstances, a delegation was sent from Pakistan to Delhi in the beginning of May, 1948, to seek a solution to the problem. The delegation was led by Ghulam Mohammad, the finance minister of Pakistan, and included two ministers from West Punjab, Shaukat Hayat Khan and Mian Mumtaz Daultana. At the meeting in Delhi, East Punjab representatives insisted that they would not restore the flow of water to the canals unless West Punjab acknowledged that it had no right to the water. To this representatives of West Punjab could not agree. The Pakistan proposal that the two governments should submit their differences to the arbitration of the International Court of Justice was not acceptable to India. There was an impasse. Ghulam Muhammad appealed to Mountbatten who consulted with Nehru. A statement was then placed before Ghulam Muhammad, and he was asked to sign it without changing a word or a comma, a condition for restoring the flow of water. On May 4, 1948, the statement was signed by Ghulam Muhammad and West Punjab ministers, on the one hand and by Nehru and two East Punjab ministers, on the other. The statement declared that, apart from the questions of law involved, the governments were anxious to approach the problem in a practical spirit. East Punjab government will progressively diminish its supply to the Central Bari Doab and Dipalpur canals in West Punjab in order to give reasonable time to West Punjab government to tap alternative sources. The statement announced that water was being restored to these canals, that West Punjab was to deposit in escrow such ‘ad hoc sum as may be specified by the Prime Minister of India’ to cover certain disputed payments and that, after an examination by each side of the legal and other issues involved, further meetings would take place.

In his book, *The Nation that Lost its Soul*, Sardar Shaukat Hayat Khan, has corroborated these facts with observations that the Indian officials took their Pakistani counterparts for a ride and later refused

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to release the water till such conditions were met. Mr. Bashir A. Malik, hydraulics engineer and a one time chief technical advisor to the World Bank, has said in his recent book\(^{33}\) that in March 1950 the Indian negotiators proposed in Karachi that the total flow of Sutlej river on which the 7.25 MAF Bhakra dam was under construction, should be left for the exclusive use of India. A decision on this proposal was postponed until the plan could be reviewed by engineers, but by the time the next meeting was held in Delhi in May 1950, India had reverted to its stand that waters of all three eastern rivers rightfully belonged to India alone.

This saga of Indian intransigence and monumental and criminal Pakistani capitulation finally resulted in the 1960 Indus Water Treaty that formalised what the (Pakistani) Punjab politicians and officials had agreed in May 1948. Much has been written about the robustness of the Indus Water Treaty and how it has weathered three wars between India and Pakistan and withstood the test of some torrid interstate times, but so immense and undeserving has been the Indian advantage obtained through such surprising ease, and so much the Pakistani loss sustained through such unexpected supineness, that the Indians have deemed it wise not to raise further issues until the outcome of the treaty becomes ancient history.

While presenting its case for settling inter-provincial water dispute before the Fazle Akber Committee, in 1971, the (Pakistani) Punjab government said that India had 9 percent of Indus Basin lands in its geographical boundaries (of which only 6 percent was canal irrigated), but it was given 20 percent water resources of the Indus river system (33 MAF average flow of Ravi, Sutlej and Beas out of a total 170 MAF). The result was that India took out the huge (18500 cusec) Rajasthan Canal from Harike barrage at the confluence of the rivers Sutlej and Beas to irrigate chunks of Rajasthan desert that is not part of the Indus Basin, while the provinces of Pakistan are fighting for each MAF of water.

In May 1948, when Pakistan was desperate to get water released for irrigating the Bari and Rechna doabs, they must have been under unbearable stress, for the negotiations with India under the aegis of the World Bank lasted a good eight years (March 1952 to 1960) during which international law on water sharing was evolving and precedents being set. The case of Lac Lanoux is an apt example.\(^{34}\) The Carol river

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crosses from France into the Spanish Pyrenees. In the early 1950s, France, asserting absolute sovereignty, proposed to divert water from the Font-Vine river for hydropower generation. It offered to compensate Spain monetarily. Spain objected asserting that the riverine integrity (basin integrity) be kept supreme and its irrigation needs be given priority. Even when France first agreed to divert back the water needed for Spanish irrigation, and then all the diverted water, through a tunnel between watersheds, Spain insisted on absolute riverine integrity, claiming that it did not want French hands on the water tap. The arbitral tribunal ruled in 1957 that “Territorial integrity ... must bend before all international obligations.” This ruling was made possible the 1958 Lac Lanoux Treaty (revised in 1970), in which it was agreed that water that was diverted out-of-basin for French hydropower generation, had to be returned in similar quantity before the stream reached Spanish territory.35

With the help of such precedents in international law upholding basin integrity, a much better case should have been made out by Pakistan and fought out in all relevant international forums. Had Pakistan raised these issues then and fought for the water that rightfully belonged to the lands of Indus Basin, India would not perhaps have felt encouraged today to cast its eyes on the Chenab and Punjab rivers and would not have attempted to divert the waters of Indus through a dam at Kalabagh which has become the biggest bone of contention between the provinces of Pakistan.

5.4 THE DISPUTE WITHIN PAKISTAN

The Indus river system has enormous quantity of water flowing through it in any given year. According to the Encyclopedia Britannica it is the 19th largest river in the world. It has an average flow of 138 MAF with 3 dams, 19 barrages and 43 canal subsystems, It is the largest contiguous man-made irrigation network in the world, and irrigating 44 million acres, it has just about expended most of its water resources. Nevertheless there are more plans underway to further deplete the once mighty river, resulting in a fierce dispute between the four provinces of Pakistan.

Out of the four provinces of Pakistan, Balochistan is the largest (area: 347,190 sq km out of Pakistan’s 796,095 sq km), but its boundaries do not touch the Indus river and therefore, it is not a riparian in the

35 Ibid.
strictest sense. Still, it was awarded 3.87 MAF per year in 1991 inter-provincial water accord and 6000 cusec to Pat feeder from Guddu barrage in upper Sindh taking this allocation to irrigate about 500,000 acres in eastern Balochistan.

NWFP is mostly hilly but its five northern districts, Peshawar, Nowshera, Mardan, Swabi and Charsadda, have sizable fertile plains. Only one of its southern district, Dera Ismail Khan (D.I. Khan), is mostly plain and alluvial. It has been allocated 5.78 MAF in the 1991 Accord (+3 MAF above rim stations, at which place the water flow is measured). However, the people of the province complained bitterly that even such water that was promised to them after the construction of the Tarbela dam in 1976, has not been allocated to them in the end. They demand much more water for developing agriculture in the alluvial plains of its D.I. Khan district and for sizeable chunks of the land of Karak and Bannu districts all falling on the right bank of the Indus. A plan was recently mooted by the acting president of ANP (Awami National Party, an important political party of the country with its base in NWFP) that a 14000 cusec canal be taken out of Kabul river to the plains of D.I. Khan, travelling parallel to the course of Indus, and irrigating parts of Kohat, Karak and Bannu districts, en-route. Azad Kashmir, from which the Chenab and Jehlum flows, and the Northern Areas, through which Indus and its various rivulets meander, are hilly areas that do not require large quantities of water for their small scale, mostly stepped, agriculture.

That leaves the vast plains of Indus in Sindh and Punjab provinces that have been brought under plough through the massive, British-built irrigation network. It is these two provinces with their 42 million canal irrigated acres (13 million in Sindh, 29 million in Punjab) that use almost all the water of the Indus river system (55.94 MAF Punjab and 48.76 MAF Sindh, according to the1991 Accord). So acute have been the differences between Sindh and Punjab, spanning one and a half century, over the sharing of the waters of Indus river system, that no less than six commissions have deliberated upon an equitable apportionment of waters between both provinces:

1. Anderson Commission 1935
2. The Indus Rao Commission 1941

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36 To this list should be added the meeting of chief ministers of all four provinces in March 1991 that resulted in the Inter-Provincial Water Accord, 1991, the water sharing agreement in effect.
3. Akhtar Hussain Committee 1968
4. Fazle Akber Committee 1970
5. Anwarul Haq Commission 1981
6. Haleem Commission 1983

With the notable exception of the Rao Commission of 1941 that resulted in the Sind-Punjab Draft Agreement 1945, (and also with exception of the inter-provincial Water Accord of 1991), so wide has been the differences in the perception of Sindh and Punjab about the rightful sharing of water, and so acrimonious the debate, that Justice Fazle Akber was constrained to write “it is regrettable that the members of the committee failed to work out any recommendations for the apportionment of the waters of the Indus and its tributaries, among the four provinces in West Pakistan. Unfortunately the lack of agreement was not restricted only to the question of apportionment; even on purely technical issues the members had generally failed to agree amongst themselves. I therefore had no other alternate but to formulate my own recommendations for the president.”

Even as fundamental an issue as determination of how much water flows in Indus river system in a year has not been reached amicably. The Water and Power Development Authority (WAPDA) cites the average flow (138MAF) of the previous 82 years (1922-2004). The Ministry of Water and Power, that controls WAPDA, cited 143 MAF in a seminar held in Islamabad by the Planning Commission of Pakistan in May 2003. In the same seminar, the Planning Commission, hosts of the event, quoted the figure of 155 MAF. The Country Director of the Asian Development Bank (ADB) quoted the figure of 152 MAF during his presentation before the Pakistan Development Forum held in Islamabad on the 28th of March, 2004. Some experts quote 142 MAF and both the governments of Sindh and of Punjab have yet other, and separate, figures. General Pervez Musharraf formed a technical committee which, among other things, was entrusted to establish an agreed figure of the yearly flow. The committee took one and a half years to finally submit its report in August 2005, that, made public after yet another four months, shows that the committee failed to agree on the quantum of water available.

Punjab is the most populous and powerful province of Pakistan. It also produces 80 percent of the country's wheat and 75 percent of the cotton crop, which, in its raw and made up forms, makes up the major part (60 percent) of Pakistan's exports. The argument advanced by the Government of Punjab (as well as WAPDA and the federal government) for developing more water resources (dams) and bringing more lands under cultivation is simple. Pakistan's population is galloping. It needs more grain and, therefore, more irrigated lands and more water resources. The Greater Thal canal that is proposed to irrigate 1.5 million acres of the Thal desert and the much favoured Kalabagh dam (KBD) to store 6.1 MAF water at the junction of the NWFP and Punjab, are part of the same thinking. These two projects and the thinking in favour or against them symbolise the difference of opinion regarding water resources, between Punjab, on the one hand, and the NWFP and Sindh, on the other.

Punjab has initiated the Greater Thal Canal (GTC) with the help of the military government of General Musharraf, bending all fiscal and procedural rules applied to such big water projects. Sindh, the elected assembly of which has passed unanimous resolutions twice against the GTC, cries foul and presents the canal as the prime example of how Punjab uses unfair means, like using the might of a military government to rob Sindh of its share of water. It accuses WAPDA and the federal government of acting as mere extensions of the Punjab government. However, other reasons given by the technocrats and most politicians of Punjab for making a do or die case for the KBD, beside the exponentially increasing population and the need for more grain are:

1. KBD will provide 3600 mega watts cheap hydro-electricity in an age when rising oil prices worldwide have greatly increased the price of thermal power. Since 70 percent of the total electric power generated in Pakistan is produced by burning furnace oil (12500 MW out of a total 18000MW), the cost to the country is astronomical. Seen in the backdrop that Punjab is the industrial hub of Pakistan and continues to advance on this path with vigour, its need for cheaper electric power for itself and for the country's progress is self-explanatory.

2. The storage capacity of the present three dams has decreased by about 24 percent from 16 MAF to approximately 13 MAF and is expected to further reduce to 50 percent of the original capacity in the next 20 years. A large storage dam is, therefore, necessary to make up the shortfall in storage.
3. 35 MAF presently flows every year into the sea and is thus "wasted". This water resource, worth billions of rupees, should be harnessed and utilised for the increasing need for food and fodder.

These arguments, very effectively aired and pursued with purpose, have greatly strengthened the perception of the people of the Punjab that all opposition to KBD by NWFP and Sindh is frivolous and that Sindh is anti-development and a squanderer of precious resources.

Mr. Abdul Wali Khan, a respected leader of ANP had more than once threatened to blow up the dam with bombs if it was ever built. Begum Wali Khan, another leader of the same party, called the dam "a threat to the country's integrity." The ANP's present leader and the leaders of Jamaat-e-Islami, Kazi Hussain Ahmed, and that of Jamiat-ul-Islam, Maulana Fazlur Rehman, both belonging to NWFP, have all opposed the dam. The arguments advanced by the leaders of NWFP for opposing the KBD are, like those of Punjab, simple:

1. The dam's reservoir will be formed by raising a wall at Kalabagh that will trap inflowing water in the ravine formed between Kalabagh and Attock, 90 km up north, extending further into Kabul, Indus and Haro river gorges. Such stored water will create a block and a backflow causing the Kabul river to overflow its banks every now and then and submerge the city of Nowshera (population 800,000) located on the banks of the river.

2. The July 2005 flash floods caused by a sudden inflow of 100,000 cusecs in Kabul River submerged large strips of land in Peshawar, Mardan, and Nowshera districts on both sides of the river, only confirming the worst fears of the opponents of KBD in the NWFP province.

3. Waters of the Kabul are extremely silt laden. Of the estimated 400 million tons of silt carried by then Indus and all its tributaries annually, 100 million is carried by the Kabul alone. Once the speed of the water flow reduces, the silt particles will start settlings on the bed this river, the heavier particles settling earlier. It is feared that in about 50 years time with the river bed thus having become raised, even mild floods will overflow the banks of the Kabul to submerge the very fertile lands in the five northern districts of NWFP. Nowshera will forever stand threatened. In any case in about 50 years the raised water level
at Attock will cause the underground water level to rise throughout the Peshawar, Mardan, Swabi, Charsadda and Nowshera valleys, necessitating costly anti-waterlogging measures.

Sind’s opposition to the Greater Thal canal and Kalabagh dam or any other dam, is fierce, and its arguments far more complicated, than that of NWFP. Sindh cites technical, legal and moral reasons for opposing reservoirs, or more canals, on the Indus river system:

*Technical reasons:* Sindh maintains that there is not enough water in the system for another canal or another large dam. It insists that the figure of 35 MAF going “waste” into the sea every year is, and Punjab uses this figure in order only to deceive the people of Pakistan and to make Sindh look like a squanderer.

Unlike most large rivers of the world that depend upon rain water, the Indus and its tributaries depend upon melting snow in the Himalayas, Hindu Kush and the Karakorum Mountain ranges. Therefore, the variation in water availability between the summer and winter months is enormous. It is estimated that 84 percent of the Indus river system water flows down in the 92 days (three month) period of 1st July to 30th September and in the remaining 273 days (nine months) of the year only 16 percent water flows in the system with virtually no flow in the peak winter months.38

It would then seem logical to store the summer water for use in the winter. However, to this should be added the complication that the total quantum of flow is highly erratic year after year. For example, the highest flow recorded is 187 MAF (1959-60) and the lowest half this figure, that is 98 MAF (2000—2001). There is no set pattern to this inconsistency in water flows and many years of dry or wet spells follow at random, making calculations of dependable water resources extremely uncertain. For instance, between 1924 and 1935, a dry spell of 10 consecutive years was experienced showing flows much below the average 138 MAF. Between the 1953 to 1962, a cycle of super floods was recorded in nine years when the flow was often more than 150 MAF. Again in the seven year period of 1990—1997, massive quantities of water, 166 (172, 170, 128, 166, 159, 161 MAF respectively) were recorded which, excepting for one year’s flow of 128 MAF, could all be bracketed in the super flood category.39

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38 Report of the Technical Committee on water resources, presented by A.N.G. Abbasi to the government of Pakistan, August 1995.
39 All figures in MAF from the 82 years flow list (1922–2004). Issued by Government of Sindh.
Sindh argues that in the highly erratic flow conditions of the Indus river system, the years of wet cycles may make up the average flow to a respectable total, but at all other times, the availability of water is subnormal. Therefore, before any more large projects are undertaken, it should first be decided how much dependable water flows annually in the system. Sindh’s experience and reasoning suggests that false and highly exaggerated figures are first concocted and fresh large projects initiated. When a year of natural shortage comes around, as was the case from 1999 to 2003, when the recorded flow was subnormal at 124, 100, 98 and 113 MAF respectively, the whole burden of shortage was passed on to the Sindh. In these four years, the five districts of lower Sindh that depend on the Indus for their drinking water needs, the subsoil water being extremely brackish, were clamouring for drinking water all the year round, while Punjab was harvesting bumper crops. Sindh, therefore, insists upon planning major water-related projects only on such water that is considered dependable. It suggests 80 percent availability, or such quantity of water that is available in four out of five years. In its estimate, this figure is 124 MAF rather than the exalted 138 MAF average.

The 1991 Inter-provincial Water Accord already allocated 114.35 MAF to the provinces for their present and planned uses. Approximately 8.6 MAF, was recommended by a three-member expert committee for release into the sea to check salinity intrusion and environmental degradation. Yet another 3 MAF were to be stored behind the walls of the Mangla dam, which at present being raised, leave negative balance for further diversion or storage of water.

All over the world, studies being conducted indicate that changes in the earth’s radiation balance are affecting the frequency, intensity and area of tropical disturbances and storms. Changes in atmospheric temperature is affecting evapotranspiration rates, soil moisture, snowfall and snow melt regimes. Ragab and Prudhomme (2002) have studied the affect of climatic changes on water resources of arid and semi-arid regions. They indicate that in the past century there has been

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40 Ibid.
41 A 3-member panel of International Experts formed by the World Bank suggested a flow of 5000 cusecs, equivalent 3.6 MAF, throughout the year and 5 MAF during monsoons, daily Dawn, 14 November 2005.
a decrease of rainfall throughout Australia, Aral Sea Basin, Mediterranean region, South Africa and Sahel. They estimate that by 2050 rainfall is expected to reduce in North Africa and Middle East by 20–25 percent and the temperature is expected to increase by 2 to 2.75 degree centigrade. For India, Pakistan and Afghanistan they estimate an increase of mean annual temperature of 1.75 to 2.5 degrees centigrade and a reduction in rainfall by 5–25 percent.

Research shows that the glacier cover of mountain regions worldwide has decreased significantly in recent years as a result of warming trends. A recent comparison of historical glacier data with images from the ASTER (Advance Spaceborne Thermal Emission and Reflection Radiometer) instrument on NASA’s TERRA satellite by the US’s Geological Survey revealed a significant shrinkage of mountain glaciers in the Andes, the Himalayas, the Alps and the Pyrenees over the past decade. The Himalayan glaciers that feed Asia’s seven greatest rivers, Ganga, Indus, Brahmaputra, Salween, Mekong, Yangtze and Huang. He have also been found to be receding since 1850. It is apprehended that by 2050 one-fourth of the glaciers would melt and by the end of the century 50 percent would disappear. These facts only go to strengthen Sindh’s argument that rather than spending $10 billion on each single dam, for which there may not be much water in the near future any way, money should be spent on improved water management and producing more grain per unit water.

**Legal Reasons:** Hydraulic and irrigation experts as well as politico-legal minds in the province of Sindh cite a number of legal and constitutional reasons for opposing a dam or a canal on the Indus river system. The most important legal objection is that they will cause “significant harm” to the lower riparian, Sindh.

The heart of the international, as well as Pakistani law, regarding water conflict resolution is that the sharing of water resources should be “reasonable and equitable, with a view to obtaining optimal utilisation and benefits” with the consent and consensus of riparian states. The 1997 UN Convention on the Law of the Non-Navigational Uses of International Water Courses (IWC), clarifies this point in its two articles:

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Article 5: Equitable and reasonable utilisation and participation

1. "Watercourse states shall, in their respective territories, utilise an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse states with a view to attaining optimal and sustainable utilisation thereof and benefits therefrom, taking into account the interests of the watercourse states concerned, consistent with adequate protection of the watercourse."

2. "Watercourse states shall participate in the use, development and protection of international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilise the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention."

Article 7: Obligation not to cause significant harm

1. Watercourse states shall, in using an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse states.

2. Where significant harm nevertheless is caused to another watercourse state, the states whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6, in consultation with the affected state, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

Nearer to home, Justice B.N. Rao, entrusted with finding a lasting solution to the water conflict between Sindh and Punjab, opined in his "The Report of Indus Commission" (1940, Para 49, Page 33) thus: "Pushed to its logical conclusion, this means that a province in which the head waters of a great river are situated can abstract any quantity of water and make a desert of the provinces or states lower down. We have already pointed out that this view is against the trend of international law and that in any event, so far as India is concerned, it would conflict with the manifest intention of section 130 and the succeeding sections of the Government of India Act 1935." The Rao Commission recommended equitable apportionment based on consent of riparian states.45

The elected Assembly of Sindh province has twice passed unanimous resolution against the Greater Thal canal and twice against the Kalabagh dam. The NWFP Assembly passed three resolutions against KBD and the Balochistan Assembly once. So much for the consensus of riparian provinces.

45 Abrar Kazi, Ibid.
The reasons for the people of Sindh's conviction that the harm caused to Sindh will be significant and irreversible are many:

1. On both sides of the Indus, and throughout the length of Sindh, a strip of land at an average 8 km wide is the riverine inundation land, known as "katcho". The katcho husbands 2 million acres of land made fertile by eons of silt deposition and excellent drainage. On 600,000 of these acres has sprung a thick forest and the remaining 1.4 million acres has turned into a rich grazing land. At the end of katcho, where the Indus drains into Arabian sea, a mangrove forest, the 6th largest in the world, spread over 650,000 acres has formed. All these forests and lands on which millions in Sindh depend for food, fodder and sustenance, themselves depend upon the flood waters of Indus. It is estimated that a large flow of at least 300,000 cusecs must flow down Indus, north to south, consecutively for about 10 days to inundate the whole Katcho and to deposit the life giving silt to the roots of the mangroves.46

The katcho, the forests and the mangroves, with their million forms of flora and fauna will irreversibly decline in quality and quantity, if flood waters do not reach them periodically, while all other "benefits and utilisation" of the water resources can be obtained through alternate means.

2. Another objection of Sindh to the diversion of the Indus river waters emanates from the law first enunciated by the US Supreme Court,47 that simply states that on any one river, the irrigation projects which were built first have more right than the projects built later. The Chashma-Jehlum (CJ) and Taunsa-Panjnad (TP) link canals constantly draw water away from Indus into barrages in Punjab that were not part of the Indus Main in the first place. Greater Thal canal offtakes from the CJ link and is therefore doubly illegal.

3. The 1997 UN Convention (IWC) obliges UN member states to protect and preserve the marine ecology of international watercourse deltaic estuaries. The people of Sindh regard the government of Pakistan's refusal to ratify the Convention an anti-Sindh step, since protection of a delta is an internationally

46 Ibid.
47 US Supreme Court: Wyoming vs Colorado (1922) 259 US 419.
accepted obligation. Sindh accuses the federal government of favouring Punjab illegally because releasing fresh water for Indus delta would run counter to Punjab's ambitions to divert water for irrigation.

4. Yet another reason of conflict between Sindh and Punjab is Sindh's desire to add underground sweet aquifers to the total balance of the country's water resources. The 1997 UN Convention also obliges the member states to include sweet water aquifers in the total water resources of the country. Sindh is convinced that by not ratifying the convention, the government of Pakistan is once again favouring Punjab at the cost of Sindh.

Moral Reasons: The government and the people of Sindh are convinced that Punjab's officials and politicians are forever planning to rob Sindh of its share of water. An example is cited of the Greater Thal canal, the regulating gates of which were installed 33 years ago when CJ link canal was being built (1972), as if it had already been decided that whenever an opportunity arose, the canal would be built. This time it was General Musharraf's military government that provided the opportunity.

Many years ago, in 1960, another military government, that of General Ayub Khan, formalised the selling of the three rivers of the Indus river system to India, without the permission or participation of Sindh, which was a co-sharer of the sold waters. The $475 million (a big amount in those days) obtained from India, World Bank and other countries was all spent in the Punjab (except for the Tarbela dam which was located in NWFP), creating a huge network of link canals apart from building two dams. All provinces of Pakistan, including Sindh, repaid the loan.

The link canals helped bring a further 10 million acres under cultivation in Punjab for which allocations were made afresh in the 1991 Water Accord. Sindh complained bitterly that its share of water in Sutlej, Beas and Ravi was sold away to India without its consent. Not a bit of the loan obtained was spent in Sindh to develop its agriculture. Finally it was burdened with payment of a debt while its share of water was reduced forever.

48 In its case presented before Justice Fazl e Akber in 1971, Abdul Wahab Shaikh, then chief engineer and Agent of the province of Sindh, forcefully argued the points that ground water should be added to the total water resources. Thus it was vehemently opposed by Punjab. The commission could not bridge the difference between the two provinces.
However, the biggest threat felt by Sindh comes from the proposed Kalabagh dam. The KBD will be situated near the northern boundary of the Punjab province. Flowing west to east, a 15000 cusecs canal offtaking from the left bank of Kalabagh dam is proposed to drain 6 MAF water each year from the dam into the Jehlum, upstream of Rasul barrage.\(^49\) This could then easily be directed to Qadirabad, Baloki and Sulemanki headworks, situated on the Chenab, Ravi and Sutlej respectively, through the present link network, connecting the whole of Central Punjab to Indus Main. With CJ link canal traversing the middle of Punjab feeding the Trimmu and Sidhnai barrages and TP link crossing the south feeding the Panjnad barrage, the complete irrigation network of the whole of Punjab province will stand connected to the Indus.

Were an eventuality to arise when for some reason the Chenab river was to be lost by Pakistan, Punjab would be in a position to divert the entire water of the Indus for the province's irrigation needs, leaving Sindh utterly high and dry. For the people and the government of Sindh, this is a dreadful thought. Given the political and civil military bureaucratic hegemony experienced by the smaller provinces in all spheres of governance at the hands of the larger province, it is little wonder that placing the water tap also in its hands is considered tantamount to committing suicide. The governments of the smaller provinces perceive the officials of the Punjab irrigation department as criminals who have conspired to sell the three rivers of Pakistan for peanuts to India, and having sold their, and others' waters, are forever scheming to drain the Indus to make up for what they bartered away.

5.5 CONCLUSION AND POLICY PROPOSALS

Seen in the backdrop of the intricate issue of Kashmir, the conflict between India and Pakistan has turned into a powder keg. There is a great need for every one concerned to show determination and a political will to resolve the imbroglio, especially when both India and Pakistan have become nuclear powers. Pakistan's claim to the waters of the three western rivers is that these rivers belong to the Indus Basin and the lands which have been given life by these rivers for eons. In fact, as argued by (Pakistan) the Punjab government before the Fazle Akber Committee (1971), the World-Bank-brokered Indus Water Treaty, gave away 3 eastern rivers, comprising 20 percent water of the

\(^{49}\) Report of Technical Committee on Water Resources, Ibid.
Indus River System (33 MAF), to India that only had 9 percent of the land of the Indus basin in its geographical boundaries, 6 percent of it being canal irrigated.

On the other hand, India's claim to the waters of the Ravi, Sutlej and Beas, (and perhaps that of the Chenab at a future date), is that they all rise in Kashmir. In other words, India's claim springs from the "doctrine of absolute sovereignty". But even if India continues to hang on to Kashmir, still the doctrine of absolute sovereignty has been explicitly rejected by the international tribunal the Lac Lanoux case in 1957. If the Indus Water Treaty was brought before an international tribunal even today it would perhaps declare India to have been very fortunate to have faced a spineless opposition in Pakistan and having obtained more than what it should ever have received. The tribunal will perhaps advise India not to mess with the waters of the Jehlum and Neelum (Kishan-Ganga) as well as the Chenab.

In the same spirit, the international tribunal will perhaps ask Pakistan to allow run-of-the-river hydroelectric projects and water for the small stepped agriculture in the Kashmir valley to the Kashmiris, who, in any case, must not be grudged the benefit of a natural resource for their homeland. Hydroelectric export to India, and perhaps to Pakistan, could go a long way in generating revenues for a land without employment-creating potential.

To this effect, recent moves by both countries to solicit international mediation regarding Baglihar and Kishan-Ganga hydroelectric projects are steps in the right direction. The time has come for the ghost of the present conflict finally to be sent away for a well-earned rest. Any thought of diverting the Chenab into the Ravi through the Maru tunnel is fraught with unimaginable dangers. Pakistan, cornered through this unwise step, is likely to fight back with all its might. Both countries being nuclear powers, the result will be nothing short of Armageddon.

The conflict within Pakistan is a bit more complicated. Here there is a severe difference of opinion between those people who believe that

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50 Doctrine of absolute sovereignty, also referred to as the Harmon Doctrine was first suggested in 1895 by the US Attorney General of the same name, during the US dispute with Mexico over Rio Grande. It argues that a state has absolute rights over water flowing through its territory (Le Marquand, David. "Politics of International River Basin: Co-operation and Management." Natural Resource Journal, Vol. 16, pp83-901, 1976). But this doctrine was immediately rejected by his successor and later officially repudiated by the US (McCaffery, Stephen C “The Harmon Doctrine One Hundred years later: Buried not Praised”. Natural Resources Journal. Vol. 36, No. 3, Summer 1996, pp. 549–590). Since then the doctrine has not been implemented in any water treaty and has not been invoked as a source of judgment in any international water legal ruling.
the water flowing out to the Arabian sea without being utilised for irrigation and food production is a waste and, therefore, should be stored behind one or more dams, and those who believe in integrated water management and more efficient use of water resource and better food growing techniques. In any eventuality, all agree that water is a finite resource, that Pakistan’s population is growing exponentially and that the need for food and fibre is increasing in geometric proportions. But here the similarity ends.

The arguments favoured by the exponents of “developing water resources” (more dams) are the same as those advanced by WAPDA and the Governments of Pakistan and Punjab. They maintain that:

i. Pakistan’s populations will reach the 220 million mark in 2025, from the present, 160 million.

ii. Pakistan produces about 20 million tons of wheat for domestic consumption and 12 million bales of cotton for domestic and export, using 105 MAF of water in the process.

iii. At present, 33 MAF water goes “waste” (unutilised) into the sea.

iv. By 2025, even if all of this remaining water is utilised for grain production, the country will face an overall deficit of 5 to 7 MAF. Therefore, efforts should be mounted to store all the water going waste, starting from now.

v. The climatic changes and forecasts of reduced water resources add to the need to build a number of reservoirs to store all the available water when the quantity of water begins to decrease.

Those who oppose building of large dams use the same arguments but in the opposite direction. Their stance is that:

i. With the highly erratic flow of the Indus and its tributaries between summers and winters, and from year to year, it is not physically possible to store all the water flowing in the system.

ii. But even if it could be made possible and all the water flowing in the system was stored and utilised to grow food to feed the 220 million people of Pakistan by 2025, what will happen subsequently? Pakistan’s population will not stop increasing after reaching 220 million, but all available water in the system, theoretically, would have been stored and utilised.
iii. Therefore emphasis should be shifted from “development of water resources”, to “integrated management of water resources” including efficient utilisation and growing more food per unit of water.

Integrated water management consists of six broad steps. These do not include administrative and fiscal measures, or such steps as may be considered to be part of governance:

1. Save Water. It is estimated that out of the 105 MAF water used by irrigation networks, measured at canal heads, only 45 MAF reaches the root zone of the crops. The remaining 60 MAF, or approximately 60 percent of the total water resources, seep underground to charge aquifers.

In the Bari, Rechna and Chhaj doabs of central Punjab, where the underground water is sweet, the seeped water is pumped out by about 0.6 million electric and diesel motors to supplement the surface supply. But lower down, in southern Punjab and in the whole of Sindh, the underground water is as saltish as sea water and a charged aquifer only brings the brackish water nearer to the surface, rendering most lands saline and the water logged. As much as 80 percent of the canal irrigated area in Sindh has raised water table of 0–3 meters and productivity of these areas has been significantly impaired.

If measures are taken to reduce the seepage of water underground in places of brackish aquifer, by brick lining of main canals, distributaries and water courses, 10–15 MAF water could be saved. If modern methods of land levelling are employed and efforts mounted to train and educate farmers throughout Pakistan, especially those of the water-logged areas of southern Punjab and Sindh, not to waste more water, 10–15 MAF could be saved, beside lowering the harmful water table and making almost half of Pakistan’s canal irrigated areas 40 percent more productive.

A further method of conserving water is to introduce drip and sprinkler system of irrigation and LEPA (low energy precision application). These systems not only increase productivity by 20 to 70 percent but save a lot of water compared to the present

gravity system. They may perhaps prove to be the only way by which agriculture may still be possible in Pakistan for the next hundred years or so. But since LEPA and the drip and sprinkler systems are costly and untried methods, pilot projects need to be introduced urgently in selected areas of the country to measure the cost benefit and success ratio, before making they are made widely applicable.

2. Develop Fresh Resources: The cities and industries of Pakistan use about 8 MAF water now but this is projected to increase to 12 MAF by 2025. Most of this water, in the shape of industrial and sewage effluent, are deposited outside small and big cities as ponds of filthy water contaminating aquifers, or is released raw in fresh water channels, spreading disease and death. If efforts were mounted to treat this water and use it for irrigating agricultural lands nearby, not only the water roughly equivalent to a large dam could be generated, but more importantly, health and the well-being of millions could be assured.

Efforts should also be undertaken to find ways and means of desalinating sea water cheaply. At present the cost of desalination is US $0.8–1.0 per cubic meter. If the cost could be reduced to U.S $ 0.08–0.10, one tenth of the present cost, desalinated water could become affordable for agriculture.

3. Produce more grain per unit of water: Pakistan’s production of grain per acre is for less than that of most countries of the world. Only one example of figures for wheat production the staple food of all Pakistanis, will suffice:

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Yield per Ha. (Tons)</th>
<th>Average Yield per Acre (Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakistan</td>
<td>2.0004</td>
<td>0.81</td>
</tr>
<tr>
<td>World</td>
<td>2.150</td>
<td>0.87</td>
</tr>
<tr>
<td>India</td>
<td>2.400</td>
<td>0.97</td>
</tr>
<tr>
<td>USA</td>
<td>2.650</td>
<td>1.07</td>
</tr>
<tr>
<td>China</td>
<td>3.300</td>
<td>1.33</td>
</tr>
<tr>
<td>France</td>
<td>6.000</td>
<td>2.43</td>
</tr>
</tbody>
</table>

When the production of grain and fruits of the two (Indian and Pakistani) Punjabs is compared, leading top producers of their
respective countries, and having comparable soils and water availability, the point can be made easily.

Production and Yield of Main Crops (2002—2003)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Indian Punjab</th>
<th>Pakistani Punjab</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production</td>
<td>Yield</td>
</tr>
<tr>
<td>Wheat</td>
<td>14415</td>
<td>4190</td>
</tr>
<tr>
<td>Rice</td>
<td>14411</td>
<td>5513</td>
</tr>
<tr>
<td>Maize</td>
<td>459</td>
<td>2882</td>
</tr>
<tr>
<td>Pulses</td>
<td>47</td>
<td>855</td>
</tr>
<tr>
<td>Cotton</td>
<td>1478*</td>
<td>7664</td>
</tr>
<tr>
<td>Sunflower</td>
<td>32</td>
<td>1590</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>63</td>
<td>1075</td>
</tr>
</tbody>
</table>

Notes: Production: 000 Tons
Yield: Kg/Ha
Cotton:  *Bales. 175 Kg each

Source: Agriculture Development Punjab (India) and Federal Bureau of Statistics (FBS), Pakistan

Fruit Production of Two Punjabs

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Indian Punjab</th>
<th>Pakistani Punjab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fruits (Ha)</td>
<td>34209</td>
<td>358100</td>
</tr>
<tr>
<td>Production (Tons)</td>
<td>418639</td>
<td>2695900</td>
</tr>
<tr>
<td>Yield (Kg/Ha)</td>
<td>12238</td>
<td>7528</td>
</tr>
</tbody>
</table>

In other words, Pakistan has a long way to go before it has exhausted its options. Common prudence demands that large and costly dams should be disregarded as an option since it create acrimony and mistrust without solving long-term problems.

4. Make Bari Doab a reservoir: The much respected irrigation scientist of Punjab Dr. Nazir Ahmed, suggests a novel method of storing water while avoiding the conflicts and dangers of large cement and concrete surface dams. He suggests a systematic recharge of aquifers to store water and also to check salinity. He declares: "The 7 million acres of the Bari doab, the valley formed by the rivers Ravi and Sutlej, can be used to store and exploit 15
MAF every year through a simple network of recharge wells spread over the area. This water is available every year as monsoon rain run-off that flows out to the sea unused. The water table in the doab is 30 to 35 feet, and can be safely recharged to come to 10 to 15 feet. Some 12000 farmers' tube wells (mostly diesel operated) are already in place to facilitate extraction. Underground formations can yield lots of water.\textsuperscript{52}

Much earlier, in 1971, a team under Mr. A.W. Sheikh, Chief Engineer, Irrigation, Sindh, arguing before the Fazle Akber Committee about availability of useable ground water, had quoted an experts' report to state that, "Ground water occurring within a depth of 500 feet below the surface averages less than 1000 ppm of dissolved solids throughout approximately two-thirds of Punjab. It is estimated that the volume of useable ground water in storage in this part of the alluvial aquifer is of the order of 2 billion acre feet.\textsuperscript{53}

From what Sindh argued before Justice Fazle Akber and what Dr. Nazir Ahmed has suggested, it appears that it is possible to recharge the Bari (and even Rechna and Chhaj) doabs through the use of wells to store anywhere upto 50 MAF over and above the present recharge that is pumped out each year. This quantity is easily ten times more than any large dam on Indus river system could store. Such a huge increase to the water resources of the country will be welcomed and grudged by no individual or province.

5. Conflict Resolution: Given the history of the conflict between Sindh and Punjab (and, to some extent, between NWFP and Punjab) the unbridgeable differences of opinion and the pervasive mistrust that has defied consensus, the only sensible course of action left is to invite experts from outside, perhaps from among the SAARC countries, or the United Nations, to mediate and decide on the issue of equitable distribution of water among provinces and to appoint a referee mandated to assure and oversee implementation of the decision.

\textsuperscript{52} Khalid Ahmed (2003): 'we were swept away in a flood of foreign expertise'. Article in the politics of managing water. Edited by Kaiser Bengali SDPI and Oxford University Press.

\textsuperscript{53} The report mentioned by Mr. Khaled Ahmed, Superintendent Engineer, Sindh, was titled Groundwater Hydrology of the Punjab, \textit{WASID Bulletin} No.6 (WASID is a division of WAPDA), and was written by D.W. Greenman. M.V Swarzonski and G.D Bennet in 1967: Presentation of the Sindh case before the Indus Waters Committee (1971).