

7

BRIEFING PAPER NO.

PILDAT
SEPTEMBER 2003

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS

Strengthening Democracy & Democratic Institutions in Pakistan

Issues of Water Resources in Pakistan

www.pildat.org



PILDAT
Pakistan Institute of
Legislative Development
and Transparency

CONTENTS

Foreword

Steering Committee for the Briefing Paper

Abbreviations and Acronyms

Executive Summary

1.	Background	11
2.	Water Availability and Requirements	12
2.1.	Water Resources	12
2.1.1.	River Flows	13
2.1.2.	Rainfall	13
2.1.3.	Groundwater Resources	14
2.2	Projected Water Requirements	14
3.	Pakistan's International and National Agreements on Water Distribution	15
3.1.	The Indus Waters Treaty 1960	15
3.2.	Apportionment of Indus Waters Accord-1991	15
4.	Provincial Consensus and Construction of Reservoirs	16
5.	Key Issues	18
5.1.	Lack of trust among the provinces especially between Punjab and Sindh	18
5.2.	Differences among provinces on the interpretation of Water Apportionment Accord of 1991	18
5.3.	Construction of Greater Thal Canal in Punjab	19
5.4.	Reduction in the availability of surface water due to silting of existing reservoirs	20
5.5.	Wastage of water in the irrigation system	20
6.	Strategy for Addressing Various Issues	20
6.1.	An Active Conflict Resolution Mechanism	20
6.2.	Regulation of Groundwater Usage	21
6.3.	Water Conservation	21
6.4.	Efficient use of irrigation water and application of modern technologies	22
6.5.	Legislation on Water Related Issues	22
7.	Legislative and Institutional Aspects	22
8.	Recommended Actions	22
	Bibliography	

CONTENTS

List of Tables & Figures:

Table 1:	Comparative Status of Development of Water Resources	12
Table 2:	Water Resource Potential	12
Table 3:	Water Usage	13
Table 4:	Water Requirements according to Population	14
Table 5:	Proposed Dams	16
Table 6:	Canals under Execution	17
Table 7:	Raising of Mangla Dam	18
Figure 1:	The Indus Basin Irrigation System	24
Figure 2:	Pakistan's Rivers and Main Streams	25

Appendices:

Appendix A:	Text of the Apportionment of Waters of Indus River System Between the Provinces of Pakistan: Agreement 1991
Appendix B:	Text of the Balochistan Assembly Resolution on Kalabagh Dam
Appendix C:	Text of the NWFP Assembly Resolutions on Kalabagh Dam
Appendix D:	Text of the Sindh Assembly Resolutions on Kalabagh Dam and Greater Thal Canal

.....**BRIEFING PAPER**
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

FOREWORD

 f all the crises, water crisis is the one that lies at the heart of our survival and that of our planet. Experts project that the global water crisis will reach unprecedented levels in the years ahead with growing per capita scarcity of water in many parts of the developing world. For centuries, human beings have fought wars in which water resources have been contested; the years ahead once again predict the threat of looming water wars between countries.

In Pakistan, availability of water resources and their development has been slowly turning into a crisis situation and has reached a level of inter-provincial conflicts which immediately need to be addressed. The challenge lies in raising the political will to implement water-related commitments; water professionals need a better understanding of the broader social, economic and political context, while politicians need to be better informed about water resource issues.

It is in this backdrop that PILDAT briefing Paper on the Issues of Water Resources in Pakistan has been prepared. The aim of the briefing paper is to present the scenario in its available detail so as to provide concise and objective information to parliamentarians on the importance of water for the future of Pakistan and to enable them to take up the issue in the parliament for better policy initiatives and options.

PILDAT developed the draft briefing paper with technical help from the Associated Consulting Engineers (ACE) Ltd., a private engineering consulting firm renowned for its experience with water-related projects and strategies. A steering Committee was constituted comprising political and technical experts from all provinces of the country. The objective behind constituting the committee was to ensure that the paper should present an objective view of the issue, highlighting major perspectives and provincial concerns and strategies. The draft was modified to add recommendations of the steering committee.

Since the exact availability of water in Indus and associated details has become a contentious issue in the country, PILDAT has made every effort to present a range of figures with sources. WAPDA figures have also been quoted at some places with elaborate references in the bibliography. PILDAT, however, does not wish to advocate a certain view and has compiled this paper with a completely non-partisan outlook. The list of issues identified as key issues is not exhaustive as PILDAT has only picked what were thought to be the most crucial issues.

PILDAT thanks the ACE Team and the Steering Committee Members for their support, involvement and guidance in developing this briefing paper. We thank IRSA for providing a copy of the Indus Water Accord of 1991 and Indus Water Commission, Lahore for providing a copy of the Indus Waters Treaty - 1960.

PILDAT and its team of researchers have made every effort to ensure the accuracy of the contents of this paper. PILDAT, however, does not accept any responsibility of any omission or error as it is not deliberate.

Lahore
September 20, 2003

.....BRIEFING PAPER.....
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

STEERING COMMITTEE FOR THE BRIEFING PAPER

Balochistan:

- **Mr. Abdul Raziq Khan Kasi**, Former Chairman IRSAs

NWFP:

- **Mr. Shams-ul-Mulk**, Former Chairman WAPDA; Former Provincial Minister
- **Mr. Shah Nawaz Khan**, Former Chairman WAPDA

Punjab:

- **Dr. Mubashar Hasan**, Former Federal Minister for Finance
- **Mr. Shah Mahmood Qureshi**, MNA; Former Federal & Provincial minister
(A signatory to the Water Accord - 1991 as the then Finance Minister of Punjab)
- **Syed Monawar Ali**, Chairman, Associated Consulting Engineers (ACE) Ltd.

Sindh:

- **Mr. Illahi Bakhsh Soomro**, Former Speaker, National Assembly
- **Mr. Abrar Kazi**, Expert, Member of the Awami Tehreek , and Secretary Sindh Water Committee

The team of **Associated Consulting Engineers (ACE) Ltd** which participated in the preparation of the Briefing paper and also attended the Steering Committee meeting included the following:

- **Mr. Irfan Saeed**, Regional Director (North)
- **Mr. Asif Kazi**, Consultative Advisor
- **Mr. Mian M. Latif**, Advisor Irrigation and Drainage
- **Mr. Sabir Ali Bhatti**, Chief Water Resource Specialist

The PILDAT team which attended the Steering Committee meeting, conceptualised, reviewed and edited the draft briefing paper included the following:

- **Mr. Muhammad Haneef Ramay**, Member PILDAT Board of Advisors; Former Chief Minister Punjab
- **Mr. Mujib-ur-Rehman Shami**, Member PILDAT Board of Advisors; Renowned Columnist; Editor-in-Chief Daily Pakistan
- **Mr. Ahmed Bilal Mehboob**, Executive Director
- **Ms. Aasiya Riaz**, Joint Director
- **Ms. Saima Ali**, Programme Manager

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

ABBREVIATIONS AND ACRONYMS

GDP	Gross Domestic Product
IRSA	Indus River System Authority
IWASRI	International Waterlogging and Salinity Research Institute
IWMI	International Water Management Institute
MAc	Million Acres
MAF	Million Acre Feet
MW	Mega Watts
NWFP	North West Frontier Province
NESPAK	National Engineering Services of Pakistan
PIDAs	Provincial Irrigation & Drainage Authorities
TOR	Terms of Reference
U/S	Upstream
WAPDA	Water and Power Development Authority
WHO	World Health Organisation
WTO	World Trade Organisation

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS

Issues of water Resources in Pakistan

EXECUTIVE SUMMARY

Water plays an extremely important role in the economy of Pakistan which chiefly depends on Agriculture accounting for 24 per cent of the national GDP, 48 per cent employment and 70 per cent of country's exports. Per capita availability of surface water is gradually dwindling from 5300 cubic meter in 1951 to 1300 cubic meters in 2002 and is projected to hit 1000 cubic meters making Pakistan a water short country as per the world standards. Pakistan has a total of 77 million acres of land suitable for agriculture out of which 54 million acres (71 per cent) is already cultivated. The remaining 23 million acres (29 per cent) can become productive if water is made available for irrigation.

Irrigation in Pakistan mainly depends upon Indus river which has an average annual flow of 138 to 145 MAF. Some experts calculate this quantity as low as 123.5 MAF. Average water flow downstream Kotri since 1977 has been 35 MAF while Sindh's estimates indicate that roughly 10 MAF is required to flow to the sea. The Indus water quantity, after deducting 10 MAF required to flow downstream Kotri and 5 MAF for headwater uses comes to about 20 MAF which the Federal Government and some experts feel can be stored during floods and used during the lean period. The construction of reservoirs, they argue, is thus a badly needed and viable proposition especially in view of the fact that the existing major reservoirs (Chashma, Mangla and Tarbela) are silting up and have already lost 25 per cent of their total capacity. The design of Kalabagh Dam (Capacity: 6.1 MAF) is ready for execution whereas the feasibility study for Bhasha Dam (Capacity: 7.3 MAF) is scheduled to be completed by June 2004. The Federal Government and the Punjab province strongly feel that these projects should be executed forthwith.

Some other experts and public figures (mainly from Sindh Province) question this proposition and strongly believe that there is not sufficient water in the Indus to construct additional storage. They believe that average flow is not the correct and scientific basis to ascertain the availability of water for such mega projects as planned by the WAPDA. The NWFP is also strongly opposed to Kalabagh Dam project as it considers Kalabagh reservoir a threat to its lands and populated areas such as Nowshehra town. Sindh province is opposed to the construction of Greater Thal Canal in Punjab and considers it a potential conduit of pilferage of Sindh's share of Indus Water.

The Federal government refutes all these allegations but the opposition persists. The provincial assemblies of Sindh, NWFP and Balochistan have passed resolutions, many unanimously, against Kalabagh Dam. Sindh Assembly has unanimously opposed Greater Thal Canal which is under construction in Punjab. Although the four (4) provinces have signed a historical Indus Waters Apportionment accord in 1991, serious differences persist especially between Punjab and Sindh on the interpretation of some of its clauses. A deep distrust between the two provinces is the main reason of water related disputes. The other major water issues which Pakistan faces today include differences on construction of additional storages, disagreement on the scope of a technical study to determine minimum water required to flow downstream Kotri, mode of sharing water shortages, construction of Greater Thal canal in Punjab, silting of existing reservoirs and wastage of huge quantity of water in the irrigation system.

Pakistan's political leadership needs to activate constitutional conflicts resolution mechanisms such as the Council of Common Interests (CCI). The parliament and its standing committees on water and power need to take a pro-active approach to reconcile the inter-provincial differences and develop a national consensus on such a critical issue as water. Elected political leadership in Pakistan has been able to develop consensus on a number of extremely complex issues such as the 1973 Constitution and 1991 Water Accord and it can do so to resolve the water-related issues.

The other actions recommended for the political leadership in general and parliamentarians in particular include signing an inter-provincial accord on new water storages, agreeing on the terms of reference for the study to ascertain minimum flow required downstream Kotri, an enhanced telemetry system, water conservation, adoption of new irrigation techniques and technologies, adopting modern technology for forecasting of floods and droughts, improvement in drinking water quality which is hazardous to public health, adopting new techniques for extracting groundwater, harnessing hill torrents, checking water pollution, improving institutional structure in water sector, legislating a comprehensive water law and better regulation of ground water usage.

1. BACKGROUND

Water plays a vital role in a country's economy. Although about 88 per cent of water is used in the agriculture sector, the industry, commerce and public health are also greatly affected by the quantity and quality of the available water.

Per capita availability of surface water has been gradually dwindling in Pakistan from 5300 cubic metres in 1951 to 1300 cubic metres in 2002. It is projected that by 2005 per capita availability of surface water may hit 1000 cubic metres, which is a threshold for defining 'a water short country'.

Pakistan's economy mainly depends upon Agriculture. It is the single largest sector and accounts for 24 per cent of the GDP and employs 48.4 per cent of the total workforce. About 68 per cent of country's population lives in rural areas and is directly or indirectly linked with agriculture for its livelihood. Over 70 per cent of our exports rely upon agricultural-based products. Water is the mainstay of agriculture. Irrigated agriculture provides 90 per cent of food and fibre requirements from about 42.5 million acres which is around 80 per cent of the cultivated area, while the remaining is contributed by over 10 million acres of barani (rain-fed) land.

Pakistan has a total geographical area of 196 million acres out of which 77.1 million acres is suitable for agriculture. A total of 54.5 million acres (71 per cent) out of the total agriculturable land is already cultivated either by irrigation or through rain. The remaining 22.6 million acres of land which constitutes 29 per cent of the total area suitable for agriculture can become productive if water is made available for irrigation. It means that a little less than 1/3rd of the agricultural potential of Pakistan remains untapped because of non-development of water resources and associated infrastructure.

Water sector industry of Pakistan is the largest enterprise accounting for approximately US \$300 billion of infrastructural investment and contributing about US \$ 16 billion annually to the GDP of the country.

Irrigated area of Pakistan has enhanced from 20.7 MAc in 1947 to 42.5 MAc in 2000 due to construction of a large number of irrigation works since independence. As a result, Pakistan now has the largest contiguous irrigated area of the world. The Indus River Basin System has three (3)

multipurpose dams / reservoirs, nineteen (19) barrages, twelve (12) link canals and forty-five (45) independent main canal commands. Schematic Diagram of Indus Basin is depicted in Figure 1.

Population growth, rapid urbanisation and industrialisation are imposing growing demands and pressures on water. The rising imbalance between supply and demand has led to shortages and unhealthy competition leading to inter-provincial tension, environmental degradation in the form of persistent waterlogging in certain areas and rapid decline of groundwater levels in other areas. Intrusion of saline water into fresh groundwater aquifer is another problem caused by excessive and imbalanced pumping.

The growing shortage of water which reaches alarming proportions during the drought years requires that a concerted effort be made to conserve water, develop available water resources to the optimum and adapt modern technologies for more efficient irrigation techniques. Unless this is done, self-sufficiency in food, socio-economic amelioration, alleviating poverty and conservation of environment would not be possible and eventually food shortages and even famine-like conditions may arise in the country.

Besides irrigated-agriculture usages, water plays an intrinsic role in many other sectors such as domestic, industrial, mining, livestock, fisheries development, etc. Hydropower is the cheapest and environmentally the cleanest way of generating electricity. Its abundant potential in Pakistan has to be developed on a priority basis if the current trend of rising power tariff is to be reversed.

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS

Issues of water Resources in Pakistan

Table 1: COMPARATIVE STATUS OF DEVELOPMENT OF WATER RESOURCES

Item	Pakistan	India	Ratio
Population	140 million	1016 million	1 : 7
Irrigated Area by Canals and Tube wells	42 Million Acres	221 Million Acres	1 : 3
Large Dams	68 number	4192 number	1 : 62
Storage Capacity	18 MAF	205 MAF	1 : 11
Hydropower	5,009 MW	21,891 MW	1 : 4
Canal Diversions	104 MAF	460 MAF	1 : 4

Source: Pakistan's |Dams & Development by World Commission on Dams (Nov 2000)

2. WATER AVAILABILITY AND REQUIREMENTS

2.1. Water Resources

Water in Pakistan is becoming scarce, while major parts of conventional water resources have already been developed. In order to meet the needs of growing population for water supply and sanitation, food and fibre, industry and environment, the conservation of this precious resource and development of next-generation water resource projects would be essential. The cost of these projects is likely to be higher than the cost of relatively simpler projects

already completed. Achieving sustainable development will, thus, be a major challenge in the 21st century.

The major exploitable water resources of Pakistan are:

- Surface Water
 - River Flows
 - Rainfall
- Groundwater
 - Useable Groundwater Aquifers
 - Useable Layers Overlying Saline Water

Table 2: WATER RESOURCE POTENTIAL (Million Acre Feet per Year)

Uses	Existing Uses (2003)				Gross Development Potential (2025)				Additional Development Potential			
	Surface	Ground Water	Rainfall Harvesting	Total	Surface	Ground Water	Rainfall Harvesting	Total	Surface	Ground Water	Rainfall Harvesting	Total
Agriculture (at Farm-gate)	57.5	37.5	5.0	100.0	70.5	43.5	8.0	122.0	13.0	6.0	3.0 *	22.0
Domestic	2.0	2.5	-	4.5	2.0	8.5	-	10.5	-	6.0	-	6.0
Industry	1.5	2.0	-	3.5	1.5	3.3	-	4.8	-	1.3	-	1.3
Environmental Uses	1.3	0.0	-	1.3	1.3	0.4	-	1.7	-	0.4	-	0.4
Total :	62.3	42.0	5.0	109.3	75.3	55.7	8.0	139.0	13.0	13.7	3.0	29.7

* Likely development by 2025

Source: Pakistan's National Water Resource Strategy (2002) by Ministry of Water & Power

2.1.1. River Flows

Pakistan has three (3) major river basins with the following average annual flows:

	MAF (Million Acre Feet)
Indus Basin	138.0 to 145.0 ⁽¹⁾
Mekran Coastal Basin	3.0 ⁽²⁾
Kharan Closed Desert Basin	0.8 ⁽²⁾
Total	141.8 to 148.8 MAF

Of the total available annual flow in the Indus Basin, 105

⁽²⁾MAF is already being used through a system of storages and distribution network. Average annual escapage below Kotri, the last Barrage on the Indus River, going to the sea, is 35 to 38⁽³⁾ MAF. Indeed a provision has to be made for certain flow requirements below Kotri Barrage to meet the requirements of local population, the ecological needs and biodiversity of the coastal area for which a study is to be made under the Water Accord of 1991.

Assuming a provision of 10 MAF for uses downstream Kotri, a tentative figure (indicated in the 1991 Accord), the additional available flow is about 20 to 25 MAF, excluding further uses by India, as follows:

(1) The average value depends upon the period over which the average is calculated and whether exceptional low and high values are disregarded or not. Some consider this value as low as 123.5 considering average flows as unreliable in view of the large variations in flow from year to year.

(2) Master Planning of Hill Torrents of Pakistan - NESPAK, 1998.

(3) 35 MAF refers to the average escapement from years 1976-77 to 2003-04 without disregarding exceptionally high and lean years. 38 MAF refers to the average of the same period after disregarding exceptionally lean and high years.

Table 3: Water Usage

	Million Acre Feet (MAF)
A. Annual Average Flow Below Kotri (Post Tarbela) 1977-2001	35 to 38
B. Requirement Below Kotri (Tentative 1991 Accord Figure)	10
C. Likely Uses in the Headwater Areas both on Eastern and Western Rivers	3 to 5 ⁽⁴⁾
Balance Potential (A-B-C)	20 to 25 MAF at Canal Headworks
Equivalent availability at farmgate or nakka:	13 to 15 MAF

Source: Pakistan's National Water Resource Strategy (2002) by Ministry of Water & Power

2.1.2. Rainfall

Monsoon and Westerly currents are the two main weather systems that contribute to rainfall over Pakistan. Average annual rainfall over Pakistan is 11.4 inches.

Aside from the useful components of rainfall that occurs on the farmlands or finds its way to the main river system, hill torrents bring in floods of short durations but of high magnitudes. Because of steep slopes, flood flows move with enormous speed, which result in the erosion of banks and beds of channels. Flood flows debouching onto the plain areas, are generally charged with high silt contents,

which prohibit their management by conventional dams or reservoirs.

A major portion of hill torrent flows not only goes waste but also causes damages in the areas which are already underdeveloped. The total development potential of hill torrents is estimated as approximately 17⁽⁵⁾ MAF of which 5 MAF has already been conserved through the construction of more than 500 structural interventions such as delay action dams, dispersion structures, retaining walls, etc. Approximately 3 MAF is considered a reasonable quantum for further harnessing by the year 2025.

(4) The Indus Waters Treaty Pakistan & India, 1960.

(5) Master Planning for Flood Management of Hill Torrents of Pakistan - NESPAK 1998.

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

2.1.3. Groundwater Resources

The vast and readily available groundwater resources of Pakistan have played an increasingly important role in meeting the country's food and fibre requirements. Groundwater now supplies around 45 per cent of crop water requirements in the country since it permits the farmers to exercise greater control over available water in its timely application for crops. This has transformed the concept of low and uncertain crop yields to more secure and predictable form of crop production. Even away from the Indus Plains in the highland areas of Balochistan and NWFP, groundwater has been crucial in supporting the agricultural sector. Crop yields have nearly doubled due to use of groundwater in addition to rotational canal water supplies. It is, therefore, imperative that long-term sustainability of groundwater, as a resource, is maintained.

The aggregate groundwater potential after full development of surface water resources is estimated to be approximately 56⁽⁶⁾ MAF of which 42⁽⁷⁾ MAF is being currently used annually through more than 700,000⁽⁷⁾ tube wells installed and operated by the farmers themselves, and about 5,000 public sector operating tube wells.

The pace at which the groundwater exploitation has unfolded has also added to the complexity of its management. In some regions, the impact on the groundwater is alarming; groundwater levels are declining rapidly to unfeasible pumping depths, and there is intrusion of saline water in the fresh groundwater areas through lateral or upward movement of the former. At the same time, there are some areas where waterlogging still persists due to inadequate pumping and/or drainage. It has been estimated that a further potential of some 6 to 14 MAF exists in the development of Pakistan's groundwater resources.

2.2. Projected Water Requirements

Population of Pakistan stands at 145 million and is likely to increase to about 221⁽⁸⁾ million by the year 2025.

Projected food requirements have been estimated based upon population growth and the requisite caloric needs. The per capita consumption of food and fibre, thus, calculated, indicates the projected water requirements at the farmgate, as depicted in Table 4.

Table 4: Water Requirements according to Population

Sectors	Existing Water Uses 2003 (MAF)	Projected Requirements Year 2025 (MAF)	Additional Requirements (MAF)
Agriculture at the Farmgate	100	128	28
Municipal and Rural Water Supply,			
Sanitation and Environment	5.8	12.2	6.4
Industry	2.2	4.8	2.6
Total	108	145	37

Source: Pakistan's National Water Resource Strategy (2002) by Ministry of Water & Power

(6) Groundwater Development Potential of Pakistan. IWASRI 1998.

(7) Exploitation & Regulation of Groundwater of Pakistan ACE, Halcrow 2003.

(8) Pakistan's Water Sector Strategy, Ministry of Water and Power 2002

In terms of irrigated agriculture, the additional water requirement by year 2025 would be 28 MAF at the Farmgate. As Table 4 indicates, some 9 (6.4+2.6) MAF of water is required for uses other than irrigated agriculture. As opposed to the total quantity of 37 MAF, the gross additional water available is 30 MAF (13 MAF from canals at farmgate, 14⁽⁹⁾ MAF as groundwater contribution and 3 MAF from rainfall harvesting). In the circumstances, even after creating additional storages to conserve excess water during the months of mid June to mid September, major effort will have to be placed in water conserving and production enhancement strategies, so as to ensure, for the people of Pakistan, domestic and industrial water as well as food security. The availability of 30 MAF seems to limit our water developmental potential in various sectors. Furthermore, since river flows in the nine-month period mid-September to mid-June, are already short of the demand, the feasibility of additional storage is needed to be studied to conserve the apparently surplus flood flows going to the sea during the three remaining months of most of the years.

3. PAKISTAN'S INTERNATIONAL AND NATIONAL AGREEMENTS ON WATER DISTRIBUTION

For sharing and distribution of surface water, two (2) major agreements have been made; one at the international level with India known as the Indus Waters Treaty - 1960 and the other at the national level amongst the provinces known as Apportionment of Waters of Indus River System between the provinces of Pakistan - 1991. These are briefly described below:

3.1. The Indus Waters Treaty - 1960

Dispute between India and Pakistan over sharing of Indus Valley River flows could not be settled through bilateral negotiations, and international mediation had to be sought. The dispute was finally resolved with the signing of the Indus Waters Treaty in 1960 after protracted negotiations through mediation by the World Bank.

Under the Treaty, India was given away the exclusive use of three (3) Eastern Rivers (Ravi, Beas and Sutlej), while the Western Rivers (Chenab, Jhelum and Indus) were left for Pakistan except for some specified uses by India. A network of two (2) storage dams, eight (8) inter-river link canals and six (6) barrages was constructed in Pakistan as replacement works under the Treaty to transfer water from

Western Rivers to the Eastern Rivers and to the canal systems which were then receiving their supplies from the three (3) Eastern Rivers.

The construction of storages and link canals allowed the operation of the Indus Irrigation System in an integrated and improved manner, with greater control over river water utilisation. The average annual canal withdrawals peaked at 105 MAF in 1979 after the construction of Tarbela Dam and other Indus Basin Replacement Works. The canal withdrawals, more or less stagnated at this level, have now declined to around 103 MAF, partly due to siltation of the reservoirs.

3.2. Apportionment of Indus Waters Accord - 1991

Since the inception of Pakistan, there have been a number of occasions when the provinces showed mutual goodwill and accommodation in resolving long-standing disputes. The construction of Kotri, Taunsa and Gudu Barrages on the main Indus River after independence was the result of such goodwill and cooperation. Similarly, the 1991 Water Apportionment Accord was a major breakthrough and a turning point in its march towards national consolidation. Several attempts had earlier been made such as by Anderson Committee (1935), Indus (Rau) Commission (1939), Akhtar Hussain Committee (1968), Fazal-e-Akbar Committee (1970), Anwar-ul-Haq Commission (1981) and Haleem Committee (1983), to resolve water distribution issue between the provinces. All these attempts failed except Rau Commission (1939) which resulted in Sindh-Punjab (Draft) Agreement, 1945 which became the basis of water distribution between Sindh and Punjab till the 1991 accord. However due to the exigencies of the partition of India in 1947, the respective provincial assemblies were unable to ratify the draft into an Agreement. The Water Apportionment Accord of 1991, therefore, will go down in the history of Pakistan as a sacrosanct agreement reached through a political process and inter-provincial consensus. For future development in the water sector, the need for a political process to gain inter-provincial consensus cannot be over-emphasised.

The Water Apportionment Accord was signed by the Chief Ministers and other representatives of the four (4) provinces on March 16, 1991 at Karachi. The accord was adopted as a decision of the Council of Common Interests (CCI) on March 21, 1991. The follow-up decisions on the accord were taken by the CCI in its meeting on September

(9) only after full development potential of surface water resources

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS

Issues of water Resources in Pakistan

16, 1991 in which the Annexure II of the accord was adopted which consisted of 10-Day Seasonal System-wise Adjusted Allocations submitted by each province as per section 14a of the accord.

In the Indus Waters Accord of 1991, all provinces recognised the need for new storages wherever feasible for planned future agricultural development. The Indus Water Accord of 1991 calculated portions of water not on the basis of actual average usages then which stood at 105 MAF but at 117 MAF, perhaps taking into account the surplus which will be created through new storages.

The apportionment agreed under the 1991 Accord, thus, provides a total allocation of 55.94 MAF to Punjab, 48.76 MAF to Sindh, 5.78 MAF to NWFP and 3.87 MAF to Balochistan. Additionally, NWFP is entitled to 3.00 MAF being used through ungauged (civil) canals above the rim

stations. The Water Accord also lays down the distribution of the balance river supplies, including flood supplies as well as the future storages as 37 per cent each to Punjab and Sindh, 14 per cent to NWFP and 12 per cent to Balochistan. Full text of the Accord is placed at Appendix A.

4. PROVINCIAL CONSENSUS AND CONSTRUCTION OF RESERVOIRS

Water resources continue to remain the driving engine of the economy of the country and should be developed and used for fuller development of the four (4) provinces of Pakistan. However, provincial consensus is necessary before the development of any strategy. Table 5 carries salient features of the two of the many dams proposed by WAPDA for construction. An inter-provincial consensus is yet to be developed for the construction of these reservoirs.

Table 5: Proposed Dams

Feature	Proposed Kalabagh Dam	Proposed Bhasha Dam
Location	Indus River; 162 miles downstream Tarbela Dam.	Indus River; 200 miles Upstream Tarbela Dam
Dam Height	260 Feet	920 feet
Live Storage	6.1 MAF	7.3 MAF
Hydropower	3,600 MW	3,360 MW
Estimated Cost	Rs. 360 billion	Rs. 400 billion
Status	Feasibility & Design completed	Feasibility Study in progress & expected to be completed by June 2004; Design to finish by 2006.
Earliest Date when Construction can start	2004	2006
Possible Completion Date	2010	2013

Source: Water Resources & Hydropower Development - Vision 2025 (Updated Figures)

Despite a number of provincial concerns regarding future water-resource development strategies, the construction of four (4) canals to provide water to the desert areas have been undertaken. Main features of these canals are shown in Table 6. Due to inter-provincial lack of trust, considerable resistance is directed against the construction of Greater

Thal canal, which is being opposed by the provincial assembly of Sindh.

However raising of Mangla embankment (Table 7) is a case which was relatively amicably resolved.

BRIEFING PAPER
 FOR PAKISTANI PARLIAMENTARIANS
 Issues of water Resources in Pakistan

Table 6: Canals under Execution

1. Kachhi Canal, Balochistan	
Location	Sibbi & Dhadar Districts
Offtaking Site	Taunsa Barrage (Indus River)
Canal Capacity	10,500 Cusecs
Area to be irrigated	560, 000 Acres
Estimated Cost	Rs. 44 billion
Percentage of Completion as of August 31, 2003	1.5%
2. Chasma Right Bank Lift Canal, NWFP	
Location	D I Khan District
Offtaking Site	Chashma Barrage (Indus River)
Canal Capacity	2,500 cusecs
Pumping Lift	60 feet
Area to be irrigated	261, 000 Acres
Estimated Cost	Rs. 38 billion
Percentage of Completion as of August 31, 2003	in the study stage
3. Greater Thal Canal, Punjab	
Location	Bhakkar, Jhang, Khushab, Layyah & Muzaffargarh Districts
Offtaking Site	Chashma-Jhelum Link (Indus River)
Canal Capacity	10,500 cusecs
Area to be irrigated	1, 500, 000 Acres
Estimated Cost	Rs. 61 billion
Percentage of Completion as of August 31, 2003	8%
4. Rainee / Thar Canal, Sindh	
Location	Sanghar & Tharparkar Districts
Offtaking Site	Guddu Barrage (Indus River)
Canal Capacity	10,000 Cusecs
Area to be irrigated	260, 000 Acres
Estimated Cost	Rs. 51 billion
Percentage of Completion as of August 31, 2003	1%

Table 7: Raising of Mangla Dam

Location	Jhelum River
Increase in Height	30 Feet
Additional Live Storage	3.1 MAF (60% increase)
Additional Power	180 MW (18% increase)
Estimated Cost	Rs. 53 billion
Status	Engineering design in progress & expected to be Completed by Feb. 2004
Expected Construction Completion	Feb. 2008

Source: Water Resources & Hydropower Development - Vision 2025

5. KEY ISSUES

There are a number of key issues relating to the water resources which confront Pakistan today. It is extremely important that as a first step these issues are understood by parliamentarians and other stakeholders; and as a second step, concerted efforts be made by them to resolve these major issues in the larger interest of the country, its people and the future generations. These key issues are listed below:

5.1. Lack of trust among the provinces especially between Punjab and Sindh:

Lack of trust among the provinces especially between Punjab and Sindh is at the heart of the water issues in Pakistan. All disputes stem from this crisis of confidence. Sindh (the lower riparian in this case) questions the upper canal withdrawals and feels that it is either being deprived or will be deprived of its share of water by Punjab. It, therefore, views any new project or plan in the water sector with a great sense of scepticism. It feels that because of the historical events its scepticism is justified.

Punjab, on the other hand, questions the 'surpluses' which pass downstream Kotri and considers a major quantity of this escapage as waste which should be stored and put to use. Sindh on the other hand considers the escapage downstream Kotri as essential and feels offended when this flow is termed as 'wastage'.

Sindhi objections to Greater Thal Canal and Kalabagh Dam Project also mainly stem from this lack of trust. The dispute on sharing the water shortages during the past five drought years has further accentuated this crisis of confidence. This

lack of trust is the greatest issue in the context of Water resources.

5.2. Differences among provinces on the interpretation of Water Apportionment Accord of 1991.

The main differences relate to the following:

a. Construction of additional storages (Section 6 of the Water Accord-1991):

This is one of the most serious water issues confronting Pakistan today.

Section 6 of the 1991 Water Accord reads: "The need for storages, wherever feasible on the Indus and other rivers was admitted and recognised by the participants for planned future agricultural development"

The federal government and the provincial government of the Punjab feel very strongly that this section amounts to an agreement to construct Kalabagh, Bhasha and other dams on the river Indus. Since the feasibility study of Kalabagh dam is already completed and the detailed engineering design is ready, the federal and Punjab governments would like to go ahead with the construction of this project forthwith. The federal government feels that the existing storages are depleting due to silting and a serious irrigation water crisis is looming large. Sindh and NWFP have serious objections to this project and their assemblies have passed resolutions against the Project. A number of elements in Sindh

apprehend that this project may become a source of withdrawing excess water for Punjab. Some people in the NWFP feel that Kalabagh Dam will threaten some of their cities such as Nowshehra and may damage their agricultural land. The Federation strongly refutes these objections on technical grounds but the opposition continues.

The Feasibility Study of Bhasha Dam is in progress and expected to be completed by June 2004. So far this project does not invoke serious opposition but one may expect closer scrutiny by provinces and the Northern Areas when project documents are ready.

b. Terms of Reference of the Study required to establish minimum escapage to sea downstream Kotri (Section 7 of the Water Accord-1991)

The section 7 of the 1991 Water Accord reads: "The need for certain minimum escapage to sea, below Kotri, to check sea intrusion was recognised. Sindh held the view, that the optimum level was 10 MAF, which was discussed at length, while other studies indicated lower/higher figures. It was therefore decided that further studies would be undertaken to establish the minimum escapage needs down stream Kotri."

Despite the passage of 12 years since the signing of the accord, the study could not be commissioned because the provinces could not agree on the scope and terms of reference of the study. Unless a study is undertaken and the minimum flow of water required down stream Kotri is known, Punjab and Sindh may not agree on the amount of water available for additional storage. Many in Sindh contend that there is not sufficient water in river Indus for further storage. The federal government cites the historical records of the past 25 years according to which an average of 35 to 38 MAF water has escaped below Kotri. Even if 10 MAF is allowed to escape below Kotri, there is sufficient water for additional storage, the federal government contends.

c. The mode of sharing shortages (Section 14b of the Water Accord-1991)

Section 14b of the accord reads, "The record of actual average system uses for the period 1977-82 would form the guide line for developing a future regulation pattern. These ten daily uses would be adjusted pro-rata to correspond to the indicated seasonal allocations of the different canal systems and would form the basis for sharing shortages and surpluses on all Pakistan basis."

Pakistan has experienced serious shortages of Indus water during 1994-95, 1997-98 and then during the past four (4) years (1999-2000, 2000-01, 2001-02 and 2002-03) During this period, Sindh and Punjab differed seriously and sometime even acrimoniously on their share of water during the shortages. In the 1991 accord, Punjab had agreed on its share of water that was 2.7 per cent less than its historical share; Sindh, on the other hand, was given a share of water that was 1.2 per cent higher than its historical share. Punjab contention was that it had agreed to a reduced share for itself because of a 'package deal' in 1991 under which additional storages were also to be constructed. Since, according to Punjab, the 1991 accord was not implemented in entirety and storages were not constructed, Punjab sought its share of water on pre-1991 historical average basis. Sindh contested this position bitterly and considered 1991 accord sacrosanct. But water continued to be shared on the basis of the pre-91 basis in the light of a "1994 Inter-provincial ministerial agreement". Many in Sindh called this as theft of their water. This serious difference of opinion and the associated bitterness continues.

5.3 Construction of Greater Thal Canal in Punjab

The construction of Greater Thal Canal is in progress in the Punjab. So is the construction of Rainee-Thar Canal in Sindh, Kachhi Canal in Balochistan and Chashma Right Bank Lift Canal in the NWFP. The Provincial Assembly of Sindh has passed two (2) unanimous resolutions against the construction of the Greater Thal Canal. Sindh feels that since sufficient water is not available in Indus River to supply water to Greater Thal Canal, the new canal will eventually become a means of siphoning off extra water beyond the due share of the Punjab. Although the Federal

Government and the Punjab Government claim that the Greater Thal Canal will only use flood water for about 90 days in a year, Sindh feels that once the land owners and tillers start depending on the canal water for irrigation, they will develop sufficient pressure and clout to make the canal perennial, withdrawing extra water beyond its due share. Sindh also complains that due process and procedure was not adopted in approving the Greater Thal Canal project and its construction was hurriedly started despite the objections of the Sindh province. Punjab and the Federal Governments contend that according to the 1991 Water accord, each province is allowed to develop water-related projects within its share of water as agreed in the accord. In addition, Greater Thal Canal is specified by the Punjab province in its 10 daily records submitted to the Council of Common Interest as a part of the 1991 accord and this record is appended to the accord as Annexure II as its integral part. Punjab and the Federal Government also point out that an elaborate Telemetry system has now been installed to continuously monitor the water withdrawals at each canal head which makes it almost impossible for any individual or province to withdraw extra water. The federal government points out that the Greater Thal Canal project was approved by IRSAs and ECNEC. While the construction of the Greater Thal Canal proceeds, street protests have been organised in Sindh against the construction of the Greater Thal Canal generating more bitterness in the inter-provincial relations.

5.4. Reduction in storage due to silting of existing reservoirs.

The state of technology at the time of construction of the three (3) main reservoirs, Tarbela, Mangla and Chashma did not provide for any de-siltation of the reservoirs. It was therefore anticipated that these reservoirs would have a limited life and substitute arrangements would have to be made. By 2002, Tarbela had lost 3.03 MAF or 26 per cent of its original storage capacity, Mangla 1.18 MAF or 20 per cent of its original storage capacity, and Chashma 0.37 MAF or 43 per cent of its original storage capacity. In total, 4.58 MAF or 25 % of the total storage capacity of the three reservoirs was lost by 2002. It is anticipated that by 2013 and 2020, we would have lost 6.27 MAF or 34 % of the total capacity and 7.27 MAF or 40 % of the total storage capacity respectively. In other words, Pakistan would have lost a storage capacity greater than the capacity of the proposed Kalabagh reservoir (6.1 MAF) by 2020. This development would have grave ramifications for the agriculture and overall economy of Pakistan. The federal government is

convinced that construction of new storage is the only effective response to this situation. Some opponents of the new storages suggest that instead the possibility of de-silting of the reservoirs should be explored. Most of the experts, however, feel that de-silting and the subsequent disposal of the removed silt is simply not feasible. The design of the proposed Kalabagh reservoir, however, has a provision of silt flushing.

5.5. Wastage of water in the irrigation system

Pakistan has the largest contiguous irrigation system in the world. It is estimated that 40 to 50 per cent of water is lost between the canal headworks to the farmgate. Lining of Canals is considered a good solution to this problem. But lining of canals in Sindh is a great issue as canals will need to be closed long enough to deprive the farmers of at least one crop and the farmers are not willing to pay this price for Canal Lining. The irrigation application rates within the farms are also high because of reliance on the conventional flood irrigation. With the passage of time, water as a commodity is becoming more and more precious. Above all it is a finite source. This high percentage of wastage, therefore, can not be afforded for long. Wastage of water through poor infrastructure or poor water management constitutes a major issue related to the water resources of Pakistan. Another aspect of this issue is the productivity of the farms against per cusec of irrigation water. Pakistan has a much lower rate of production. The irrigation efficiency, therefore, needs to be enhanced.

6. STRATEGY FOR ADDRESSING VARIOUS ISSUES

6.1. An active Conflict Resolution Mechanism

Pakistan has always faced water shortages and will continue to do so, except in the monsoon wet months. In order to utilise the surplus flood waters in a timely and effective manner, there is a need to develop provincial consensus on water conservation and development strategies while removing any prevailing misgivings. Despite the Constitutional provision of "Council of Common Interests," there is a lack of sound conflict resolution mechanism among the provinces. Such a mechanism needs to be evolved on a practical and sustainable basis. There are two possible ways to do this:

a. Activation of Council of Common Interests - CCI:

Articles 153 to 155 of the Constitution of Pakistan relate to the appointment and functions of the Council of Common Interests (CCI). Article 155 specifically relates to water-related complaints of the federal government or provincial governments. It is important that we make use of the constitutional institutions and mechanisms to resolve our issues instead of resorting to other methods. Currently the CCI is not constituted as members to the Council have not been nominated. The CCI should be constituted and it should be allowed to play its role in resolving inter-provincial conflicts and disputes and developing consensus on such resolutions.

b. Parliament and Parliamentary Committees should play their rightful role:

Parliament is the most important and the appropriate forum to debate national issues and develop consensus among the people and provinces. Both houses of the Parliament i.e. the National Assembly and the Senate should take steps to discuss, debate and develop consensus on water related issues in Pakistan. A special responsibility lies with the standing committees on Water and Power in the two houses to do the basic work in this regard before the full parliament takes up the issue for resolution. The standing committees in the two houses can either take up the issue separately or as a joint effort. The committees should call water experts as witnesses and hold public hearings on the question of water issues. These hearings should be open and preferably televised for creating public awareness. We lose more by trying to keep issues under wraps. Open discussion may seem chaotic in the beginning but ultimately leads to the development of national consensus. It is rather unfortunate that both National Assembly and Senate are without their standing committees even after the passage of about 10 months. The formation of these committees should not be delayed any further. In case there is a technical obstacle in constituting the permanent committees, speaker of the National Assembly

and Chairman of the Senate may constitute adhoc committees so that the functioning of the committees should get underway. As the successful conclusion of the 1991 accord and framing of the constitution of Pakistan by consensus in 1973 demonstrate, elected representatives can develop lasting and sustainable consensus at national level even on extremely complex and contentious issues. Parliament should be the most active player in the quest for a national consensus.

6.2. Regulation of Groundwater Usage

There are frequent instances of excessive and un-regulated pumping of groundwater for irrigation which result in the fall of water table in some areas and persistent waterlogging and salinity in others. Moreover Sweet groundwater is getting increasingly polluted due to lateral or upward movement of saline groundwater through water mining that is taking place particularly in Punjab and Balochistan.

A regulatory framework for optimal exploitation of groundwater is also required to be enforced in the four (4) provinces. Unsystematic and uneven pumping of groundwater has to be checked to avoid large scale mining in some areas and to avoid pollution as a result of contamination of saline water bodies.

In the upper reaches of canals, the supplies are comparatively more liberal and, therefore, groundwater exploitation is minimal, although aquifer in the upper reaches is of good quality. In lower reaches, canal supplies are generally inadequate for meeting the crop water requirements, and so is the fresh groundwater, which forces the farmers to over-exploit poor-quality groundwater to meet their irrigation needs. The unsystematic and erratic exploitation of water has thus resulted in a number of adverse interactions which need to be corrected through appropriate institutional and legal interventions.

6.3. Water Conservation

In view of the huge (around 45 to 50 per cent) losses of irrigation water between canal-heads and the farmgate, water conservation should be accorded a high priority. Lining of Canals and Water courses should be taken in hand more vigorously.

6.4. Efficient use of irrigation water and application of modern technologies

About 90 per cent of water is used for producing agricultural crops. A greater emphasis should, therefore, be placed on growing and producing more with less quantities of water. Feasibility Studies should be commissioned, and based on positive results of these studies, pilot projects may be initiated in the use of Drip and Sprinkler systems of irrigation to assess the practicability and cost-benefit ratio of such technologies. In countries like Israel, these irrigation technologies are being implemented with success. Pakistan should pursue such technologies now in order to be able to use those 10 to 15 years later. Farmers also need to be educated in land levelling and economical water usages. More effort and resources need to be directed towards research and development.

6.5. Legislation on Water-related issues

Legislators should concentrate on bringing new legislations to replace the outdated laws and to address the new issues. Safety of Dams, contamination of surface and ground water and safe drinking water are some of the issues which require new and more effective legislation. (Please see the following sections for recommendations on specific legislation)

7. LEGISLATIVE AND INSTITUTIONAL ASPECTS

One of the vital legal questions that still remain unresolved globally is: who owns the water resources, or who should own the water resources? The next question; perhaps even more important, is: who has the usage rights over waters of rivers, streams, canals, groundwater, karezes, and springs, etc. Many different categories of water rights exist in Pakistan, yet legal cover in most cases is absent.

There are a large number of provincial acts passed from time to time to cover the water-related needs spread over more than a century. Starting with Punjab Irrigation Act legislated in 1873 and similar laws enacted later on in the other three (3) provinces, there are also four (4) Provincial Soil Reclamation Acts pertaining to waterlogging and drainage, Water Users Association Ordinances of 1981 and 1982, PIDA Acts of 1997, and a host of city development legislations covering, inter alia, domestic water supply. At the Federal level, WAPDA Act of 1958 and IRSA Act of 1992 provide guiding principles for development and distribution

of water. On the one hand, the existing laws have overlapping and conflicting provisions in many provincial and federal laws. On the other hand, certain crucial laws such as the Dam Safety Acts, which exist in most countries with large dams, do not exist in Pakistan.

There is, thus, a need to add, delete and modify various provisions, and to cover the drastically changed conditions and ground realities. Preferably, all water-related provincial laws should be combined into one comprehensive act, which would make the laws concise and clearer, more-readily understandable and less susceptible to misinterpretations.

On the institutional side, there is need to enhance delegation of powers and organisational capacities of the newly-created autonomous provincial irrigation and drainage authorities (PIDAs). The intended concepts including autonomy, decentralisation and participatory management involving the water users, have not been implemented by the provinces. Active involvement and participation of the users in planning and operation of the public-sector utility services is of crucial importance in minimising inefficiencies and malpractices in the system. Water has to be treated at par with other community development services, and there is a dire need for effective regulatory bodies to exercise proper quality controls.

8. RECOMMENDED ACTIONS

In order to efficiently develop and manage water resources of Pakistan and to ensure quality as well as availability of water to meet the growing needs across all sectors, there are a number of actions that need to be taken, which are outlined below.

1. Activation of Council of Common Interests (CCI):

The Council of Common Interests (CCI) that is a constitutional body should be constituted without any delay so that it may play its role assigned in the constitution to resolve inter-provincial disputes especially those relating to water.

2. Parliament and its committees to be more proactive:

Parliamentarians should play a more active role in developing a sustainable consensus on such vital national issues as development of water resources. The Standing Committees on Water

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

- and Power should hold public hearings and call expert witnesses to understand and clarify the issues. The Government should also understand the importance and value of the Parliament as a consensus-building forum.
3. **An inter-provincial accord on new storages:** In order to meet the growing needs of food for increasing population, an inter-provincial consensus on development of water resources for constructing additional storage/carryover storage reservoirs and canals is necessary for conservation and effective use of badly needed water. There is also need to evolve a sound “conflict resolution mechanism” on a practical and sustainable basis. Since lower riparians appear agreeable to the concept of constructing carry-over dams, an inter-provincial accord needs to be entered into on this part of the water resource development.
4. **Study to ascertain water flow required downstream Kotri:** As required in the 1991 water accord, an urgent study needs to be undertaken to determine water requirements downstream of Kotri Barrage.
5. **Enhanced Telemetry System:** Improvement and expansion in the telemetry system is required to ensure transparency in water distribution amongst the provinces
6. **Water Conservation:** A comprehensive plan for optimum conservation of water should be prepared and put into action.
7. **Adoption of New Technologies:** Feasibility study and pilot projects should be launched to assess the sustainability of new and effective irrigation technologies in Pakistan.
8. **Forecasting of Floods & Droughts:** Research needs to be undertaken for better understanding and forecasting of floods and droughts and preparation of emergency plans.
9. **Improving Domestic Water Quality:** Improvement in the quality of domestic water in urban as well as rural areas is required besides ensuring satisfactory drinking quality water for the population. Parliamentary and provincial assemblies standing committees on health or other divisions should take cognisance of this question of great public interest.
10. **Adopting new technologies for ground water extraction:** Development and use of latest state-of-the-art technologies is in order to maximize groundwater pumpage through skimming freshwater lenses overlying the saline groundwater.
11. **Harnessing Hill Torrents:** Development of flood flows of hill torrents is necessary which offer great potential for conservation primarily in areas located outside the Indus plain.
12. **Checking Water Pollution:** A system of effective check and control of pollution in all water bodies is required.
13. **Improved Institutional Structure:** Establishment of improved institutional structure both at federal and provincial levels is required for integrated management of water for all sectoral uses including municipal, rural domestic supply, agriculture, industry, mining and environmental, in addition to an effective regulatory framework.
14. **A comprehensive Water Law:** Preparation of a comprehensive Water Law is needed which should update and replace more than two dozens of existing Provincial Acts covering the subject of Water, as legislated from the Year 1873 to Year 1997. A comprehensive legislation would make the water-related laws concise and more-readily understandable and less susceptible to misinterpretations.
15. **Regulation of Groundwater Usage:** A system needs to be evolved to regulate pumping of ground water to check lowering of water table in some areas and water logging in the other.

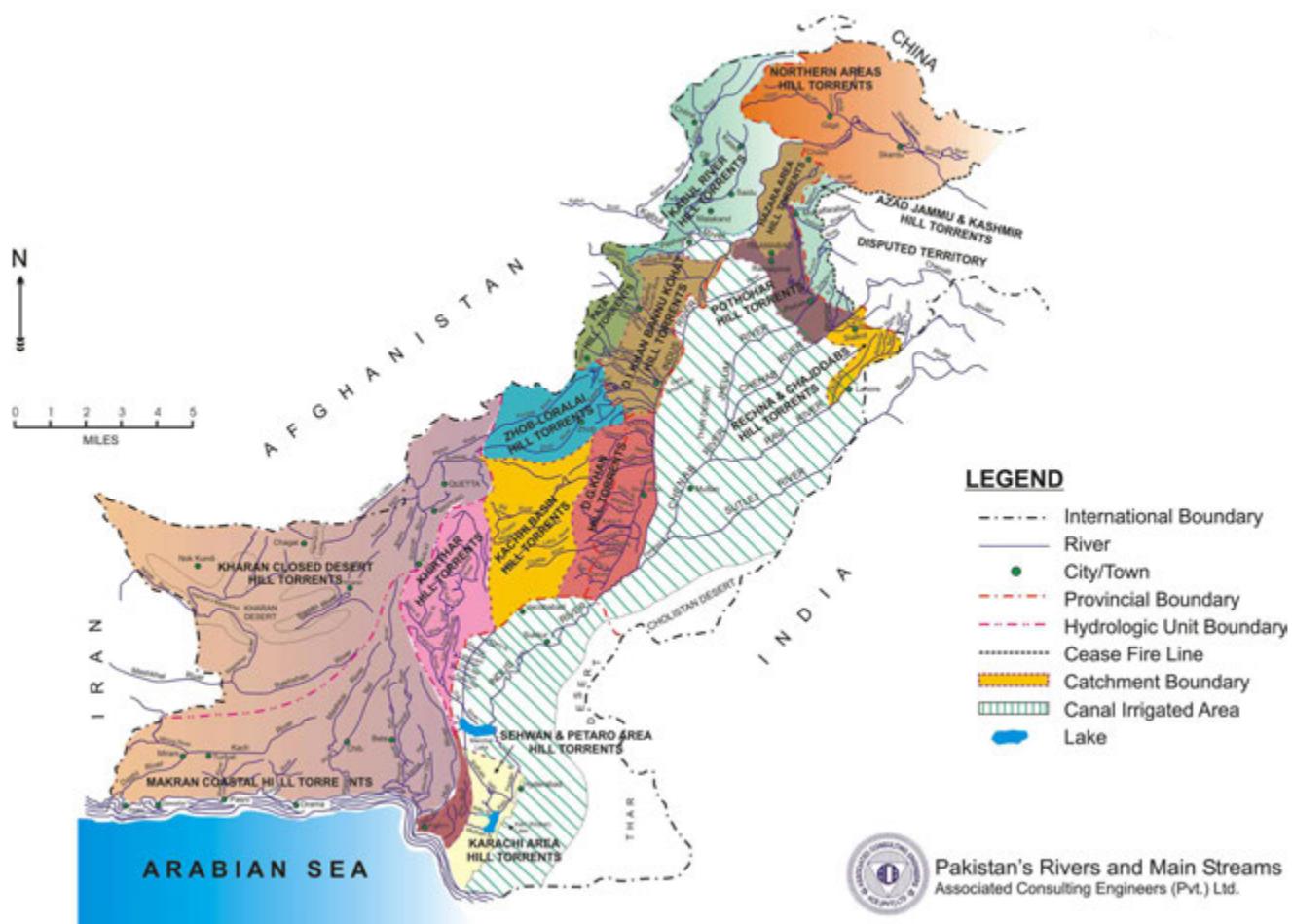
BRIEFING PAPER
 FOR PAKISTANI PARLIAMENTARIANS
 Issues of water Resources in Pakistan

Figure 1: The Indus Basin Irrigation System



BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

Figure 2: Pakistan's Rivers and Main Streams



LEGEND

- International Boundary
- River
- City/Town
- Provincial Boundary
- Hydrologic Unit Boundary
- Cease Fire Line
- Catchment Boundary
- Canal Irrigated Area
- Lake



Pakistan's Rivers and Main Streams
Associated Consulting Engineers (Pvt.) Ltd.

BIBLIOGRAPHY

- a A Spatio-Temporal Analysis of Rainfall in the Canal Command Area of the Indus Plain. IWMI (2000)
- b A Strategic Plan (Pakistan Water Partnership 1999). World Bank (1999)
- c Agricultural Statistics of Pakistan. Ministry of Food & Agriculture (1997-98)
- d Agricultural Strategies for the First Decade of New Millennium. Food and Agriculture Organisation Islamabad-Pakistan (2000)
- e Apportionment of Waters of Indus River System Between the Provinces of Pakistan, Agreement 1991 (A Chronological Expose) by IRSAs.
- f Canal & Drainage Act, (1873)
- g Dams and Development by World Commission on Dams (2000)
- h Economic Survey of Pakistan (2002-03)
- i Exploitation & Regulation of Groundwater of Pakistan ACE, Halcrow (2003)
- j Fifty Years of Pakistan in Statistics (1947-1997) Summary & Volume-1 to IV. Federal Bureau of Statistics (1998)
- k Groundwater Development Potential of Pakistan IWASRI (1998)
- l Guidelines on Water and Sustainable Development: Principles and Policy Options. United Nations, New York (1997)
- m I COLD Report on Dams and the Environment (1994)
- n Integrated Water Resources Management Study (Appraisal of National Water Strategy). IWASRI (1998)
- o Kalabagh Dam (Information booklet by WAPDA) (July 1998)
- p Master Planning for Flood Management of Hill Torrents of Pakistan by NESPAK, (1998)
- q National Agriculture Policy by Ministry of Food & Agriculture Islamabad (1991)
- r Overcoming Water Scarcity and Quality Constraints by International Food Policy Research Institute (2002)
- s Pakistan National Water Sector Profile by Halcrow, (2001)
- t Pakistan's National Water Resourse Strategy by Ministry of Water and Power (2002)
- u Politics of Managing Water, edited by Dr. Kaiser Bengali SDPI & Oxford (2003)
- v Presentation on Development of Water Resources by WAPDA (Sept 2003)
- w Revised Action Programme for Irrigated Agriculture. Planning Division by WAPDA (1979)
- x The Indus Waters Treaty - Pakistan & India (1960)
- y Water & Hydropower Development in Pakistan Vision - 2025 by WAPDA (2001)
- z Water and Year 2025 Associated Consulting Engineers (ACE) Ltd. (2003)
- aa Water for All: The Water Policy of the Asian Development Bank (2001)

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

APPENDICES



BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

APPENDIX A

TEXT OF THE APPORTIONMENT OF WATERS OF INDUS
RIVER SYSTEM BETWEEN THE PROVINCES
OF PAKISTAN - AGREEMENT 1991



BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

SECRET

APPORTIONMENT OF THE WATERS OF THE INDUS RIVER SYSTEM
BETWEEN THE PROVINCES OF PAKISTAN

As a follow-up to the meeting of the Chief Ministers at Lahore on March 3, 1991, a meeting of the representatives of the four provinces was held at Lahore on March 04, 1991. Another meeting was held at Karachi on March 16, 1991. The list of participants is attached.

The participants agreed on the following points:-

1. There was an agreement that the issue relating to Apportionment of the Waters of the Indus River System should be settled as quickly as possible,
2. In the light of the accepted water distributional principles the following apportionment was agreed to:

Mohammed
Aslam
AB

16-3-91

PROVINCE	KHARIF	RABI	TOTAL
PUNJAB	37.07	18.87	55.94
SINDH*	33.94	14.82	48.76
N.W.F.P. (a) (b) CIVIL CANALS**	3.48 1.80	2.30 1.20	5.78 3.00
BALOCHISTAN	2.85	1.02	3.87
	77.34	37.01	114.35
	+	+	+
	1.80	1.20	3.00

W.M.Z.
16-3-91

* Including already sanctioned Urban and Industrial uses for Metropolitan Karachi.
** Ungauged Civil Canals above the rim stations.

M. Shah
16-3-91

W.M.Z.
16-3-91

W.M.Z.
16-3-91

Easid
16-3-91

W.M.Z.
16-3-91

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS

Issues of water Resources in Pakistan

3. N.W.F.P/Baluchistan Projects which are under execution have been provided their authorised quota of water as existing uses.
4. Balance river supplies (including flood supplies and future storages) shall be distributed as below:

Punjab	Sindh	<u>Balochistan</u>	NWFP	Total
37	37	12	14	100%

5. Industrial and Urban Water supplies for Metropolitan city, for which there were sanctioned allocations will be accorded priority.
6. The need for storages, wherever feasible on the Indus and other rivers was admitted and recognised by the participants for planned future agricultural development.
7. The need for certain minimum escapage to sea, below Kotri, to check sea intrusion was recognised. Sindh held the view, that the optimum level was 10 M.A.F., which was discussed at length, while other studies indicated lower/higher figures. It was, therefore, decided that further studies would be undertaken to establish the minimal escapage needs down stream Kotri.
8. There would be no restrictions on the Provinces to undertake new projects within their agreed shares.
9. No restrictions are placed on small schemes not exceeding 5000 acres above elevation of 1200 ft. SPD.
10. No restrictions are placed on developing irrigation uses in the Kurram/Gomal/Kohat basins, so long as these do not adversely affect the existing uses on these rivers.
11. There are no restrictions on Baluchistan, to develop the water resources of the Indus right bank tributaries, flowing through its areas.

Mr. Shah
16/3/91

W.S. (6/3/91)

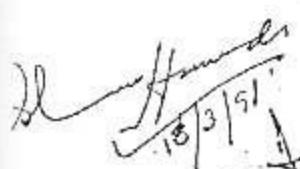
W.M. 13

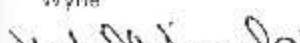
Easid
16-3-91

R.W.
16-3-91

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

12. The requirements of LBOD will be met out of the flood supplies in accordance with the agreed sharing formula.
13. For the implementation of this accord, the need to establish an Indus River System Authority was recognised and accepted. It would have headquarters at Lahore and would have representation from all the four provinces.
14.
 - a) The system-wise allocation will be worked out separately, on ten daily basis and will be attached with this agreement as part and parcel of it.
 - b) The record of actual average system uses for the period 1977-82, would form the guide line for developing a future regulation pattern. These ten daily uses would be adjusted pro-rata to correspond to the indicated seasonal allocations of the different canal systems and would form the basis for sharing shortages and surpluses on all Pakistan basis.
 - c) The existing reservoirs would be operated with priority for the irrigation uses of the Provinces.
 - d) The provinces will have the freedom within their allocations to modify system wise and period-wise uses.
 - e) All efforts would be made to avoid wastages. Any surpluses may be used by another province, but this would not establish any rights to such uses.


C.M. Punjab
Ghulam Hyder
Wyne

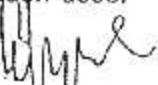

Shah Mehmood
Qureshi
Minister Finance

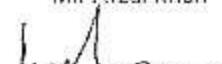

Mazar Ali
Adviser


C.M. Sindh
Jam Sadiq Ali


Muzaffar Hussain
Minister Law

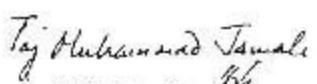

Mohammad Ali Beluch
A.C.S (I&P)/Adviser

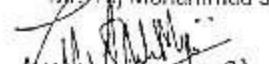

C.M. NWFP
Mir Afzal Khan


Mohsin Ali Khan
Minister Finance

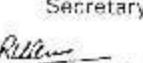

Khalid Aziz
A.C.S.I.P & DI


16/3/91


C.M. Baluchistan
Mir Mohammad Jarnai


Mir Zulfiqar Ali Magsi
Minister Home


Mohammad Amin
Secretary (I&P) - 91


R.U. ANWER

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

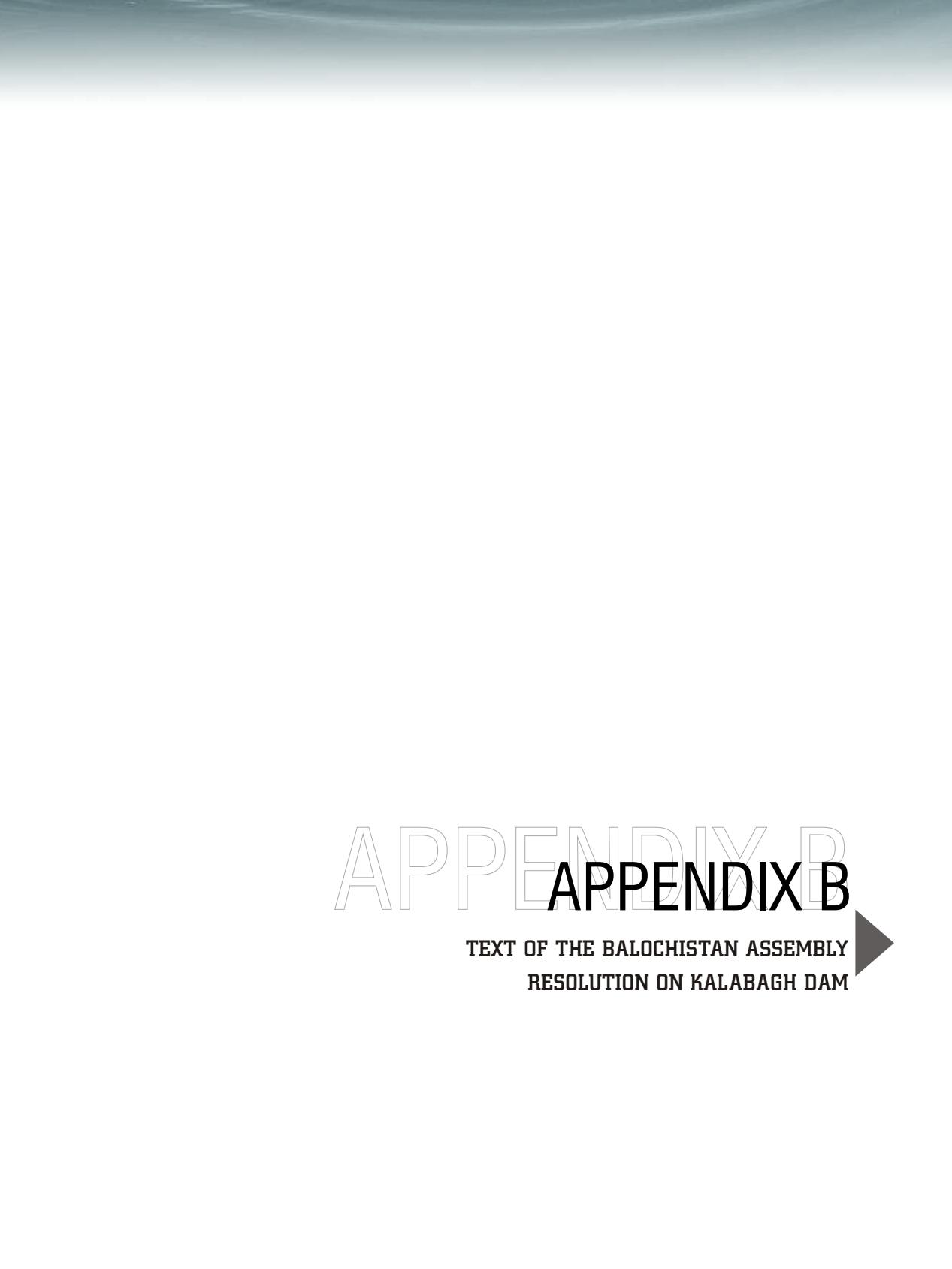
LIST OF PARTICIPANTS

1.	Mr. Ghulam Hyder Wyne	Chief Minister, Punjab
2.	Mr. Jam Sadiq Ali	Chief Minister, Sindh
3.	Mr. Mir Afzal Khan	Chief Minister, N.W.F.P.
4.	Mr. Mir Taj Muhammad Jamali	Chief Minister, Balochistan
5.	Mr. Shah Mehmood Qureshi	Minister Finance, Punjab
6.	Mr. Muzaffar Hussain Shah	Minister Law, Sindh
7.	Mr. Mohsin Ali Khan	Minister Finance, N.W.F.P.
8.	Mr. Zulfiqar Ali Magsi	Minister Home, Balochistan
9.	Mr. Mazhar Ali	Advisor, Government of Punjab
10.	Mr. Muhammad Alam Baloch	ACS (I&P)/Advisor, Government of Sindh
11.	Mr. Khalid Aziz	ACS (P&D), Government of N.W.F.P.
12.	Mr. Muhammad Amin	Secretary (I&P), Government of Balochistan
13.	Mr. Farid Khan	Government of Punjab
14.	Mr. Rana Khursheed Anwar	Secretary (I&P), Government of Punjab
15.	Mr. Pervez Masud	Chief Secretary, Government of Punjab
16.	Mr. M.H. Siddique	Director Regulation, Government of Punjab
17.	Mr. Abdul Aziz Shaikh	Advisor (WD), Government of Sindh
18.	Mr. Allah Bux Baloch	XEN, Government of N.W.F.P.
19.	Mr. Muhamamd Ibrahim	XEN, Government of Balochistan
20.	Mr. Faqir Ahmed Paracha	Secretary (I&P), Government of N.W.F.P.

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

APPENDIX B

TEXT OF THE BALOCHISTAN ASSEMBLY
RESOLUTION ON KALABAGH DAM



BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

قرارداد 50

موئل: 6-10-1994

منجائب: سردار اختر مہنگل، رکن صوبائی اسمبلی بلوچستان

اس ایوان کی رائے ہے کہ صوبائی حکومت و فاقہ حکومت سے درخواست کرے کہ کالاباغ ذیم کی تعمیر کا منصوبہ ترک کیا جائے کیونکہ اس ذیم کی تعمیر سے ایک طرف صوبہ سندھ آپاشی کے لئے پانی سے محروم ہو جائے گا اور دوسری طرف شمال مغربی صوبہ سندھ کے پیشتر علاقے زیر آب آجائیں گے جس کی وجہ سے وہاں کی زمینیں پانی کی زیادتی کی وجہ سے سیم اور تھوڑ کا شکار ہو جائیں گی اس طرح دونوں صوبوں کی قبل کا شت اراضی خیر ہو جائے گی۔ نیز بلوچستان کی قابل کاشت اراضی آپاشی کے لئے پانی سے محروم ہو جائے گی۔

قرارداد منظور ہوئی

نیاز محمد
وزیری
بلوچستان صوبائی اسمبلی

RESOLUTION NO 50 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF BALOCHISTAN
IN THE MEETING HELD ON 6-10-1994

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

APPENDIX C

TEXT OF THE NWFP ASSEMBLY
RESOLUTIONS ON KALABAGH DAM



BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

قرارداد نمبر 4

منجانب:- محترمہ نیگم نیم ولی خان صاحبہ، رکن صوبائی اسٹبلی سرحد

”اس ایوان کی رائے میں کالا باع ذیم کا منصوبہ نہ صرف فنی لحاظ سے ناقص بلکہ مجموعی لحاظ سے اس صوبہ کے علاوہ پاکستان کے اکثریت صوبوں کے مخاذ کے منافی ہے۔

اہذا یہ ایوان مرکزی حکومت سے پر زور سفارش کرتا ہے کہ کالا باع ذیم کے منصوبے کو ترک کیا جائے۔ خصوصاً جب کہ تبادل منصوبوں کی افادیت مثلاً بھاشا ذیم اس منصوبہ سے زیادہ بہتر اور نافع ہے۔“

RESOLUTION NO 04 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF NWFP
IN THE MEETING HELD ON 20-12-1988

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

قرارداد نمبر 251

منجائب:- جناب عبدالاکبر خان صاحب، رکن صوبائی اسمبلی سرحد

”یہ اسمبلی صوبائی حکومت سے سفارش کرتی ہے کہ وہ وفاقی حکومت سے سفارش کرے کہ لاپاش ذیم کے مخصوص بے کوڑک کیا جائے کیونکہ اس سے صوبہ سرحد کے خواہ و کافی لفڑان پختخے کا اندریشہ ہے۔“

RESOLUTION NO 251 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF NWFP
IN THE MEETING HELD ON 30-5-1991

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

قرارداد 26

- منجائب:- (1) جناب حاجی محمد عدیل صاحب، رکن صوبائی اسمبلی سرحد
(2) جناب عبدالاکبر خاں صاحب، رکن صوبائی اسمبلی سرحد
(3) جناب سردار عنایت اللہ خاں گنڈھ پور صاحب، وزیر زراعت سرحد
(4) جناب بہرام خاں ملک صاحب، رکن صوبائی اسمبلی سرحد
(5) جناب انور کمال صاحب، رکن صوبائی اسمبلی سرحد
(6) جناب ملک میاں انور صاحب، رکن صوبائی اسمبلی سرحد
(7) جناب مولانا محمد عصمت اللہ صاحب، رکن صوبائی اسمبلی سرحد

یہ ایوان متنقق طور پر وفاقی حکومت سے مطالبہ کرتا ہے کہ چونکہ کالا باخ ذیم کو منصوبہ خصوصی طور پر ہمارے صوبے کے مناد کے خلاف ہے اور عمومی طور پر پاکستان کے تمام صوبوں کے لئے نقصان دہ ہے۔ یہ ایوان اس سے پیشتر بھی کئی بار متنقق طور پر یہ قرارداد پاس کر چکا ہے کہ کالا باخ ذیم نہ بنایا جائے اور بجلی کی کمی کو دیکھڑ رائے سے پورا کیا جائے۔ جس میں ہمارے صوبے میں بھاشا کے علاوہ کئی ایسے مقامات ہیں جہاں چھوٹے اور بڑے ذیم بنائے جاسکتے ہیں۔

RESOLUTION NO 26 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF NWFP
IN THE MEETING HELD ON 18-11-1993

BRIEFING PAPER
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

APPENDIX D

TEXT OF THE SINDH ASSEMBLY
RESOLUTIONS ON KALABAGH DAM &
GREATER THAL CANAL



Resolution No. 409

PUT BY DR. ABDUL WAHID SOOMRO, MPA.

This House resolves that the proposed Kala Bagh Dam being detriminated to the interest of Pakistan in general and Sindh Province in particular be dropped. Provincial Assembly of Sindh had already passed two resolutions in the regard in the past and this House reaffirm the same. The House therefore recommends to the Federal Government to abandon this project once for to remove the misgivings of the people of Pakistan.

RESOLUTION NO 409 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 14 - 6 - 1994

Resolution No. 414

PUT BY DR. SIKANDAR MANDHRO, MPA

This House resolves that the proposed Kala Bagh Dam being detriminated to the interest of Pakistan in general and Sindh Province in particular be dropped. Provincial Assembly Sindh had already passed two resolutions in the regard in the past and this House reaffirm the same. The House therefore recommends to the Federal Government to abandon this project once for to remove the misgivings of the people of Pakistan.

RESOLUTION NO 414 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 14 - 6 - 1994

Resolution No. 413

PUT BY MR. AHMED ALI KHAN PITAFI, MPA

This House resolves that the proposed Kala Bagh Dam being detriminated to the interest of Pakistan in general and Sindh Province in particular be dropped. Provincial Assembly Sindh had already passed two resolutions in the regard in the past and this House reaffirm the same. The House therefore recommends to the Federal Government to abandon this project once for to remove the misgivings of the people of Pakistan.

RESOLUTION NO 413 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 14 - 6 - 1994

Resolution No. 423

PUT BY MR. GHULAM QADIR PALIJO, MPA

- This House resolves that the proposed Kala Bagh Dam being detriminated to the interest of Pakistan in general and Sindh Province in particular be dropped. Provincial Assembly Sindh had already passed two resolutions in the regard in the past and this House reaffirm the same. The House therefore recommends to the Federal Government to abandon this project once for to remove the misgivings of the people of Pakistan.

RESOLUTION NO 423 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 14 - 6 - 1994

Resolution No. 01

PUT BY MR. MUMTAZ ALI BHUTTO, MPA

This Assembly resolves and recommends to the Government of Sindh to approach the Federal Government to discontinue the construction of Kala Bagh Dam Scheme as the same will cause very serious harm to Sindh.

RESOLUTION NO 01 PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 14 - 6 - 1994

.....BRIEFING PAPER.....
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

**JOINT RESOLUTION BY MR. NISAR AHMED KHUHRO
LEADER OF THE OPPOSITION AND SYED SARDAR AHMED,
SENIOR MINISTER HOME**

We move a joint Resolution that the Assembly does recommend to the Government of Sindh to make a complaint to the CCI under Art 155- of the Constitution of the Islamic Republic of Pakistan against the construction of the Greater Thal Canal and to request the Federal Government to stop the construction of the said canal as the province of Sindh has legitimate grievances which need to be redressed.

(Signed)

Nisar Ahmed Khuhro

(Signed)

Syed Sardar Ahmed

RESOLUTION PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 28 - 2 - 2003

.....BRIEFING PAPER.....
FOR PAKISTANI PARLIAMENTARIANS
Issues of water Resources in Pakistan

**RESOLUTION BY MR. MUHAMMAD HUSSAIN KHAN
MINISTER FOR LOCAL GOVERNMENT, KATCHI ABADIES, & SPATIAL DEVELOPMENT**

I, Muhammad Husain Khan move this resolution of recent public interest that the unanimous resolution passed by this Assembly on 28.02.2003 has not been given due weight and consideration by the Federal Government. On the contrary in the PSDP document a sum of Rs.1500 million has been earmarked for construction of Greater Thal Canal meaning thereby that no importance is given to the unanimous resolution of this Assembly.

And therefore this house is of the opinion and recommends to the Federal Government that the unanimous resolution passed by this Assembly on 28.2.2003 be implemented in letter and spirit as early as possible.

This house is also of the opinion and hereby resolves that the Construction of Greater Thal Canal should be discontinued immediately, failing which further line of action in this regard would be announced as Construction of Greater Thal Canal is depriving this Province of its legitimate water.

(Signed)

(MUHAMMAD HUSSAIN KHAN)
Minister for Local Government,
Katchi Abadies and Spatial Development,
Government of Sindh

RESOLUTION PASSED UNANIMOUSLY
IN THE PROVINCIAL ASSEMBLY OF SINDH
IN THE MEETING HELD ON 19 - 6 - 2003



91/2 E, Model Town, Lahore-54700, Pakistan.
Tel: (+92-42) 111 123 345 Fax: (+92-42) 585 4755
Email: info@pildat.org URL: www.pildat.org