



Meeting Report

Purpose of the Meeting	Water Experts Meeting On “Water Resources Challenges Of Pakistan”
Date & Day	1 st April, 2016 (Friday)
Location	Central Library, MUET Jamshoro
Meeting Participants	List of participants attached as annex-IV.
Key Points Discussed	
Meeting started with recitation from holy Quran followed by mutual round of introduction of the participants.	
<p>1- Dr. Bakhshal explained the objectives of the meeting. He described that Pakistan is facing several water challenges and issues to which we need to find solutions. This expert consultation was organized with this objective in mind. He also gave a brief presentation on USPCAS-W’s overall goals, objectives and scope of work.</p>	
<p>2- Mr. Idrees Rajput gave a presentation on “Water Allocation and Distribution across Provinces”, emphasizing on issues related to political economy of water with reference to Water Accord of 1991. His presentation comprised of three parts; i) Water Resources, ii) Water Distribution and iii) Construction of Large Dams. (Presentation attached as annex-I).</p>	
<p>3- Mr. Fazlullah Qureshi gave presentation on “Water Governance and Institutional Performance” and framed his discussion within the context of agricultural productivity and poverty eradication. His presentation also comprised of three sections; i) water management, ii) poverty in Sindh and Pakistan and iii) urban water supply. In his presentation, he discussed section wise issues and proposed recommendations. (Presentation attached as annex-II).</p>	
<p>4- While summarizing the meeting, Dr. Aslam Chaudhry synthesized the following messages emanating from the two presentations. These messages were:</p> <ul style="list-style-type: none"> i- Use the unexploited potential of GWR and rainfall judiciously in view of the future water shortages the country is likely to face. Data shows that Pakistan still has the potential to exploit 14 MAF from GWR and 12 MAF from rainfall harvesting. This amounts to a total of 26 MAF which is more than the storage capacities of 4 KB dams. ii- Is there something we can do to reverse the declining capacity of our existing reservoirs, while waiting for the construction of a new dam, if it will ever happen? By 2025, both Tarbela and Mangla will have lost their storage capacity around 6 MAF. iii- Promote conjunctive use of surface and groundwater, where possible. And this is evident from the relatively high growth rate of cropping area in Punjab as compared to Sindh. 	



- iv-** The water governance in general has been poor in Pakistan, but more so in the Sindh province.
- v-** Water accord is not being implemented in its letter and spirit, and important issue is that water shortages are not equally shared. Serious trust deficit exists among provinces, and all governments over the last several decades lacked political will to resolve the issue.

He proposed a Framework of Action identifying eight broader issues touched upon in the two presentations and invited suggestions from the participants about the research needs to bridge the knowledge gap for finding plausible solutions to these issues (Framework for Action is attached as annex-III).

5- A lively discussion ensued focusing on questions such as:

- How to manage water related issues on daily basis?
- Whether KBD is technically feasible or not?
- How to improve water productivity and water efficiency etc.
- Addressing the issue of water quality for future.
- Revisiting water accord: will it include environment, climate change etc.

6- During the course of discussion, participants identified several research projects, following being the most notable;

- i-** Study on the impact of water shortages on cropping intensity and poverty reduction.
- ii-** Matching cropping patterns to water availability and water shortages.
- iii-** Value of water in different uses (among crops), and its linkages to agricultural water pricing.
- iv-** What issues and factors, other than water allocation and distribution, could be included in the water accord?
- v-** Assessment of cropping statistics and agricultural land use patterns in Sindh.
- vi-** Options for improving water use efficiency, and factors that will facilitate adoption of irrigation technologies.
- vii-** Estimation of crop water requirements.
- viii-** Revisiting the groundwater assessment data.
- ix-** Study on sea water intrusion (below Kotri Barrage).
- x-** Creating and updating the water database.
- xi-** Study on crop zoning and water pricing policy
- xii-** Study on capacity building needs and gaps of government institutions, and how the Center could help.

7- Participants were also informed that a Council of Research and Policy is being established. This will be a multi-stakeholder forum to set-up the research agenda and help in its



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implementation. This meeting could be viewed as a starting point towards the establishment of the council.

- 8- While closing the meeting, Dr. Aslam Uqaili emphasized that the Center shall establish and update a data bank in the field of water accessible to all researchers in future. He also appreciated the need for organizing such dialogues on frequent basis.

Meeting ended with vote of thanks.



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Annex – I

DATED: APRIL 01, 2016

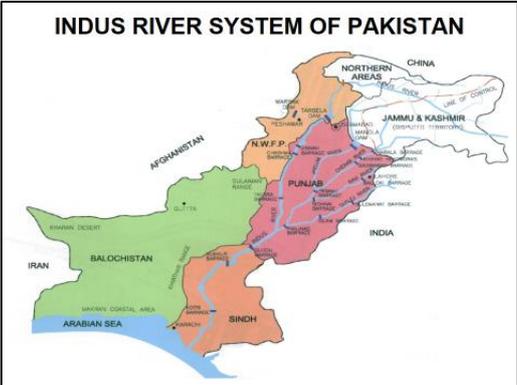
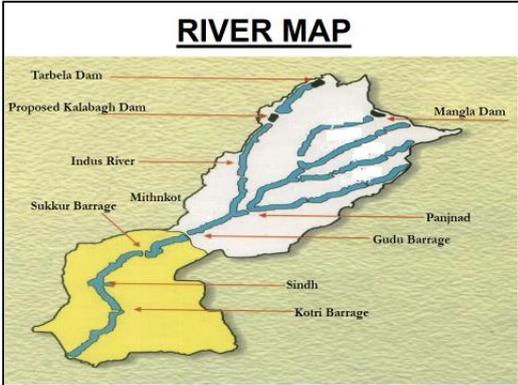
INTER-PROVINCIAL WATER ISSUES OF PAKISTAN

MUHAMMAD IDRIS RAJPUT

1. Water Resources.
2. Water Distribution.
3. Construction of Large Dams.

I. WATER RESOURCES

- SOURCES OF AVAILABILITY**
1. Surface flow (rivers).
 2. Rainfall.
 3. Ground Water.



1. SURFACE FLOW

In bcm

River	1976-77 to 2008-09		
	Max	Min	Average
Indus	138.4	81.9	111
Jhelum	39.5	14.7	28
Chenab	40.3	23.3	32.6
Sutlej (Beas)	13.11	0.02	3.24
Ravi	13.64	0.83	5.34
			180.18

180.18 bcm = 146.13 MAF

Source: *Handbook on water statistics of Pakistan (December 31, 2011).*

2. Rainfall

Average annual rainfall	11.4 inches
Development potential	17 MAF
Already developed on 500 small dams	<u>5 MAF</u>
Potential for development	12 MAF



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3. Ground Water

Development potential	56 MAF
Already developed	<u>42 MAF</u>
Remaining	14 MAF

POTENTIAL

	Present	Additional Possible	Total
Surface flow	62.3	13.0	75.3
Ground Water	42.0	14.0	56.0
Rainfall	5.0	3.0	8.0
	109.3	30.0	139.3

WATER USES

Irrigation	:	95%
Industries	}	5%
Drinking		

PER CAPITA SURFACE WATER AVAILABILITY

Year	Population in million	Availability M ³
1951	34	5300
1961	46	3950
1971	65	2700
1981	84	2100
1991	115	1600
2000	148	1200
2013	207	850
2025	267	659

Source: Handbook on water statistics of Pakistan (December 31, 2011).

They say that threshold is 1,000 m³ for normal conditions. If less than 1,000 m³ per person it is Severe shortage.

If it is less than 500 m³ per person it is SCARCITY situation.

PER CAPITA AVAILABILITY M³

Country	1990	2025
Kuwait	75	57
Saudi Arabia	306	113
UAE	308	176
Israel	461	264
Pakistan	1623	659
Iran	2025	816

II. WATER DISTRIBUTION

Inter-provincial water disputes between Sindh and Punjab dates back to British Rule when new canals, barrages and dams were planned, constructed or envisioned. First Committee to resolve the dispute was Anderson Committee in 1935, followed by Rau Commission in 1941 and signing of a draft agreement in 1945.



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The problem became more complex when immediately after independence, India cut off supplies to Pakistan Canals with headworks on three eastern rivers. This led to Indus Basin Treaty in 1960, with three eastern rivers viz Sutlej, Beas & Ravi given to Indian for their exclusive use. Replacement infra-structure was built in Pakistan to provide water to canals which were deprived supplies from 3 eastern rivers.

Following four Committees/ Commissions were constituted to resolve post-treaty distribution problem:-

- | | |
|-----------------------------|------|
| 1. Akhtar Hussain Committee | 1968 |
| 2. Fazale Akbar Committee | 1970 |
| 3. Anwar-ul-Haq Commission | 1976 |
| 4. Haleem Commission | 1983 |

But water distribution problems were not resolved.

REASONS OF DISPUTE

- 1)Commodity is short.
- 2)Injustice in distribution.
- 3)Fear of future impact.

PARTIES TO DISPUTE

1)UPPER RIPARIAN.

- (i.) Powerful.
- (ii.) Aggriever.

2)LOWER RIPARIAN.

- (i.) Weak.
- (ii.) Aggrieved.

PSYCHE OF UPPER RIPARIAN

- 1) First fulfill his demand and then leave rest down.
- 2) Develop new areas.
- 3) Not to enter into agreement. If circumstances compel to enter into agreement, violate the agreement on one pretext or other.

PSYCHE OF LOWER RIPARIAN

- 1) Fear that upper riparian must be drawing more than its share.
- 2) Protect cultivation on developed areas.
- 3) Fear that development in upper area will reduce share of lower riparian.

A unanimous Water Accord was signed in 1991 with the efforts of Nawaz Sharif the then Prime Minister of Pakistan.

But there is dispute between provinces on its implementation.

The cause of dispute is said to be Kalabagh dam



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Water distributed between provinces for gauged canals was 114.35 MAF against availability of 105 MAF.

It is said that this availability was increased to 114 MAF as under:-

Availability gauged Canals	105 MAF
Raised Mangla	3 MAF
Construction of KBD	<u>6 MAF</u>
	114MAF

Punjab claims that since KBD has not been constructed, distribution cannot be done as per 10 daily allocations given in Water Accord.

When asked: Is there any clause in Water Accord that implementation of this Accord is subject to construction of KBD?

They say there is no clause in Water Accord, but while negotiating the Accord provinces agreed to construction of KBD. Now they are morally bound for its construction.

Since it is not constructed excess water distributed is not available, so distribution cannot be done on Accord and it should be done on basis of 105 MAF available at time of Accord for gauged canals.

- ISSUES (SINDH)**
- Sharing.
 - Storages.
 - Studies for downstream Kotri needs.
 - Filling Mangla Dam.
 - Operation of Link Canals.

SHARING

REQUIREMENTS

- i. Sharing should be done as per ten daily allocations as approved by CCI forming part and parcel of the Accord.
- ii. Shortages should be shared by all provinces.

WHAT IS BEING DONE?

- i. Till 2003 Sharing for availability below Accord allocation was being done on the basis of average uses for 5 years from 1977 - 82 (historic uses) rather than on the basis of 10 daily statements approved by CCI which was clear violation of Accord. Now Advisory

Committee of IRSA since April 09, 2003 has adopted a three stage formula for distribution as under:-

Availability	Distribution
(i) Upto 105 MAF	As per average distribution done during 5 years period from 1977 to 1982 or so called historic used basis.
(ii) From 105 - 117.35 MAF	Upto 105, as per above historic basis plus from 105 to 117.5 MAF as per accord allocation basis.
(iii) Above 117.35 MAF	Upto 117.35 as per accord allocation basis plus above 117.35 MAF in ration of 37:37:14:12 percentage basis between Punjab, Sindh, NWFP and Baluchistan Provinces.



Above is a further violation of Accord. Under its charter IRSA has to implement the Accord but it is flagrantly violating the Accord.

- ii. NWFP and Balochistan have been exempted from sharing shortages by IRSA which is clear violation of Para 14(a) and (b) of Accord which prescribes sharing on all Pakistan basis.

The most critical factor for construction of reservoirs is surplus water availability. This can easily be determined if flows were uniform. But there is vast variation in annual flows. The maximum recorded was 186.79 MAF in 1959-60 and the minimum recorded was 97.17 MAF in 2001-02.

It is generally argued that over 35million acre feet of water goes down to sea every year on average basis. This water must be utilized by storage in reservoirs. Since surplus water is to be stored in Kharif let us calculate its availability for period 2000 to 2014 (Kharif).

WATER GOING DOWN TO SEA BELOW KOTRI

Year	MAF
2000-01	0.745
2001-02	1.924
2002-03	2.152
2003-04	20.165
2004-05	0.286
2005-06	25.331
2006-07	21.722
2007-08	15.747
2008-09	5.824
2009-10	4.066

Year	MAF
2010-11	54.52
2011-12	14.27
2012-13	5.989
2013-14	18.22
2014-15	6.86

STORAGES

CLAUSE-6 OF WATER ACCORD

“The need for storages, whenever feasible on Indus and other rivers was admitted and recognized by the participants for planned agricultural development.”

GUIDING POLICY

1. Priority of construction of new reservoirs comes after meeting Accord allocations of existing canals and downstream Kotri needs and other commitments.
2. Future storages have to be planned in consideration of the surplus water available, in view of the fact that the flow pattern of western rivers is highly erratic and surplus water for storage is not available every year.

Thus surplus water is not available for storage. However, if we use policy of conserving every drop of surplus water, surplus water is available in flood years only. This can be stored in a big capacity dam and can be used in subsequent dry years. A potential site is available at Kartzara/ Skardu.

If there dams on Indus at Basha, Kalabagh and Akhori are built, there will be no problem in flood years. But in dry years, these will not be filled and agriculture and industry dependent on these will suffer if not filled. If filled Sindh will suffer as the lowest riparian, as its Kharif supplies will be significantly curtailed, due to filling of dams. There will be huge hue and cry and provincial harmony will be completely disturbed.

STUDIES FOR DOWNSTREAM KOTRI NEEDS

Clause of 7 of Water Accord reads as under:-

The need for certain minimum escapage to sea, below Kotri to check sea intrusion was recognized. Sindh held the view, that the optimum level was 10 MAF, which has 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 downstream Kotri

Issue	Need for certain minimum escapage to sea, below Kotri was recognized.
Discussion	Sindh held the view, that the optimum level was 10 Maf, which was discussed at length, while other studies indicate lower/higher figures.
Decision	It was, therefore, decided that further studies would be undertaken to establish the minimal escapage needs downstream Kotri.



Since 1991, studies could not be started due to difference of opinion on T.O.R. Upper riparian insisted on conduction of study report for single term of reference of "sea intrusion". Lower riparian emphasized study on all needs as per decision par of clause. However, during 2005 two studies were started through international consultants under supervision of international panel of experts and they have given their reports.

Panel of experts who monitored two studies have given following recommendations for downstream Kotri needs:-

- (i) Flow of 5000 cusecs throughout the year downstream of Kotri.
- (ii) A quantum of 25 maf in 5 years downstream of Kotri.

It is pointed out that there is no mention of "sea intrusion" in TOR of two studies. There is mention of "sea water intrusion". The tow terms have different significance. In sea water intrusion salinity effect by sea water entering into river is found which is done under these studies.

In sea intrusion effect of sea tides on erosion of coast line is seen. For checking this coastal erosion flow in river is required to counter balance. No study for water requirement to counter act sea intrusion has been done. Thus downstream Kotri requirement worked out by two studies are less than actual requirements.

FILLING MANGLA DAM

- Dams are filled when water is surplus.
- But Mangla Dam is filled in April and May, when there is shortage in Sindh. Sometimes it is filled even in February and March. This causes great setback to early Kharif sowing in lower riparian provinces.

OPERATION OF LINK CANALS

- Two Link Canals viz Chasma - Jhelum and Taunsa -Punjad were constructed to divert water from Indus river to tributary area.
- These are enabling devices to take surplus water from Indus river to tributary area when it is short of requirements.
- However, these divert water from river when there is shortage in Sindh and there is adequate water in tributary area which is confirmed by the fact that water is stored in Mangla dam.

ISSUES (KP)

KP is unable to utilize its sanctioned allocation of 8.78 MAF due to non-development of infrastructure. This is being utilized by other provinces. So they should give financial compensation to KP.

14 (c). 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.

ISSUES (BALUCHISTAN)

Sindh delivers less water to Baluchistan during periods of crop sowing. They should deliver their due share and pay compensation for short delivery.

According to Sindh, problem is due to exemption given to Baluchistan in sharing shortages and constraint in head regulator of NW canal at Sukkur barrage. This shortage is being shared proportionately.



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III. CONSTRUCTION OF LARGE DAMS

WHY WE NEED A NEW DAM?

1. Live storage capacity of Tarbela dam has reduced from 9.3 MAF to 6.62 MAF i.e. 29%.
2. Live storage capacity of Mangla dam has reduced from 5.3 MAF to 4.495 MAF i.e. 15%.
3. As a result, all water stored in Khairf is consumed in ensuing Rabi and no water remains for early Kharif. There are shortages in early Kharif.

Reduction is capacity in 2010

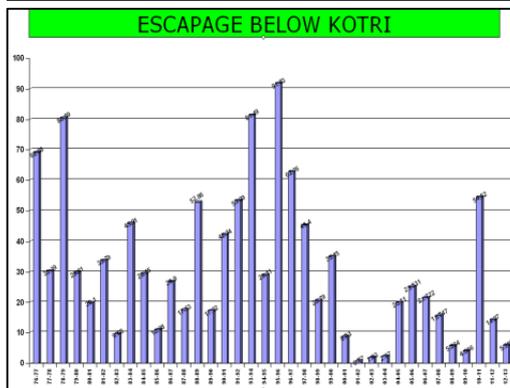
Tarbela dam	2.68 MAF
Mangla	<u>0.805</u> MAF
	3.485 MAF

Upto year 2025, the reduction in capacity will be about 6.0 MAF.

So we need a replacement dam. On the other hand water going down to sea below Kotri in recent past is as under:-

Year	Flow in MAF
2000-01	8.83
2001-02	0.77
2002-03	1.93
2003-04	2.37
2004-05	20.11
2005-06	25.331
2006-07	21.722

Year	Flow in MAF
2007-08	15.474
2008-09	5.824
2009-10	4.066
2010-11	54.52
2011-12	14.27
2012-13	5.898
Average in post Tarbela is 30.87 MAF	



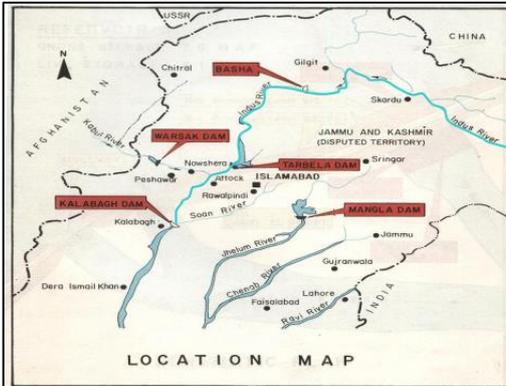
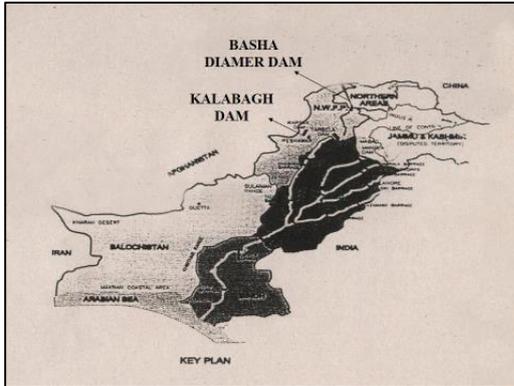


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Surplus water is available in flood years. It can be stored and used to meet early Kharif shortages.

WHY WE OPPOSE KALABAGH DAM AND AGREE FOR BASHA DAM?



1. Kalabagh Dam is situated in Punjab near Kalabagh town.
2. It is the last potential site for a dam on Indus.
3. There is a proposal of constructing two canals of 8 MAF capacity against its live storage capacity of 6.1 MAF.

4. It controls flows of Kabul river, Soan and Harrow hill torrents and Indus itself.
5. Being in Punjab there are chances of its filling in shortage years.
6. Its power potential is only 2500 MW which is to be increased to 3500 MW.

1. Basha dam is situated in KP/G.B.
2. There is no potential of construction of any canal as being hilly area there is no land for cultivation.
3. It controls flow of only Indus.

4. Being in KP/G.B. there are no chances of its manipulation.
5. Its storage capacity is 6.4 MAF and power generation capacity is 4500 MW.



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The then President of Pakistan announced on January 17, 2006 for construction of Basha Dam. A period of over nine years has passed but its construction has not been started.

Its construction should be started immediately.

WHAT ARE PROSPECTS OF KBD?

1. After construction of Basha dam and its operation.
2. Canals are removed from KBD.
3. Trust building in provinces that Punjab will not fill KBD in shortage years or fill after irrigation needs of provinces are met.

THANKS

Annex – II



Seminar
"Irrigation Water Management in Sindh-Issues and Options"
KARACHI DATED 23rd August 2014

Presentation By:- Mr. Fazlullah Qureshi

"Water-Governance and Institutional Performance"

Outline of the Presentation

- Water Management
- Poverty in Sindh and Pakistan
- Urban Water Supply

Section # 1

Water Management

Dated: July,2014

TABLE # 1
1991 Water Accord Apportionment - Dt:-16-03-1991 (MAF/BCM)

Province	Kharif	Rabi	Total	%age Share	Unit
Punjab	37.07 (45.60)	18.87 (23.21)	55.94 (68.81)	49%	MAF (BCM)
Sindh	33.94 (41.75)	14.82 (18.23)	48.76 (59.98)	43%	MAF (BCM)
Balochistan	2.85 (3.51)	1.02 (1.25)	3.87 (4.76)	3%	MAF (BCM)
Sub total S&B	36.79 (45.26)	15.84 (19.48)	52.63 (64.74)	46%	MAF (BCM)
NWFP	3.48 (4.28)	2.30 (2.83)	5.78 (7.11)	5%	MAF (BCM)
Total:	77.34 (95.13)	37.01 (45.54)	114.35 (140.65)	100%	MAF (BCM)



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TABLE # 1
Continue

Notes:-

- (1) 1 BCM = 0.81 MAF 1.MAF = 1.23 BC3 (Billion Cubic Meter)
- (2) Source – "Water Accord 1991"

Dated: July, 2014

TABLE # 2
Periodical Provincial Share in "Annual Canal Withdrawals" (BCM)
Viz a Viz

Overall Shares as per Water Accord 1991
Punjab 68.81 (49%) : Sindh & Balochistan 64.74 (46%) Total : 140.65

Year	Punjab	Sind - Bal:	Total = 100
1967-68	63.21 (57)	45.03 (40)	111.00
1970-71	54.33 (52)	47.20 (45)	104.35
1974-75	52.16 (50)	48.74 (47)	103.95
1980-81	67.62 (51)	60.79 (46)	131.99
1985-86	62.32 (53)	52.80 (45)	118.61
1990-91	67.39 (54)	53.91 (43)	124.98
1995-96	66.02 (56)	46.52 (40)	117.24
2000-01	68.06 (52)	58.00 (44)	132.08
2007-08	63.59 (52)	54.25 (45)	121.51
2010-11	62.40 (54)	48.22 (42)	116.22

TABLE # 2
Continue

Source: Hand Book on water Statistic in Pak (M.O. W&P) Dec. 2011.

Notes:- Figure in brackets shows %age of actual distribution of total water among the provinces.

Remarks /Findings:
As per water accord Sindh/Balochistan VS Punjab %age water sharing is 46:49, whereas actual withdrawal shows Punjab withdrawal over 50% every year which in selected year goes upto 56 to 57%, where as Sindh/Balochistan got its share only twice otherwise it always drawn less than its share
The reason could be:
- Mismanagement at IRSA level.
- Poor management at Provincial level.
- Theft/losses between Taunsa and Guddu.
- More Transmission losses due to higher Temperatures in Sindh.

Conclusion: Shortages are not equally shared.

Recommendations:
- Solution: IRSA's act be modified to enhance its implementation and monitoring capacity by appointing independent observes and/or installing automatic systems for calculation .

Dated: July, 2014

TABLE # 3
"Time Series Tube Wells Installation from 1970-71 to 2011-12" (000)

Year	Punjab (Private)	Sindh (Private)
1970-71	89.5	4.1
	(81.8)	(4.1)
1980-81	172.1	15.4
	(161.9)	(13.0)
1990-91	295.9	21.4
	(285.5)	(17.2)
2000-01	610.8	53.9
	(607.3)	(41.8)
2005-06	857.8	94.5
	(855.2)	(80.5)
2011-12	954.7	96.2
	(953.3)	(82.0)

Source: Agriculture Statistics of Pakistan (Various Editions)

Conclusion:- Growth of Tube wells in last 40 years is 11 times in Punjab, where as in Sindh it is 24 times, numbers wise it has accelerated only after 1991-92 (water Accord Year).

Dated: July, 2014

TABLE # 4
Area under Major Crops in Sindh and Punjab (Lac Acres)
(A) Sindh in Selected 5 years Averages:

Crop	1950-55	70-75	90-95	05-10
Wheat	12.90	19.70	26.30	24.80
Rice	13.96	16.99	14.59	15.93
Sugar Cane	0.22	2.17	6.17	5.95
Cotton	9.52	11.19	12.05	14.87
Total	36.60	50.05	59.11	61.55

TABLE # 4
Continue

Area under Major Crops in Sindh and Punjab (Lac Acres)
(B) Punjab Area Under Major Crops (Area Lac Acres)

Crop	1950-55	70-75	90-95	05-10
Wheat	76.70	106.80	145.80	163.30
Rice	8.41	8.02	33.07	45.05
Sugar Cane	4.74	10.67	16.20	16.98
Cotton	21.89	36.05	56.01	59.13
Total	111.74	161.54	251.08	284.46

TABLE # 4
Continue

***Source:**
*Agriculture Statistics of Pakistan (Various Editions)

***Findings:**
*Area in Sindh in Last 60 years has increased by 68% where as in Punjab it has increased by 154%age.Crops/ Province wise figures are as under:
*Major Crops %age increase in last 60 years

	Punjab	Sindh
Wheat	113%	92%
Rice	436%	14%
Sugar Cane	258%	2605%
Cotton	170%	56%

Dated: July, 2014

TABLE # 5
%age Periodical Growth of major Crops Area in "Sindh and Punjab"

Crop	Punjab			Sindh		
	1970-71-90-91	1990-91-11/12	1970-71-11/12	1970-71-90/91	1990-91-11-12	1970-71-11/12
Wheat	30.1%	13.5%	47.7%	25.8%	Nil	25.3%
Rice	71.0	35.7	132.2	1.3	Nil	Nil
Sugarcane	10.5	44.7	59.9	220.3	(-325.0)	140.5
Cotton	62.5	19.3	93.7	27.0	(-314.8)	8
Overall	39%	19%	66%	26%	(-38%	16%



TABLE # 5
Continue

Source: Agriculture Statistics of Pakistan, Ministry of Agriculture (Food Security and research)

Findings (Table 4 and 5): Since last 40years area under crop in Punjab is regularly growing where as in Sindh it almost static or -ve except in sugarcane but in recent years it has also registered downward trend.

Reasons: Table 4 & 5:

- Use of tube well water in Punjab.
- Under reporting of area in Sindh.
- Mismanagement of water distribution at national and Sindh provincial level.
- Conversion from low consumption to high consumption water use cropping order.
- Lack of Agri: Extension Facilities.

Recommendation: Improved Governance, better Public Services, no political intervention and Accountability in every sphere.

Dated: July, 2014

TABLE # 6
Major Crops 2011 "Yield Per Hectors (KGs)" In Selected Countries

Crop	Sindh	World Avg.	USA	China	India	Egypt	Brazil	Pak.
Wheat	3,585	3,005	3,118	4,750	2,830	(Germany) 7,310	(UK) 7,681	2,553
Rice(Paddy)	3,555	4,404	7,921	6,686	3,531	9,567	(Korea) 7,283	2,396
Sugarcane	52,900	70,542	75,484	66,518	69,247	(Columbia) 119,620	76,448	35,997
Maiz	NA	5,218	9,592	5,460	4,432	7,270	4,375	3,558

TABLE # 6
Continue

Source: FAO/Agriculture statistics of Pak: 2011-12(a) Directorate of Agri. Extension Govt of Sindh

Findings:

- In Sindh average yield are best in Pakistan. One reason could be under reporting "area under crop" and/or are better natural environment
- There is more scope, because even at present the average production in Pakistan (and Sindh) is almost half of the world best yields.

Recommendation:

- Better / Improved agriculture extension practices through Private / Public participation.
- Aggressive +ve role of farmers association other than agitation.

Dated: July, 2014

TABLE # 7
Selected Years Data wrt Area under crop, canal water Diversion and collection of "Land Revenue" and "Water Rate"

Year	Area under Crop (Lac Hectors)		Total Land Revenue (Rs. Millions)	Water Diversion		Water Rate (Rs: Million)	L.R per Cropped Hector (Rupees)	Water Rate/Per BCM per Hector (Rupees)
	Total	Major Crops		Total BCM	40% of Total BCM			
1970-71	32.4	20.4	28.40	45.10	18.04	59.01	8.76	3.27 Rs. 18.2
1980-81	38.2	25.03	41.74	57.10	22.84	224.66	10.93	10.71 Rs. 58.8
1990-91	39.8	25.23	33.36	51.21	20.48	228.28	9.05	11.15 Rs. 57.4
2000-01	31.4	21.14	157.57	53.80	21.52	632.72	50.18	29.40 Rs. 201.5
2005-06	35.2	23.46	123.06	43.87	17.55	338.15	35.00	19.27 Rs. 96.1
2011-12	30.2	23.32	207.66	45.40	18.16	204.48	68.76	11.26 Rs. 67.7

TABLE # 7
Continue

Source:

- Agriculture Statistics of Pakistan.
- Hand books on water statistics and Govt of Sindh Budgets.

Note:

- Column # 9 = Col: 7 ÷ Col: 6 = Rs Million Per BCM
- Col: 7 ÷ Col: 2 = Rs. Per Hector

Findings:

- There appears no relationship between cultivation of crops and collection of revenues.

Recommendation:

- Latest Technology based system be introduced for Assessment of cropped area, Distribution of water and Assessment and collection of Revenue by independent Agency / Authority and strong banking system.

Dated: July, 2014

TABLE # 8
"Broad Comparative Parameters of Sindh and Punjab Irrigation System"

	Punjab	Sindh
Head Works & Barrages	13 No	03No
Main Canals	25No	14No
Length of Main and Link Canals,Barrages, Distributaries, Minors	31,551 KM (19,594 Miles)	21,310 KM (13,234-Miles)
Off take capacity of Main Canals	1,30,000	1,34,307
Off take capacity of link Canals (Cusecs)	1,10,000	Nil
Gross Covered Area	23.35m Acres	14.39m Acres
Water courses	58000 (out lets)	42,000

Source:
Hand Book on Water Statistics of Pakistan (WCAP, M.O Water and Power – final report Dec 2011).



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TABLE # 9 (1)
"Revenue Receipt and Expenditure of Irrigation and Drainage"
SINDH AND PUNJAB

"A" Rev: EXP: (Rs. In Million)

YEAR	PUNJAB				SINDH			B.E VS R.E/ Ac Variation
	B.E	R.E	Account	Variation	B.E	R.E	Account	
2008-09	—	—	—	—	7,897	7,533	6526	(-)17%
2009-10	—	—	—	—	8,435	9,052	NA	(+)7%
2010-11	—	—	7,696	—	9,472	16,980	14,416	(+)52%
2011-12	8,409	9,113	—	(+)8%	11,295	13,737	NA	(+)22%
2012-13	8,936	—	9,959	(-)11%	12,865	14,690	12,755	Negl:
2013-14	9,804	12,561	—	(+)28%	14,359	14,436	NA	Negl:
2014-15	12,428	—	—	—	15,974	—	—	—

Dated: July, 2014

TABLE # 9 (2)
"Revenue Receipt and Expenditure of Irrigation and Drainage"
SINDH AND PUNJAB

"B" Revenue Receipt

YEAR	PUNJAB				SINDH			B.E VS R.E/ Ac Variation
	B.E	R.E	Account	Variation	B.E	R.E	Account	
Year	—	—	—	—	—	—	266	(2007-08)
2008-09	—	—	—	—	500	502	347	(-)30%
2009-10	—	—	—	—	770	600	NA	(-)22%
2010-11	—	—	2,675	—	600	400	187	(-)69%
2011-12	2,869	2,499	—	(-)13%	500	575	205	(-)59%
2012-13	2,949	NA	1,162	(-)59%	600	298	188	(-)69%
2013-14	2,762	1,610	—	(-)42%	848	291	—	(-)66%
2014-15	3,099	—	—	—	628	—	—	—

TABLE # and 9 (1 & 2)
Continue

- **Source:**
 - White Paper: Govt of Punjab Budget and Sindh Govt :Budget Vol:
- **Findings:**
 - Rev EXP of Sindh V Punjab was almost identical in early 20s, it exceeded in 09-10 and now it is almost 25% more than Punjab.
 - In past seven years Sindh Exp: almost doubled without significant improvement in system delivery.
 - On Income side Punjab Revenue are 14 times high (10-11 Account) and 6 times high in 13-14 RE.
 - Revenue Receipt in Sindh on decrease, down from Rs.347m (08-09Ac) to Rs: 188m(12-13Ac) OR from Rs.600m(RE 9-10) to Rs:291m RE(13-14)
 - The revenue estimates given in the Budget were never achieved and short fall in number of years was almost 69%.
 - Increase of Revenue Receipt Punjab has also failed to achieve the Budget target.
- **Solution:**
 - It is example of "Poor" or "No Governance." Whole system needs administrative and financial over hauling to make it sustainable, Water charges in all sectors i.e Irrigation, Potable and Industrial uses need, to be increased and properly charged.

THANK YOU
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Annex – III

Framework for Action: Water Research Agenda
US-Pakistan Center for Advanced Studies in Water, MUET, Jamshoro

Issues	Knowledge Gaps (what we know, and what we don't know)	Research Priorities (1-2 items per issue)
1. Managing groundwater resources (including updated assessment?)		
2. Reversing decline of storage capacity of existing reservoirs		
3. Optimizing the use of rainwater		
4. Encountering the threat of sea water intrusion		
5. Enhancing agricultural water productivity/irrigation efficiency		
6. Rationalizing irrigation water charges (efficiency, equity and sustainability)		
7. Improving water governance		
8. Revisiting water accord		

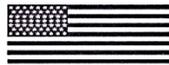
The following issues are extremely important but we did not discuss: (1) safe drinking water, (2) water quality, (3) adaptation/disasters



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Annex – IV



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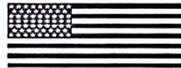
U.S.–Pakistan
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Water Experts Meeting on Water Resources Challenges of Pakistan

1st April, 2016 (Friday)

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