



## Pakistan Needs a Large Dam: The Running Saga of Diامر Bhasha Dam

**With a brewing water crisis, Pakistan must build a large dam on top priority.**

### About IPR

Institute for Policy Reforms is an independent and non-partisan think tank established under Section 42 of the Companies Ordinance. IPR places premium on practical solutions. Its mission is to work for stability and prosperity of Pakistan and for global peace and security. IPR operations are supported by guarantees from the corporate sector.

Is the decline in agriculture production in 2015-16 an indication of things to come?

Despite incentives by GoP, total agriculture production fell by 0.19%. The growth rate for crops is -6.25% and -7.2% for 'important crops'. Cotton fell by over 21%. This drop is alarming in itself. The fear is that it is not a one off reversal.

A number of key agriculture indicators show that they peaked some years ago and have been in decline since. Many issues affect agriculture. These include seed quality and virus as well as input and offtake prices. Equally, water availability in canals and its proper use are key concerns. The water sector in Pakistan needs urgent reforms in policy and practice. Agriculture has a share of 21% in our GDP. About half the country's population earns its livelihood from agriculture.

Available water was 138.6 MAF in 2014-15. It fell to 133 MAF in 2015-16. Actual flows to canals is 114 MAF and reducing. Area irrigated by canals has been in long-term decline since the 1990s. Total gross storage capacity of under 19 MAF is just 14% of available water resource and has not changed from 1980. Per capita dam capacity was 320 cubic meters in 1980. It is 150 now. We have discussed, but not built a single large dam since Tarbela completed in 1974. Kalabagh has been in terminal debate. No dispute accompanies Diامر Bhasha, but it has been a permanent work in progress. During this time, net water storage has come down by 30%. Pakistan is among the most water stressed countries in the world. With silting of dams and a growing population, this will only become worse.

## Board of Directors

Mr. Humayun Akhtar Khan, Chairman and CEO

Mr. Akbar Khan

Dr. Khalida Ghaus

Mr. Ashraf M. Hayat, Executive Director

## Board of Advisors

Lt. Gen (R) Sikander Afzal

Dr. Manzoor Ahmad

Mr. Munawar Baseer

Ms. Roshan Bharucha

Mr. Hussain Haroon

Dr. Iqar Ahmad Khan

Mr. Tasneem Noorani

Mr. Tariq Parvez

Mr. Salman Raja

Dr. Atta-ur-Rehman

Dr. Abid Suleri

Mr. Abdullah Yousaf

Mr. Moeed Yousaf

4- Shami Road,  
Lahore Cantt, Pakistan

UAN:111-123-586

<http://ipr.org.pk>



<https://www.facebook.com/InstituteForPolicyReforms>

[https://twitter.com/IPR\\_Pakistan](https://twitter.com/IPR_Pakistan)

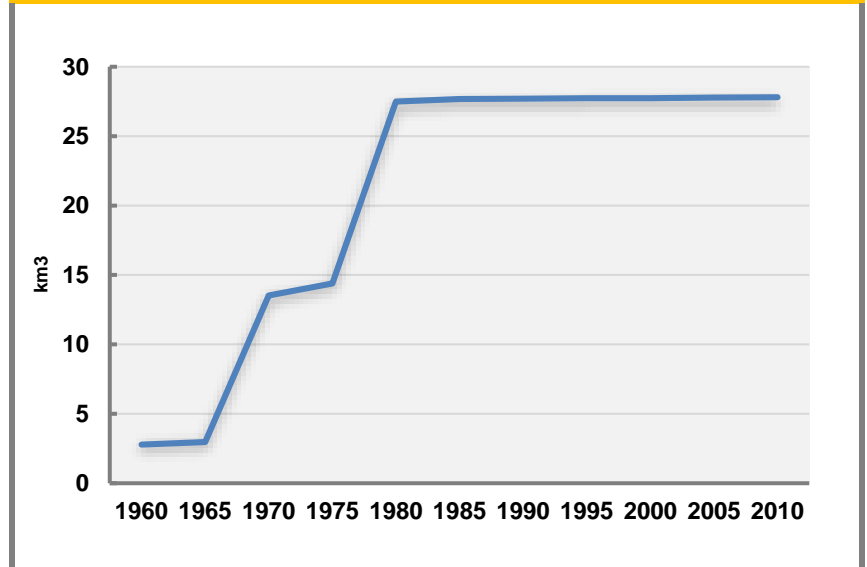
## Copyright

No part of this publication may be reproduced or transmitted in any form or by any means without permission in writing from the **Institute for Policy Reforms**

It is time to take lead on a major dam. IPR recommends urgent execution of Diamer Bhasha. GoP must seek Chinese assistance for the dam.

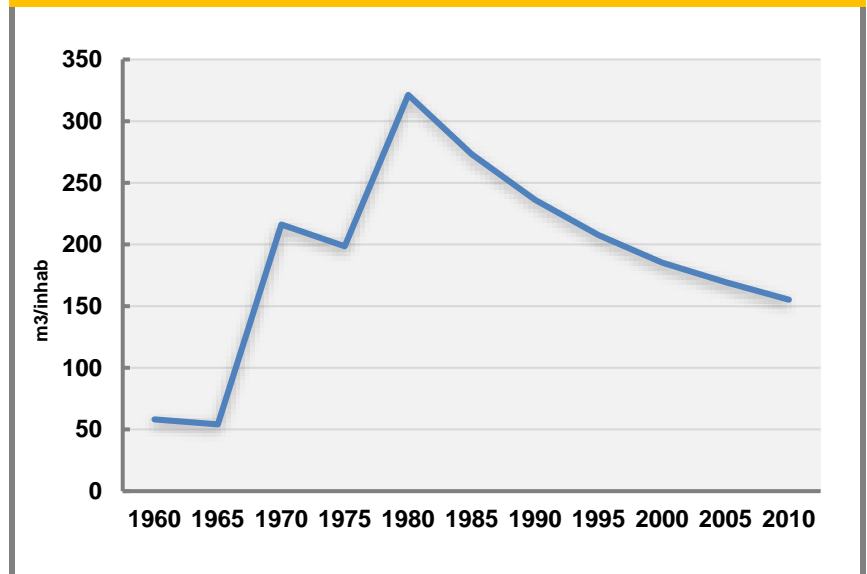
Let us look at the numbers.

**Figure 1: Pakistan Total dam capacity**



Source: FAO AQUASTAT, 2015

**Figure 2: Pakistan - Dam Capacity per capita**



Source: FAO AQUASTAT, 2015

## **Diamer Bhasha Dam Parameters**

- **Water storage:** Bhasha will add 6.4 MAF gross storage. This is 35% to 40% of the total existing capacity.
- **Power generation:** The project provides for 4,500 MW of hydro power generation capacity
- **Cost:** The approved cost of the project is Rs. 834.2 Billion or USD 11 Billion equivalent (at 2009 rate for USD). Land acquisition is another Rs. 101.3 Billion. GoP has a separate project for transmission. Substantial project completion period is eight years though the total period is eleven years. ECNEC approved the project in 2009. It should have been nearing completion by now.
- **Return on investment:** IRR of the project is 15% at original cost. It is 13.4% with 20% escalation and 12.6% with 30% escalation. Bhasha is a feasible project though its real benefit lies through the enhanced water and national security. This is critical for Pakistan. The reservoir, additionally, will increase power generation capacity of Dasu by about 25% and of Tarbela by an estimated 10 to 15%. It will also reduce silting of Tarbela. Our experience from Tarbela and Mangla dams show that actual benefits far exceed original estimates. World experience shows also that such projects especially benefit the poor.

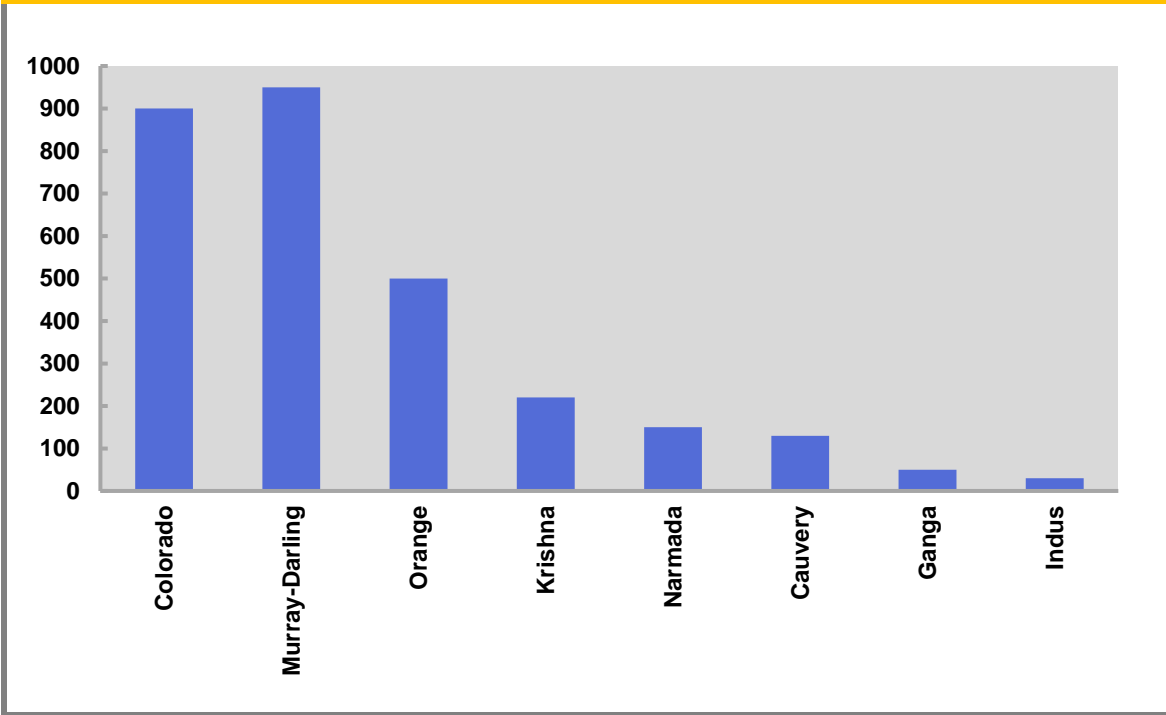
## **Project Execution**

WAPDA, the project execution agency has met almost all technical requirements to begin the work. The project is on hold for want of funds.

The size and financial magnitudes are unprecedented for Pakistan. It needs special execution arrangement. Even more so, it needs top level commitment. This is needed to:

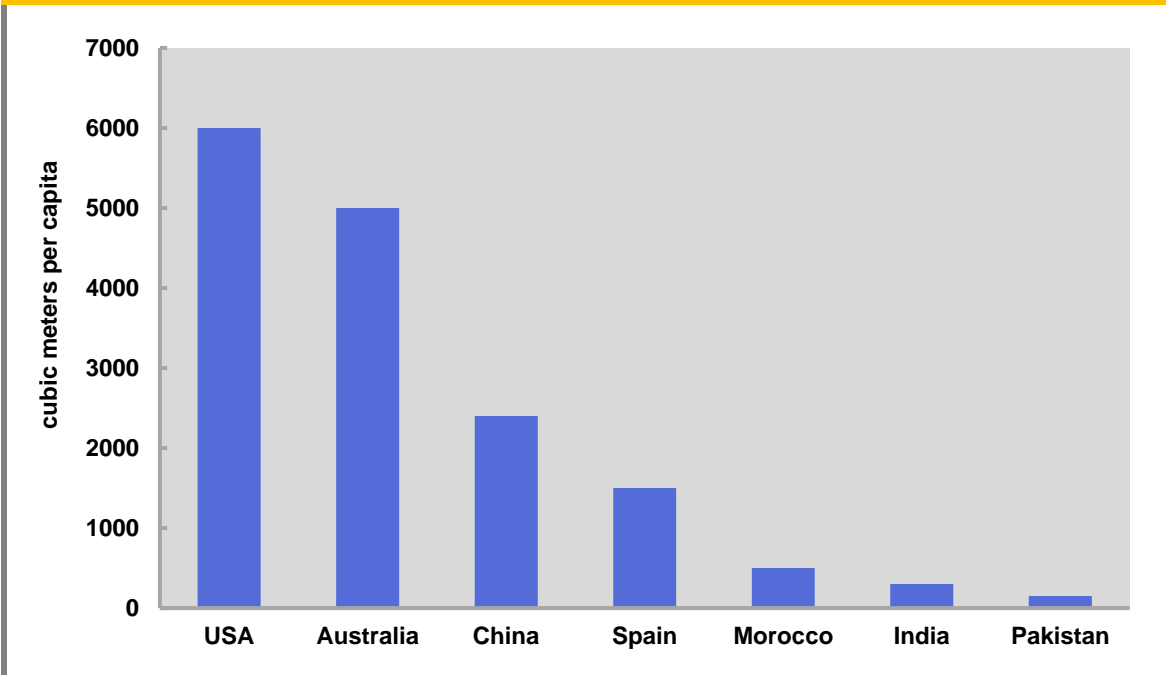
- Provide sufficient and timely GoP and WAPDA funds
- Attract donor assistance for the project. We must show ownership and resolve to international agencies.
- Top level leadership will help assuage concerns of neighbouring countries.
- Resolve issues of land acquisition. (Much of the land has been acquired).
- Ensure top level monitoring for effective execution of project

**Figure 3: Days of average flow which reservoirs in semi-arid countries can store in different basins**



Source: The World Bank analysis of ICOLD and GDRG data.

**Figure 4: Storage per capita in different semi-arid countries**



Source: The World Bank analysis of ICOLD data

## **Pre-construction Activities**

Pakistan has completed bulk of pre-construction work. Donors do not usually fund such activities. To demonstrate our priority for the project, it is important to complete the following activities quickly:

1. Land acquisition: GoP must acquire balance land and ensure prompt resettlement. Estimated land cost is Rs. 101 Billion of which Rs. 72 Billion have been spent. We understand that a major part of land has been acquired. Land needed for the project totals 37,419 acres including for the 100 KM catchment lake. Land around the dam site and for other pre-construction work is about 1950 acres.
2. KKH relocation: The project requires relocation of over 100 KMs of KKH. The 35 KMs Shatial-Thor section is a priority. This is now being done as part of reconstruction of KKH under CPEC. GoP must ensure that KKH upgradation includes the project's relocation needs.
3. WAPDA workers' colony: This may not be necessary if project execution is under an EPC contract. Regardless, the time and cost needed are not significant.

## **Construction Work:**

WAPDA has divided project construction into five lots:

- **Lot 1:** Concrete dam and related structures, substantial completion eight years, USD 1,827 Million
- **Lot 2:** Underground works and related structures, substantial completion six years from year 3, USD 685 Million
- **Lot 3:** Hydro-mechanical equipment and hydraulic structures, substantial completion six years from year 3, USD 422 Million
- **Lot 4:** Power generation equipment, substantial completion six years from year 4, USD 1,030 Million
- **Lot 5:** Electrical High Voltage and Power Plant equipment, substantial completion five years from year 4, USD 1,053 Million

Though above costs are in USD, these are 2009 values and may need revision. Also, these do not include IDC and other costs.

**Funds Needed: Funds for Pre-construction: Rs. 21 Billion, immediate need Rs. 5.5 Billion for WAPDA Colony**

Land: Balance fund needed is Rs. 15 Billion after Rs. 14 Billion provided in PSDP 2016-17. However, at present enough land is available to begin construction.

KKH relocation: This is already being done as part of CPEC. WAPDA must work with NHA to ensure that the project meets the dam's needs

Workers' colony: Rs. 5.5 Billion (may not be necessary in EPC contract).

**Funds for Project Construction: Rs. 486 Billion in 11 Years:** GoP may consider private investor for power generation. That leaves Lots one through three for prioritized construction. Total for the three lots is USD 2,934 Million or Rs. 310 Billion over eleven years before IDC and other costs. The break up between local and foreign funds is 56% and 44% respectively. Most likely, foreign assistance will meet forex needs only. Even so, this analysis adds 50% for IDC and other costs. Financial phasing for the three lots:

Lot No.	Year-wise Phasing in Million USD												
	0	1	2	3	4	5	6	7	8	9	10	11	Total
Lot 1		274 15%	183 10%	183 10%	183 10%	183 10%	183 10%	183 10%	183 10%	91 5%	91 5%	91 5%	1,827
Lot 2		0	0	103 15%	103 15%	103 15%	103 15%	103 15%	68 10%	34 5%	34 5%	34 5%	685
Lot 3		0	0	63 15%	63 15%	63 15%	63 15%	63 15%	42 10%	22 5%	22 5%	21 5%	422
<b>Total</b>		<b>274</b>	<b>183</b>	<b>349</b>	<b>349</b>	<b>349</b>	<b>349</b>	<b>349</b>	<b>293</b>	<b>147</b>	<b>146</b>	<b>146</b>	<b>2,934</b>
Pre-Const.	200												200
IDC and other costs					187	187	187	187	187	187	187	191	1,500
<b>Total</b>	<b>200</b>	<b>274</b>	<b>183</b>	<b>349</b>	<b>536</b>	<b>536</b>	<b>536</b>	<b>536</b>	<b>480</b>	<b>334</b>	<b>333</b>	<b>337</b>	<b>4,636</b>

During the construction period, financing need does not exceed Rs. 56 Billion in any one year (USD 536 M x Rs. 105). Recall, PSDP 2016-17 provides Rs. 60 Billion for the two LNG power projects. The maximum forex requirement in any year is USD 156 Million (Rs. 16 Billion).

In addition to construction, the project requires investment in transmission in the public sector. GoP does not yet have an estimate, but given the terrain and distance, this will need substantial resources. To save cost, GoP may explore also if its recent policy for execution through EPC contracts is necessary.

Once broken into segments and phased over the duration of its implementation, funds needed for the project do not appear as daunting as the totals suggest. However, Bhasha needs donor financing for execution. This is because of its scale as well as the large foreign component.

One reason multilaterals have been hesitant is that part of the project lies in Gilgit Baltistan. The Peoples' Republic of China has supported projects in Gilgit Baltistan for decades. The project lies on the KKH and falls within the sectors selected for bilateral cooperation.

Though not part of CPEC, GoP may sponsor the project for funding by the Peoples' Republic of China.

China has a number of windows for financing. Funds could come from their government, the recently formed AIIB<sup>1</sup>, or the China Development Bank (which financed the Three Gorges). An initial commitment of USD 1 to 1.5 Billion will give fillip to the project.

### **Priority Activities:**

- Hold top level meeting with the Government of the Peoples' Republic of China to demonstrate priority for the project and advocate for Chinese assistance
- Hold top level discussion with neighbouring countries to highlight importance of the project and to assuage their concerns
- Set up high level execution and monitoring committee, preferably headed by the Prime Minister (WAPDA must remain the implementing agency).
- Commit and provide PSDP funds for project implementation

---

<sup>1</sup> So far AIIB has accepted four projects for funding. All of these are co-financed with other multilaterals (WB, ADB, and DFID). The largest amount committed to any one project is USD 273 Million to Indonesia. Lending is long-term at flexible markup of LIBOR plus a spread.