Water Security in a Changing world: Challenges Pakistan MUST face.... SOON

Dr. David Grey

With acknowledgements to Oxford & former World Bank colleagues
“Never say anything with which a reasonable person cannot disagree”. In this spirit, if I say anything that everybody agrees with, I would be sorry, because my intention is to provoke!”

(with acknowledgement to John for shared ideas & hopes!)

John Briscoe 1948-2014
Harvard Professor, former WB Senior Water Advisor, my close friend...
‘Friend of Democratic Pakistan’
‘Indo-Pak peace central for prosperity in region’

Former Pakistan diplomat Shafqat Kakakhel talked about “Pakistan’s Water-Related Challenges”. He said that Pakistan depends for the basic needs of billions of their citizens on both Pakistani and Indian governments, but the two governments are still dealing with water issues as well as other issues, he said.

OP-ED

Can Pakistan escape a dry future?

Pakistan is running out of time. To escape a dry future with disastrous consequences, it has to build new reservoirs and complete those under construction expeditiously, well before 2025.

Jehangir Khattak

These nightmarish predictions may become a reality as early as 2025 when Pakistan's water availability is projected to reach the 'absolute scarcity' level. The country will have to change its current self-destructive course of wasting its most prized asset and do something about it on urgent basis. It is running out of time to escape a dry future with disastrous consequences and has to build new reservoirs and complete those under construction expeditiously, well before 2025. The clock is ticking.
WATER
One Blue Planet
(only one)
& it is changing

climate change, melting ice?

most terrestrial life depends on this

Oceans 97.5%

99.2%?

Glaciers, Snow & permafrost 1.72%

Ground water 0.75%

Lakes, swamps & rivers 0.01%

1/10,000th
Early Human Speciation, Brain Expansion Influenced by African Climate Pulse

Susanne Shultz¹, Mark Maslin²*
¹ Faculty of Life Sciences, The University of Manchester, Manchester, United Kingdom, ² Department of Geography

Abstract

Early human evolution is characterised by pulsed speciation and dispersal events as revealed by continental paleoclimate records. We propose that the collated record of ephiphenomena could be a proxy for the regional paleoclimate conditions experienced by early hominins.

Figure 1. Top panel shows the East African Rift valley shallow lakes and the calculated normalised lake level (only) are shown above. Middle panel shows African hominin diversity (left) and cranial capacity (right) through time. Bottom panel illustrates the dispersal routes of Homo sapiens (red), Homo neanderthalensis (yellow), and Homo erectus (blue) across the globe.
Nile River Basin: ancient civilizations, great challenges now

Egypt warns Ethiopia Nile dam dispute 'life or death'”

By THE ASSOCIATED PRESS • CAIRO — Nov 18, 2017, 8:17 AM ET

CAIRO — Egyptians are worried about uncertainties surrounding Ethiopia’s schedule for storing Nile water behind the walls of the Grand Ethiopian Renaissance Dam.

The Nile Basin Initiative

Shared Vision: to achieve sustainable socio-economic development through equitable utilization of, and benefit from, the common Nile Basin water resources.
Tigris-Euphrates: ancient civilizations, great challenges now

Water: A Source of Life and Conflict in the Land of Two Rivers

By: Joris Leverink

Tigris–Euphrates river system | Photo: Wikimedia Commons

Published 22 May 2015
The Indus: ancient civilizations, great challenges now

No evidence of conflict - utopia?

India and Pakistan Water Tensions Escalate to The Hague

August 10, 2016 / In Asia, Conflict & Cooperation / by Codii Kozacok

Hydropower projects spark discord in the Indus River Basin, but water management challenges go deeper.
Lesson for humanity: societies & leaders that manage water become powerful
societies & leaders that stop managing water lose power (collapse?)


Water Security.... key goal of societies & leaders
Water Security: a key human goal

WATER: source of life, production, growth & cooperation

- Healthy people
- Healthy ecosystems
- Food production
- Energy production
- Navigation
- Cultural Value
- Cooperation
Water Security: a key human goal

water: cause of death, destruction, poverty & dispute

- Drought
- Flood & inundation
- Landslide
- Desertification
- Contamination
- Epidemic & disease
- Dispute, even conflict

Some 70,000 people have fled their homes in a remote part of southern Ethiopia, after a deadly conflict broke out between rival groups - apparently triggered by the construction of a new borehole. The BBC's Elizabeth Blunt has been to visit the affected areas.
‘Water Security’ an enduring human goal:

Not only can water float a boat, it can sink it also

Moral: nature can help and harm you
Water Security: a ‘risk-based’ approach

**Water security: ‘tolerable water-related risk to society’**

- confidence, protection; freedom from danger, risk, want, anxiety, fear, doubt
- ‘as low as reasonably practicable’, cost-benefit: next $ spent reducing other risks (current values of society)
- **to benefits** of water (WSS, irrig., power. health, env); of **impacts** (drought, flood, pollution); of **spillovers** (conflict, epidemic)
- aggregate of people in a community, including all needs/values (eg culture, ecosystems)

• Water Security: an **outcome** providing two freedoms:
  – **freedom from** intolerable water-related risks &
  – **freedom to** pursue otherwise constrained social/economic opportunities

• **Hypothesis**: water-related risks inhibit growth & stability; mitigating these risks expands growth opportunities (beyond water)

• **Dynamic**: tolerable risks now may become intolerable
  – exogenously (eg with climate change or population growth)
  – ‘tolerability’ of risks will reduce with economic growth
Dynamic model of water security & growth

Growth, Wealth, Well-Being
Water endowment
surface & ground water
Investments in water security: Information, Institutions, & Infrastructure

water security: 7 key challenges
WS Challenge 1: Endowment

Headline Risk: Variability + Unpredictability + Change = Complexity

Countries with simple hydrologies and high investments in water security have high incomes

- is poverty a cause of the water problem?
- is water problem a cause of poverty?
- or both?

Basins: population > 2m
Colors: GDP per capita
Horizontal axis: hydrological complexity
Vertical axis: investment in water security

Hall et al., Science 2014
WS Challenge 2: local water services risks

- Food & farm...
  - 1 billion malnourished (→ 5m child deaths/yr)
  - Irrigated yields in India/Pak. 30% of a good performer
- Household water & sanitation
  - 800 million without access to clean water (improving)
  - 2.6 billion without toilets (600m in India) (improving)
  - but: 2100 urban pop ±7bn: conven. sewerage impossible
- Educating girls: Pakistan...

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<table>
<thead>
<tr>
<th>Crop</th>
<th>Rank</th>
<th>Country</th>
<th>Yield (Kg/ha)</th>
<th>Ratio to Indian Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>1</td>
<td>UAE</td>
<td>10000</td>
<td>3.82</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Ireland</td>
<td>8764</td>
<td>3.35</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Netherland</td>
<td>8548</td>
<td>3.26</td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>India</td>
<td>2619</td>
<td>1</td>
</tr>
<tr>
<td>Rice/Paddy</td>
<td>1</td>
<td>Tr &amp; Tobago</td>
<td>11134</td>
<td>3.56</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Egypt</td>
<td>10598</td>
<td>3.39</td>
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<tr>
<td></td>
<td>3</td>
<td>Greece</td>
<td>9118</td>
<td>2.92</td>
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<tr>
<td></td>
<td>56</td>
<td>India</td>
<td>3124</td>
<td>1</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1</td>
<td>Egypt</td>
<td>120889</td>
<td>1.81</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Tanzania</td>
<td>119565</td>
<td>1.79</td>
</tr>
</tbody>
</table>

Source: Pakistan’s Water and Power Development Authority.
WS Challenge 3: local flood risks

- India & Bangladesh monsoon 2007: 4,300 died, 70m in 260 districts affected, 7,400 km² crops destroyed
- Thailand: 2011 floods: 884 died, 1.5m homes, 7500 industrial plants & 25% of rice crop damaged, $45 bn economic loss (in 5 costliest natural disasters)
- **Pakistan** 2010 monsoon: 2,000 died, 1.7m homes destroyed; 20m seriously affected; $10-20bn loss. 2011 monsoon: 360 died 300,000 in camps, 9m affected. 2012: again... >100 died....
- Inadequate warning, poor response..... consequences?
WS Challenge 4: local drought risks

• Horn of Africa 2010-11 drought: endemic; major rain failure – 15 million needed aid; 350,000 in Dadab camps; 29,000 under 5s died in 90 days; Somalia... NOW...

• Syria 2006-2011 drought affecting 60% of country; 75% farms crop failure; 85% of livestock lost; 2-3m affected; exodus to cities... jobs..... crisis?

• Russia drought 2010 (NB: with Pakistan floods): wheat harvest down 40%, 8/2010 North Africa exports banned, bread riots.. Arab Spring?

• Pakistan – regular drought... 53.5° 5/2017; the future?
WS Challenge 5: transboundary risks

- 260 international basins: tensions: longstanding, always, growing with demand
- Uncertainty, limited knowledge & capacity, ‘rents’, misperceptions, increasing risks
- Serious issues: Indus, Nile, Jordan, Tigris-Euphrates, Ganges-Brahmaputra, Mekong, & ….
- What about China?
WS Challenge 6: global spillover risks to stability

- Urban services, food prices/shortages – social unrest .... linkages?
- Syria drought, related: mass displacement, political unrest, civil war, super-power tension
- 2010 Russian drought: 01/12 world food prices historic high (wheat +84%): Tunisia? Arab Spring? Oxfam, Schelling
- 2010/11/12 Pakistan floods: risks to national stability?...... to regional security?... uncertain
### Top 10 countries for people at risk of water insecurity

<table>
<thead>
<tr>
<th>Shortage Index: Total population at risk of frequent water shortages</th>
<th>Flood Index: Expected population flooded</th>
<th>Water and Sanitation Index: Total population lacking sanitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>India</td>
</tr>
<tr>
<td>2</td>
<td>Pakistan</td>
<td>China</td>
</tr>
<tr>
<td>3</td>
<td>India</td>
<td>Vietnam</td>
</tr>
<tr>
<td>4</td>
<td>Bangladesh</td>
<td>Bangladesh</td>
</tr>
<tr>
<td>5</td>
<td>Nepal</td>
<td>Myanmar</td>
</tr>
<tr>
<td>6</td>
<td>Algeria</td>
<td>Indonesia</td>
</tr>
<tr>
<td>7</td>
<td>Saudi Arabia</td>
<td>Pakistan</td>
</tr>
<tr>
<td>9</td>
<td>United States</td>
<td>Thailand</td>
</tr>
<tr>
<td>10</td>
<td>Afghanistan</td>
<td>Nigeria</td>
</tr>
</tbody>
</table>

**Colour scale is GDP per capita income classification:**

- **Low income**
- **Lower middle income**
- **Higher middle income**
- **High income**
Water security in changing climates.....

But >2 billion people are water insecure NOW...
Water security: World Economic Forum - from a concern to the concern

Source: World
Water security: complexity & the case of Asia, the Indus, Pakistan ....
River rivalry: water disputes, resource insecurity and diplomatic deadlock in South Asia

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E-mail: wirsingr@apcss.org; jasparroc@apcss.org
\textsuperscript{b}National Security Studies, USMC Command and Staff College, Quantico, VA, USA

Received 14 November 2005; accepted in revised form 16 February 2007

ABSTRACT:................................. It warns that the continued festering of un-addressed river resource disputes between these states—between India and Pakistan, India and Nepal, and India and Bangladesh—is bound to retard rational river resource development in the region, stiffen the antagonism already apparent in their bilateral relationships and, inevitably, weigh heavily against hopes for expanded regional cooperation.

Political economy of South Asia’s big rivers: unstable relationships
While South Asia is increasingly integrated into global economy, intra-regional trade is world’s lowest.
Relative Water Stress Index: the South Asia Deficit
Hotspots of Security Risks associated with Climate Change: the South Asia Challenge

Conflicts and Security Risks in Selected Hotspots

- Climate-induced degradation of freshwater resources
- Climate-induced decrease in food production
- Climate-induced increase in storm and flood disasters
- Environmentally-induced migration

Source: WBGU
Greater Himalayas: world’s “water tower”; 2 bn? people in 7 basins; 3.5 bn? dependent

Indus: Afg, Chi, Ind, Pak. 200m? c.40% glacier-fed
## major South & East Asian rivers

(2008 data)

<table>
<thead>
<tr>
<th>River</th>
<th>Area (km²)</th>
<th>Mean discharge (m³/s)</th>
<th>Mean discharge % of Glacier melt in river flow</th>
<th>Population x1000</th>
<th>Population density</th>
<th>Water availability (m³/capita/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indus</td>
<td>1,081,718</td>
<td>5533</td>
<td>44.8</td>
<td>178,483</td>
<td>165</td>
<td>978</td>
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<tr>
<td>Ganges</td>
<td>1,016,124</td>
<td>18691</td>
<td>9.1</td>
<td>407,466</td>
<td>401</td>
<td>1447</td>
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<tr>
<td>Brahma</td>
<td>651,335</td>
<td>19824</td>
<td>12.3</td>
<td>118,543</td>
<td>182</td>
<td>5274</td>
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<tr>
<td>Irrawaddy</td>
<td>413,710</td>
<td>13565</td>
<td>unknown</td>
<td>32,683</td>
<td>80</td>
<td>13,089</td>
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<tr>
<td>Mekong</td>
<td>805,604</td>
<td>11048</td>
<td>6.6</td>
<td>57,198</td>
<td>71</td>
<td>6,091</td>
</tr>
<tr>
<td>Yangtze</td>
<td>1,722,193</td>
<td>34000</td>
<td>18.5</td>
<td>368,549</td>
<td>214</td>
<td>2,909</td>
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<tr>
<td>Yellow</td>
<td>944,970</td>
<td>1365</td>
<td>1.3</td>
<td>147,415</td>
<td>156</td>
<td>292</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,324,386</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

After ICIMOD 2008
Pakistan: mid-late 20thC water challenges overcome

- 1960 Indus Waters Treaty: national entitlement settled
- Instruments & institutions: management & development
- Huge technical capacity built – a ‘technocracy’
- Coping infrastructure: link canals, storage, hydropower
- Waterlogging and salinity reversed
- 1991 Accord: interprovincial entitlements settled, IRSA established
- Major recent ‘points of light’ e.g.
  - Irrigation reform: irrigation management transfer
  - Ghazi-Brotha: hydropower, social & environmental focus
  - Mangla: good practice resettlement
  - Draft National Water Policy:
Pakistan: 21stC water challenges to overcome

• Threatened water resource base
  • Growing water stress & growing demand – limited ‘spare’ water
  • Degrading resource base: water quality, wetlands, the delta
  • Unmanaged & overexploited groundwater
  • Climate & river flow changes: impacts?

• Deteriorating infrastructure assets:
  • Lost reservoir storage, reducing regulation capacity
  • Deteriorating barrages, canals & low water productivity
  • Financially unsustainable

• Increased management needs, yet weakened capacity
  • Slide from ‘technocracy’ to ‘complacency’
  • Inadequate management of system
  • Disputes/mistrust: interprovincial provincial & international
Some research suggests Indus river flows may fall >40% within 100 years - what does this mean for vulnerable Pakistan?

Gwyn Rees et al 2005
Pakistan: 21\textsuperscript{st}C water revolution?

- A ‘hydraulic’ society for millenia: snow melt from high mountains feeding a great river across desert

- 1\textsuperscript{st} revolution: unprecedented water development at the heart of nation building, mid 20\textsuperscript{th} Century

- 2\textsuperscript{nd} revolution essential: state-of-art skills & institutions; renovation & expansion of infrastructure assets (Kalabagh, Diamer-Bhasha?); quantum shift in efficiency with equity; & ‘pride/status’ for experts...

- Political change - trust building, benefit sharing; \underline{interprovincial} & \underline{international} cooperation.... is there a reasonable alternative?

- Water, food & power security for future generations, prosperity & peace .... there is no alternative!
Water security: the case of ??? in 1935

Achieving water security- imagine a place where:

• 98% of tenants have no electricity
• 41% of tenants have no toilets
• 78% of tenants go 300m for water
• Low literacy & life expectancy
• Most live on subsistence farming on exhausted soil
• Frequent, catastrophic flooding

THIS IS NOT A PART OF ASIA OR AFRICA TODAY – IT IS THE TENNESSE VALLEY, U.S.A. IN 1935

In a generation:

• $224m/yr flood damage prevented, $5.4 billion total
• almost 100% Literacy
• Life expectancy in 70’s – small pox, malaria, typhoid gone
• Industrial production up >500%
• 700 miles of navigable water links to sea.
• Median incomes at national levels

David Lilienthal
TVA Chairman
No armies with bombs and shellfire could devastate a land so thoroughly as Pakistan could be devastated by the simple expedient of India permanently shutting off the source of waters that keep the fields and people of Pakistan green.

Lilienthal’s key principles:

- A political approach based on technical and engineering data: the Indus Basin constituted a single hydrological unit.
- India and Pakistan needed to work together in a joint use of this truly international river basin on an engineering basis.
- Dividing the basin between states ignored the rivers’ ability to tie human actors and environmental processes on both sides of the border together. Political and administrative boundaries within the basin were human imposition.
From Provincial assets to Inter-Provincial assets? → an institutional option to build trust & share benefits? *Why not?*
2007 Baglihar ‘Difference’

1. IWT: minimum ‘live’ storage
2. Neutral expert ruling: modern ‘best practice’ for sediments

Project allowed with low gates for ‘flushing’ (added live storage) which could be used to stop river flows
2013 Kishenganga ‘Dispute’

IN THE MATTER OF
THE INDUS WATERS KISHENGANGA ARBITRATION

-before-
THE COURT OF ARBITRATION CONSTITUTED
IN ACCORDANCE WITH THE INDUS WATERS TREATY 1960
BETWEEN THE GOVERNMENT OF INDIA
AND THE GOVERNMENT OF PAKISTAN
SIGNED ON 19 SEPTEMBER 1960

-betweeen-
THE ISLAMIC REPUBLIC OF PAKISTAN

-and-
THE REPUBLIC OF INDIA

PARTIAL AWARD

COURT OF ARBITRATION:
Judge Stephen M. Schwebel (Chairman)
Sir Franklin Berman KCMB QC
Professor Howard S. Wheater FEng
Professor Lucius Caflisch
Professor Jan Paulsson
Judge Bruno Simma
H.E. Judge Peter Tomka

SECRETARIAT:
The Permanent Court of Arbitration

18 February 2013
The Case of Kishanganga

India wins KG battle

*Delhi bound to maintain minimum flow of water to protect agri interests of Pak
* IWT doesn’t permit India reduction of water level in reservoirs below ‘dead storage’
* It won’t have any bearing on territorial claims, rights of countries over J&K

PTI
New Delhi, Feb 19: An International Court of Arbitration (ICA) on Indo-Pak dispute on Kishenganga hydro project has upheld India's right to divert water for the power plant, but said New Delhi is bound to maintain a minimum flow of water to protect the agricultural interests of Pakistan.

MPs on fire over lost Kishanganga case, demand fixing responsibility

ISLAMABAD - Members of the Lower House of parliament on Friday expressed their serious reservations over the country losing the case of Kishanganga Hydro Power Project at the International Arbitrary Court, demanding the government fix responsibilities responsibility and roll heads.
Project allowed
Low gates (added live storage) NOT allowed

In his article in The Hindu, John Briscoe makes some valid points about the Kishenganga Award (editorial page, “Winning the battle, but losing the war,” February 22).

Briscoe’s suggestion of joint and collaborative undertakings is welcome, but given the state of relations between the two countries, they seem highly improbable. If that sort of cooperation is possible, what prevents the existing Treaty itself from being operated in a constructive, harmonious spirit? I have myself been making more modest proposals of joint studies to take care of certain concerns of Pakistan, but I wonder whether they will happen. We must of course keep trying.

(Ramaswamy R. Iyer is a former Secretary, Water Resources, Government of India.)
‘entities’ cooperate to seize opportunities & reduce risks......

- converging agendas

..all cases can be rational - choice will depend upon *perceptions* of their relative *benefits*.
**calculus**: look for 4 types of benefits

<table>
<thead>
<tr>
<th>Type 1: Environmental</th>
<th>Improved ecosystem sustainability, conservation &amp; water quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing Benefits</td>
<td><strong>To the river</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 2: Economic</th>
<th>Improved productivity – energy, food, WASH, flood &amp; drought management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing Benefits</td>
<td><strong>From the river</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 3: Political</th>
<th>Reduced risks; policy shift to cooperation &amp; development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreasing Costs</td>
<td><strong>Because of the river</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 4: Indirect Economic</th>
<th>Broader cooperation &amp; integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing Benefits</td>
<td><strong>Beyond the river</strong></td>
</tr>
</tbody>
</table>
What is cooperation?

- Cooperation is not “all or nothing”
  - *more* cooperation is not necessarily *better*

- Different levels of cooperative effort
  - different benefits, in different places, at different times

- “Right” level of effort depends on potential benefits
  - driven by hydrology, economics, riparian relations

- ......and the costs of capturing those benefits

- A “continuum of cooperation”
## Sharing cooperation benefits: possible mechanisms

<table>
<thead>
<tr>
<th>Water Sharing</th>
<th>Benefit Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning rights</td>
<td><em>Direct payment for water use</em>- e.g., municipal or irrigation supplies (rights already assigned)</td>
</tr>
<tr>
<td></td>
<td><em>Direct payment for benefits</em>- e.g., fisheries, watershed mgmt; or compensation for costs- <em>e.g., inundated land, pollution</em></td>
</tr>
<tr>
<td></td>
<td><em>Purchase agreements</em>- e.g., power, agriculture products (benefit transfer through terms/price)</td>
</tr>
<tr>
<td></td>
<td><em>Co-financing &amp; co-ownership arrangements</em>- e.g., power infrastructure (benefit transfer through deal structure)</td>
</tr>
<tr>
<td></td>
<td><em>Broadened bundle of benefits</em>, including provision of unrelated goods and services &amp; less tangible (e.g. reputational) benefits</td>
</tr>
</tbody>
</table>
Cooperation Continuum: context specific

- **Indus**: treaty, commission
- **Mekong**: info sharing, assessments
- **Rhine**: converging national agendas
- **Orange (Lesotho Highlands)**: joint planning & investment
- **Senegal**: joint equity ownership

- **Communication & notification**
- **Information sharing**
- **Regional assessments**

- Adapt national plans to mitigate regional costs
- Adapt national plans to capture regional gains
- Identify, negotiate & implement national investments that capture cooperative gains
- Joint institutions
- Joint project assessment & design
- Joint investment
- Joint ownership of assets
‘Game-Changer’?
(a) maintain IWT but (b) modernize interpretation

- For example, undertake jointly-planned, jointly-financed & jointly-operated hydropower/storage?
- Is there the vision, courage & spirit?.. if not now, when....?

Itaipu Binacional (Brazil-Paraguay) – on border

Lesotho Highlands (Lesotho-South Africa) – within Lesotho

Manathali (Mali, Mauritania, Senegal, & now Guinea) – within Mali
Pakistan-India cooperation: ‘Beyond the River’

India Should Revive Iran-Pakistan-India Gas Pipeline: Parliamentary Panel

India should consider reviving the long-delayed Iran-Pakistan-India (IPI) gas pipeline following easing of sanctions on Tehran, a Parliamentary panel has said.

Press Trust Of India
Updated: March 19, 2017, 3:49 PM IST

“The government should examine the idea of reviving the (IPI) project as international conditions have become favourable following lifting of sanctions against Iran,” the Standing Committee on Petroleum and Natural Gas said in a report submitted to Parliament on Friday.

The Oil Ministry in its comments to the committee stated that IPI pipeline was envisaged to transport natural gas from South Pars gas field of Iran to Pakistan and India with a carrying capacity of 60 million standard cubic meters per day, to be equally split between India and Pakistan.

“The total length of the pipeline up to Indian border (near Barmer) was about 2,135 km (1,100 kms within Iran and the rest within the territory of Pakistan),” the ministry said. "As per past estimates, investments required for this pipeline were in excess of USD 7 billion.”
more ancient wisdom......

river + dyke = Good management, governance, political order....

• Origin of the word “rival”:
  1570–80; < L rīvālis orig., one who uses a stream in common with another, equiv. to rīv(us) stream + -ālis -al
Pakistan’s Water Security Challenges mirror Global Water Security Challenges: both must be met!

- Understand, manage & develop complex, variable hydrological systems to achieve/sustain water security
  - Major investments in:
    - State-of-the-art institutions with skills, planning & management tools, technology
    - Smart infrastructure, including monitoring networks, storage/treatment/transfer networks
  - Build relationships & trust to enable inter-provincial & international cooperation, with cost & benefit sharing
  - Predict & manage increasing scale/no of extreme events: hurricanes, floods, droughts;
  - Predict & manage “spillovers’ (environmental, internal/external migration, supply chain failures, political tensions)

- Meet massive demand increases for water, food, power as population expands
  - High priority for safe sanitation, especially for girls in all schools & women everywhere
  - Innovate in water & wastewater service delivery to rapidly urbanising populations
  - Innovate in irrigation services, with (tradeable?) entitlements, accountable institutions, farmer participation
  - High priority for universal electricity coverage with hydropower & renewable solar
Water, like religion and ideology, has the power to move millions of people. Since the very birth of human civilization, people have moved to settle close to it. People move when there is too little of it. People move when there is too much of it. People journey down it. People write, sing and dance about it. People fight over it. And all people, everywhere and every day, need it.