Water, water every where?

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Why this title?

- **In the poem, *The Rime of the Ancient Mariner,* by Samuel Taylor Coleridge published in late 18th century, the Mariner bemoans "water, water, every where – not any drop to drink" because it was in ice like condition as his ship was stranded in South Seas – an apparent contradiction of scarcity amidst plenty**
- **It also tells of an albatross which showed them the way to warmer seas but was killed by him thinking it as evil and it hung from his neck as punishment**
- **Morale for Bangladesh – one of the most fresh water abundant country – but suffers some time acute seasonal scarcity due to shortage of supply and deteriorating quality due to pollution which may threaten food security and industrialisation as well as safe water for drinking unless proper policies are taken for resolving them – if not, the "albatross" of the guilt due to inefficiency, misuse and abuse of abundant water and make it scarce will hang from our neck for long or forever – so better take measures now rather than later**

Ancient Mariner statue at Watchet Somerset, England with albatross hanging from his neck

Water Scarcity in Bangladesh: Nature of the Problem

While water is abundant, high population means that average water availability is low – 7741 m3/capita, less than one –half of world average

High external dependence for water makes the situation less tractable due to its uncertainty

Seasonal character of water availability and scarcity – highly uneven availability between dry and wet seasons although in aggregate average compares well with many countries

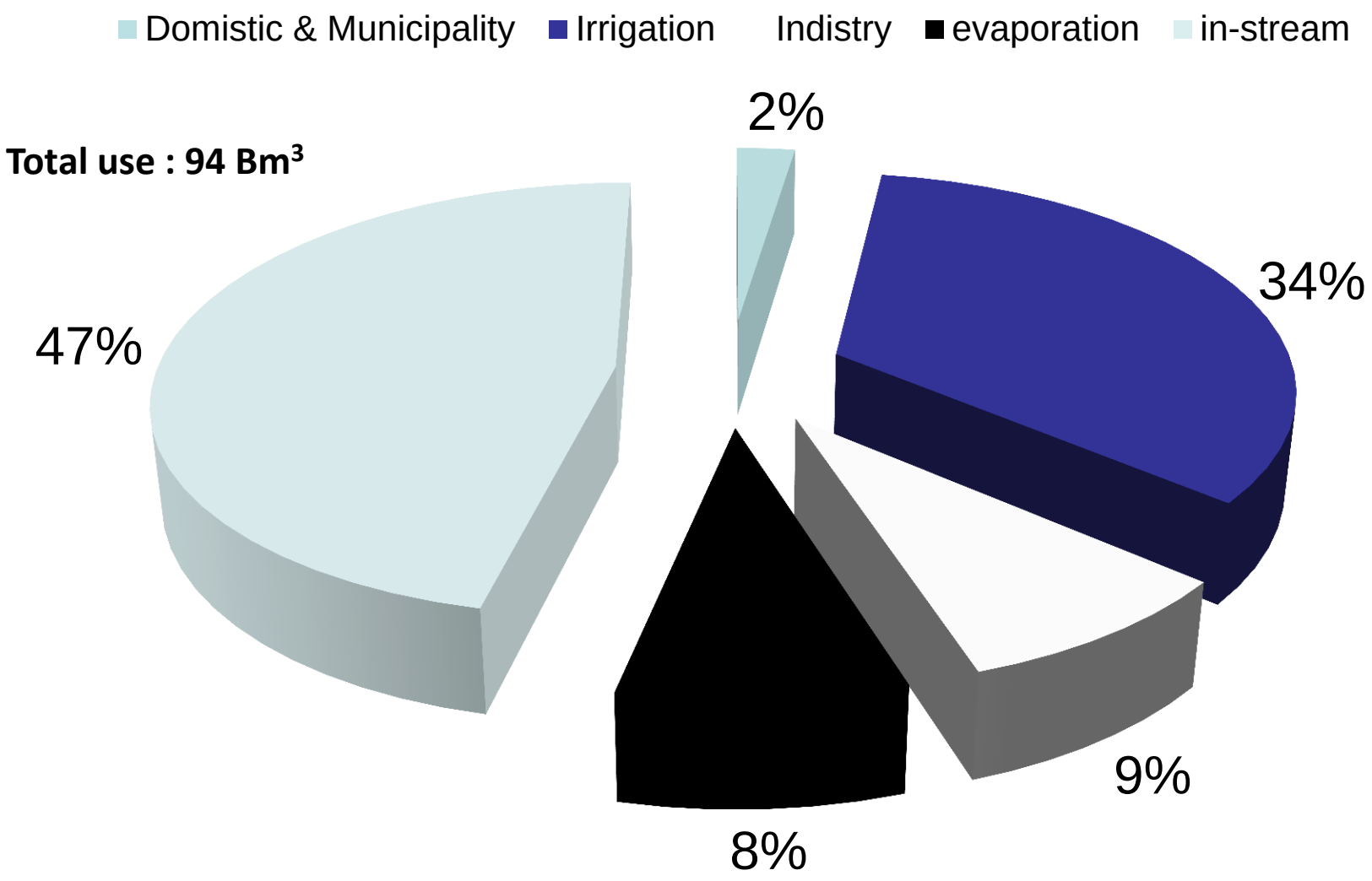
Challenge is to balance, through technical and economic means, surplus and deficits between seasons through increased supply and reduction in demand by raising efficiency in use, cutting misuse and wastage as well as improving quality

Water Stress in Dry Period (Jan – May)

Water Resources Availability (Bm^3)	Dry Season (Jan-May)	Water Resources per capita per dry season
Internal	38	238
External	133	831
Total	171	1,069

Water resources availability during dry period 1069 m^3 or 37% less than the norm of 1700 m^3 per-capita

Present Consumption of Water (%)



Overall Water Stress

- **Total renewable water resources during Nov-May is 206 Bm^3 (75 percent of the water resources is external);**
- **Total consumptive usages is about 50.5 Bm^3 and environmental need/use is around 44 Bm^3; Total usage is 94.5 Bm^3**
- **Much of scarcity of resources is because of inefficient and inequitable way the resource being governed, high level of wastage in supply lines as well as in actual use, and low quality of water due to high pollution in cases, toxicity due to arsenic and salinity in parts of the country**

High Dependence on Ground Water

- **For much of consumptive need BD depends mainly on ground water – 79% as opposed to only 25% in SE and East Asia**
- **Groundwater Extraction (app): 30 Bm^3**
- **Irrigation and industrial consumption are two main demands on ground water**
- **Agriculture accounts for 75-80% of total ground water use**
- **That makes ground water availability and use as critical issues**
- **Major draw down of water tables in particularly drought-prone zones is now a fact**

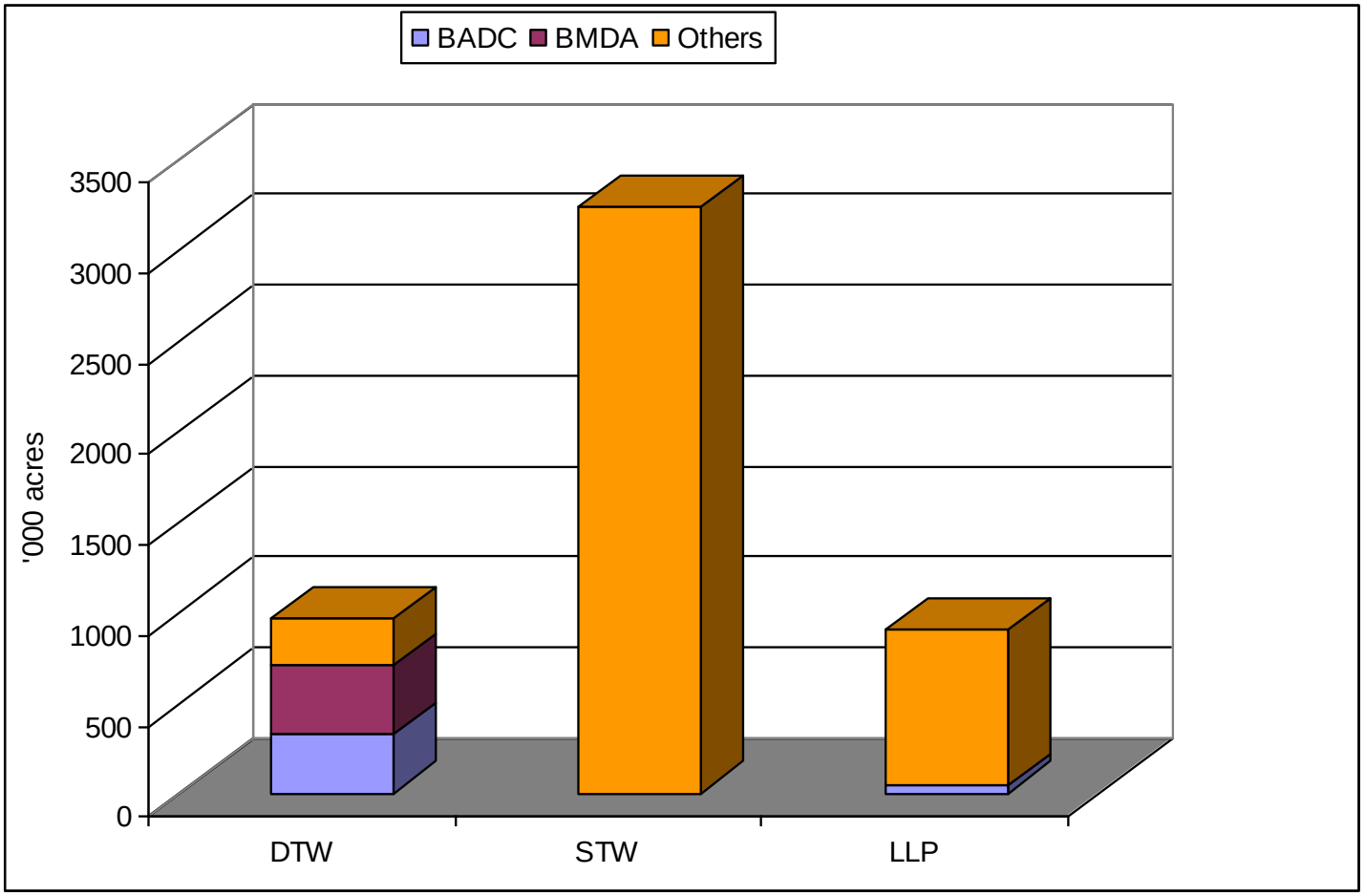
Nature of solution to problem

- **Emphasise surface water for irrigation and industry**
- **Avoid technical losses in existing supply mechanisms**
- **Both of above necessitate heavy investments in infrastructure**
- **Rationalise transboundary supply of water- an issue fraught with many uncertainties**
- **Perhaps most important is to raise efficiency particularly in agricultural, industrial & domestic water use**

Water Use in Agriculture & Industry

- **Context**
  - **Highly seasonal availability – low dry supply season with high demand due to Boro cultivation – critical for food security – But results in falling GW levels in some areas**
  - **Farmers using/buying water from STW main consumer – water use behaviour least known**
  - **Institutions – BWDB/BADC/BMDA – DTW and LLP**
  - **Industrial water use generally excessive compared to elsewhere – textiles a main user – behaviour on water use largely unknown**
  - **Factors underscoring industrial waste water treatment largely conjectural and anecdotal, little or no analytical studies**

Irrigation Acreages by Source, Device and Institutions



Crop Area & Water Requirements (mm)

Crop	Quantity
Boro	1000-1250
Aman	870-1000
Aus	750-870
Wheat	300-370
Sugar cane	1250-1750
Potato	370-450
Maize	500-620
Onion	370-500
Mustard	150-300

Area of ten major crops has increased three times where boro area alone has increased 17 times in 2010-11 as compared to 1980-81 levels and boro has the highest consumptive need for water under current framer practices (2300-2400 mm) which is far more than what is scientifically recommended

Technologies for Saving Water

- **4 types**
  - **Raising supply efficiency by having buried pipes and plastic pipes in case of ground water ; using impervious materials for surface water supply canals;**
  - **Raising on-farm efficiency with different types of water management as in case of AWD, SRI, raised bed, early ploughing**
  - **Changing cropping pattern and crop diversification**
  - **Charging for water in real time as in case of smart cards**
- **First one is relatively easy but may need major infrastructure investment; in case of second and third, not all technologies yet properly functioned in BD and may need major behavioural change by farmers**
- **Fourth one has functioned but needs major investments in IT infrastructure and changes in management style**

Raising On-farm water Use Efficiency

- **Water productivity in BD is one of the lowest in the world as water use is high while land productivity is low (almost 40% lower than in SE Asia)**
- **Technologies exist for saving water without fall in output but irrigation charging system is not conducive to that**
- **Need some hard thinking related to pricing as farmers either pay little or no charges; or pay highly by area irrespective of volume of water used providing no incentive to save water**

Pricing of Water in Agriculture

- **BWDB acreage based charges for LLP use in secondary canals – very low charges – collection efficiency <30% - little effect on water use as even full charge is no more than 1% of value of output**
- **BMDA has introduced smart cards for DTW irrigation and also LLP since 2006 and the results had been very good – those using BMDA water, use 30-35% less water per acre than those buying water from privately supplied sources – but necessitates major investments in IT infrastructure**
- **BADC charges for DTW – variable – little information – new proposals call for licenses based on capacity of pump and hour – but not approved because of political sensitivity - collection efficiencies unknown – also introduced smart cards but major issues of costs and benefits to farmers as mangers control the cards**
- **RDA now experimenting with several water saving technologies in field but results yet uncertain as it is only 2nd year of operation**
- **Private sector STW – apparently no licensing and no regulation on water use – but recording for power-driven pumps – charges are the highest – in cash up to 2500/acre or 1/4th of crop – we may need quite some thinking in changing farmers' behaviour in this case**

Industrial Water Charges

- **Industrial connection fees for water from utilities – for own DTW, only license fees based on capacity – but outside some industrial areas, generally no licensing – water use unknown but known to cause abstraction problems in areas such as Gazipur**
- **Financing schemes for ETPs – but remain largely inoperative – DoE reports indicate public sector industries more of avillain than private sector ones - new measures are in offing in BEZAs**

Assessment

- **Low rates or no rate in case of publicly provided irrigation water and very high charges in case of privately supplied water**
- **For public supply, charges are generally for recouping parts of O&M though largely unrealised**
- **Abstraction charge and user charges not separated**
- **Matters little for main use and users in agriculture – farmers buy water at flat rates per acre**
- **Little incentives to save water through raising efficiency – but BMDA experience has real promise**
- **In case of industries a kind of duality exists – those catering to export markets and subject to buyers' environmental and other requisites are much more amenable to these regulations, but not so in case of those largely catering to internal market**

Issues in Pricing of Water

- **Farmers need access to appropriate technology as well as corresponding management and financing practices – but these may not be enough**
- **Farms need economic incentives for raising water use efficiency which may be provided through various means**
- **Broad technologies identified in Agric – AWD, early ploughing, raised bed, SRI, cropping pattern changes and smart card**
- **Incentives should be such that**
  - **rights to water through licensing/abstraction charges are levied;**
  - **And also payments or fees for ecosystem services are institutionalised which may take various forms – may have cross-subisdisation across actors**
  - **need to be discussed with those on whom the charges are to be levied before concrete designs may be suggested**
- **Raise general supply side efficiency by financing various water saving capital investments**
- **Role of economics should be brought into focus**

Role of Economics

- **Value of water in different uses including for env integrity and ecological balance should be estimated before any kind economic policy instruments incl. pricing are designed and put in place with concerns for equity and affordability taken into consideration**
- **Various designing of economic instruments and the explicit or implicit prices to be determined based on full cost incl capita to be decided as well as wherever PES may be introduced to incentivise farmers**
- **How to the make the system effective in phases such as how much of capital costs to be passed on over what time period**
- **Full and rigorous review of present systems necessary before any designing of EPI**
- **Piloting needed before any major change is put in place**

THANK YOU