Water from the Padma river lifted to the Sharmangla canal for irrigation (Zillul Bari)

Mainstreaming river water to facilitate irrigation in Barind ( )

Sharmongla Sech Prokolpo.

The technology promotes the lifting of river water by pump sets and conveys the water through buried pipelines to a canal. The conserved canal water is used for irrigation delivered by low lift pumps (LLP). Because water is held in the canal it revitalises the ecosystem along its length. Furthermore, using river water for irrigation avoids dangers associated with groundwater depletion.

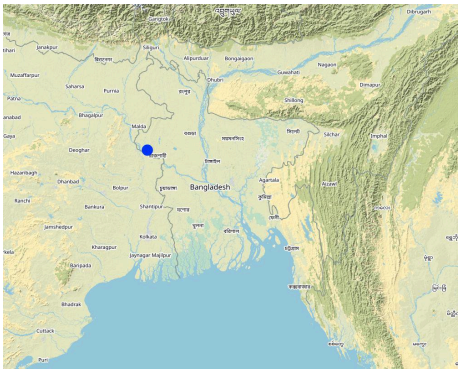
The project is sited at Sharmongla under Godagari Upazilla of Rajshahi district. The Sharmongla canal is located about 3.5 km away from the Padma river. Its total length is 29.0 km. Under this technology, water is lifted from the Padma river by pumps set on a pontoon. The lifted water is then discharged to a canal through underground pipelines. The water so discharged is lifted to the crop fields (delivery points) for irrigation. The elevation difference between the delivery points and the sourcing river is about 21 m. There are numbers of submerged weirs/dams constructed across the canal at different locations for conserving water: the water then helps regenerate the ecosystem along its banks and enriches the habitat.
Pontoon at a glance:
•Year of construction: 2004
•No. of centrifugal pumps at pontoon: 12
•Pump capacity: 50 m lifting height.
•Power of each pump: 60 HP
•Capacity of each pump: 2.5 cusec
•Total capacity of pump sets: 30 cusec
•Capacity of electric sub-station: 750 KW
•No. of discharge pipelines: 12

Sharmongla canal at a glance:
•Length of the canal: 29 km
•Average width of the canal: 15 m
•Average depth from ground level: 5 m
•No. of submerged weirs and dams within the canal: 14
•No. of LLP (low lift pump): 27 electrified and 6 solar pumps
•Total irrigated area: 1850 ha
•Benefiting farmers: 5330
•Harvest yield of rice per year: 20,500 metric tonnes (approx.)
•Afforestation on the canal bank: 65,500 trees

Purposes/objectives of the technology:
•The main purpose of the said technology is to provide water for irrigation. This prevents abstracting of groundwater, which has adverse effects on the environment: therefore this system is environment friendly.
• Enhancing groundwater recharge thereby supports ecosystem function.
•The storing of river water in irrigation canals supports the enrichment of the habitat.

Approach for implementing the technology:
There was no irrigation facility for crop production in this drought-prone area. Government officials came to the locality, discussed with the local community, elites, as well as the farmers. Finally, the local community was convinced about the technology. Then the irrigation system could be implemented in the area. On seeing the success of the technology, the same has been replicated on approx. 9400 ha. in Barind area, benefitting approx. 32,200 farmers.

Maintenance of the technology:
In case of problems, the respective mechanic of that area informs the Assistant Engineer through the Sub-Assistant Engineer. Thus the problem is solved by their own initiative. It is also monitored by the Executive Engineer of the respective District, and finally by the Executive Director from the headquarters if needed.



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Crop cultivation:
Due to the application of the technology, previously fallow land has come under cultivation/irrigation facilities, mono-cropped land has been converted into multi-cropped land. Different crops, like rice, wheat, maize, mustard, pulses, potato, tomato, spices and other vegetables are cultivated.

Farmers' acceptance:
The technology has been well accepted by the farmers, as uncultivated land has been brought under cultivation and different crops are now being cultivated year-round.


Pontoon with pumps at Padma river; there are 12 pumps operating (Zillul Bari)


Water in the Sharmangla river (Zillul Bari)

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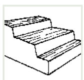
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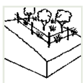
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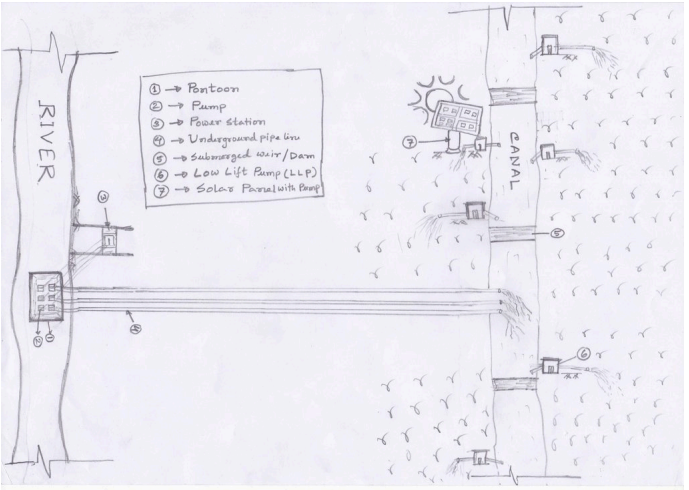
1. Pontoon: Length 55 ft, Width: 25 ft, Height: 4.50 ft
2. Centrifugal pump (12 nos)—each pump 60 HP,capacity-2.5 cusec, pump head: 50m
3. Electric power station capacity: 750 KW
4. Underground water distribution line (12 nos): Length of each line is 3.50 km
5. Length of water storage canal (Sharmangla canal): 29.0 km (average width 15.0 m and depth 5.0 m)
6. Nos of submerged weir/dam to reserve water in the canal: 14 nos
7. Nos of LLP (electrified) to lift water from the canal to crop field through buried pipeline : 27 nos
8. Nos of solar pump to lift water from the canal to crop field through buried pipeline: 06 nos
9. Nos of Prepaid meter for collecting irrigation charges (Revenue): 33 nos
10. Irrigated area: 1850 ha
11. Construction materials:
-Pontoon: A kind of platform that float on water made of Mild steel sheet, Stainless steel etc.
- Power station: Transformer, electric pole, wire etc.
- Distribution line: mild steel and PVC pipe
- Dam/Submerged weir: steel bar, cement, sand, brick, stone etc.



Author: Sayed Zillul Bari

- (**1 Pontoon, Pumps, Pipes, weir construction etc** volume, length: **Pontoon (Length 55 ft, Width: 25 ft, Height: 4.50 ft) is a platform build on iron sheets, that can float on river, where pumps were set. The pipes for water delivery were of PVC. Water canal in this case compiler referred to canals of Barind which were ephemeral. Now water reserve for year round use.Piping system includes PVC pipe to convey water to the field, where a valve was set to control water disposal. There is a pipe of 12 inch dia to maintain water head through out the system.**)
- **BDT**
- ( ) 1 USD = 85.0 BDT
- 800 BDT

Pontoon construction, power supply and lining of the underground piping system.

1. Pontoon construction and installation on the river (/ : 60 days)
2. Pumps installation on the pontoon (/ : 30 days)
3. Construction of underground water distribution line (/ : 70 days)
4. Re-excavation of derelict canal (/ : 120 days)
5. Construction of submerged weir / dam (/ : 180 days)
6. LLP installation at the canal bank (27 nos) (/ : 150 days)
7. Solar pump installation (06 nos) (/ : 45 days)
8. Pre-paid meter installation at pump sites to collect irrigation charges (33 nos) (/ : 30 days)
9. Buried pipe line construction for irrigation at crop land sites (/ : 120 days)

			(BDT)	(BDT)	%
Pontoon construction and installation on the river	1	1,0	5000000,0	5000000,0	
Construction of underground water distribution line	1	1,0	27800000,0	27800000,0	
Construction of submerged weir / dam	1	14,0	1600000,0	22400000,0	
Re-excavation of derelict canal	1	1,0	29000000,0	29000000,0	
Pre-paid meter installation at pump sites to collect irrigation charges	1	33,0	243000,0	8019000,0	
Solar pump installation	1	6,0	2000000,0	12000000,0	
LLP installation at the canal bank (27 nos)	1	8,0	2700000,0	21600000,0	
Pumps installation on the pontoon	1	12,0	1833000,0	21996000,0	
Buried pipe line construction for irrigation at crop land sites	1	1,0	23100000,0	23100000,0	
				170'915'000.0	
				2'010'764.71	

1. Pontoon repair and maintenance (/ : 1/5years)

2. Pump repair and maintenance (/ : As per requirement, 1/yr)
3. Distribution line maintenance (/ : As per requirement, 1/yr)
4. Power station repair and maintenance (/ : As per requirement, 1/yr)
5. Submerged weir / dam repair and maintenance (/ : 1/5yrs)
6. LLP repair and maintenance (/ : 2/yr or as and when necessary)
7. Buried pipe line repair and maintenance (/ : 1/6yrs, as and when necessary)
8. Prepaid meter repair (/ : 2-3/yr)

			(BDT)	(BDT)	%
Prepaid meter repair	1	0,2	100000,0	20000,0	
Buried pipe line repair and maintenance	1	1,0	0,05	0,05	
Pontoon repair and maintenance	1	1,0	500000,0	500000,0	
Pump repair and maintenance (each)	1	1,0	20000,0	20000,0	
Distribution line maintenance	1	1,0	75000,0	75000,0	
Power station repair and maintenance	1	1,0	50000,0	50000,0	
Submerged weir / dam repair and maintenance (each)	1	1,0	200000,0	200000,0	
LLP repair and maintenance (each)	1	1,0	50000,0	50000,0	
				915'000.05	
				10'764.71	

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✓ 1,501-2,000
2,001-3,000
3,001-4,000
> 4,000

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Most of the rainfall events happen during May to October
Agroecological region 26

(0-2%)
✓ (3-5%)
✓ (6-10%)
(11-15%)
(16-30%)
(31-60%)
(>60%)

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✓ 5-50
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At present land users are used to grow high water demanding crops. For example Boro paddy and potato both crops require large volume of water and the irrigated area slowly increasing, that situation demand of irrigation water increasing.

The supply of agricultural inputs increased and channelized

through deploying dealers etc. Hence expenses relatively decreased

Basically in this area could be grouped in to two. One group has almost no land and previously they have to migrate beyond barind area as labor and they were poor. At present they have job (agri-labor or otherwise) in their area and become more solvent then past 90's. On other hand the second group cultivate the land of their own or leased, which they could not in 90's. They also in handicap because of poor crop and no option to cultivate in two seasons. Hence apparently both groups as of their status are in well shape. The peoples those who have no land for cultivation now can engage them in many other entrepreneurship (e.g. farm product marketing, livestock/poultry raring, carpentering, grocery, etc etc) emerged.

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Along with the Barind Multipurpose Development Authority (BMDA) other national institutions like Department of Agricultural Extension, Livestock, Fisheries, Bangladesh Rural Development Board (BRDB), Financial institutions- Rajshahi Agricultural Development Bank and others (NGO) are operating more effectively in the Barind in multiple dimensions. In addition students from Rajshahi University also engaged in their research on various issues. BMDA also improving its capacity and skill to develop more effective approach for Barind area.

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This comment was done comparing between conveying water by open drainage and through pipeline. Definitely there are almost no run-off from pipe line distribution. On the hand land users have to confirm their field bunds to protect run-off. Prepaid metering system also restricted land users not to allow excess water to over flow from their field. In-spite of that there may be small amount run-off, but the detachment of top soils is within tolerable limit and accumulate within field bunds.

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It is reported that ground water slowly recharged, As a results shallow tube wells are also working , which were about to abandoned before.

Vegetation coverage increased,

Increased land cover-Reduced drought

In 90's the lands were bare and in monsoon after heavy downpour a large amount of water going to downstream as

run-off with detached top soil. At present land is covered, field bunds are strengthen, restrict run-off as a result soil loss decreased.

Field bunds enhance soil accumulation by limiting run-off water by field bunds/dykes.

Mechanized cultivation and usage of farm machinery however enhance soil compaction.

Emission of carbon decreased as vegetation cover round the year increased.

Reduced dusty wind, temperature cooler then before.

The Barind was almost desert like before 90's. Its natural vegetation were almost extinct. Biodiversity both Species and habitat were low. At present it is improving spectacularly.

None None

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Usage of surface water reduces groundwater abstraction and improves groundwater (GW) recharge

As the land cover has increased, that has a substantial impact on limiting polluted surface water to flow up to river.

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1-10%
11-50%
✓ > 50%

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0-10%
11-50%
51-90%
✓ 91-100%

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It could rather to explain as the beneficiaries of the technology. Truly a single land user or a group of land user will not able to install this type of system for multiple reasons. There are two components of this technology, one is the government institution who provided the scope of using surface water for irrigation and the second one are the land user who use the scope or facilities of irrigation system Here about 1800 farmers are involved to use surface water as their irrigation source.

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where there are no canal for water storage , local ponds are used to reserve the surface water to irrigate land surrounding the pods and obviously where river water could not be reached.

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- Ensured crop production through irrigation
- Reduced ground water irrigation and decrease ground water depletion.
- Increased work facility at project area

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- Improved socio-economic condition of beneficiaries
- Increased ground water recharge
- Increased fish cultivation and duck farming at the canal

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- Scope of individual level implementation is very limited Community approach will facilitate the SLM implementation etc.
- Maintenance, distribution and regulation of water etc have no control of the beneficiaries Capacity of the beneficiaries to be developed

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- Source of lifting water points may be shifted in the long run Efficiencies of irrigation water supply need more attention with demand and supply.
- Weak linkage with beneficiaries Integrated approach needed to include community and implementing agencies.
- Crops with high water demand may not sustain in the long run Appropriate crop and cropping patterns are to be adopted with crop zoning
- Increasing cropping intensity leads to deficiency of soil nutrients Monitoring of soil health essential for this region.

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https://qcat.wocat.net/km/wocat/technologies/view/technologies_5171/

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- Department of Environment (DoE) -
- Establishing National Land Use and Land Degradation Profile toward Mainstreaming SLM Practices in Sector Policies (ENALULDEP/SLM)

- Project documents: Available in BMDA

- Questionnaires on Tecnologies (QT): www.wocat.net
- Sustainable land management (SLM): https://knowledge.unccd.int/topics/sustainable-land-management-slm
- Achieving Land Degradation Neutrality at the country level: https://knowledge.unccd.int/topics/land-degradation-neutrality