UNIVERSITY OF ASIA PACIFIC

PROJECT

Course Code: CE 461

Course Name: Irrigation and Flood Control

Topic:

An Irrigation project management plan

For

Payra River,

Village: Krishnakathi,

Upazila: Bakerganj (Unions 14)

District: Barisal

Submitted To

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Source of Irrigation Water

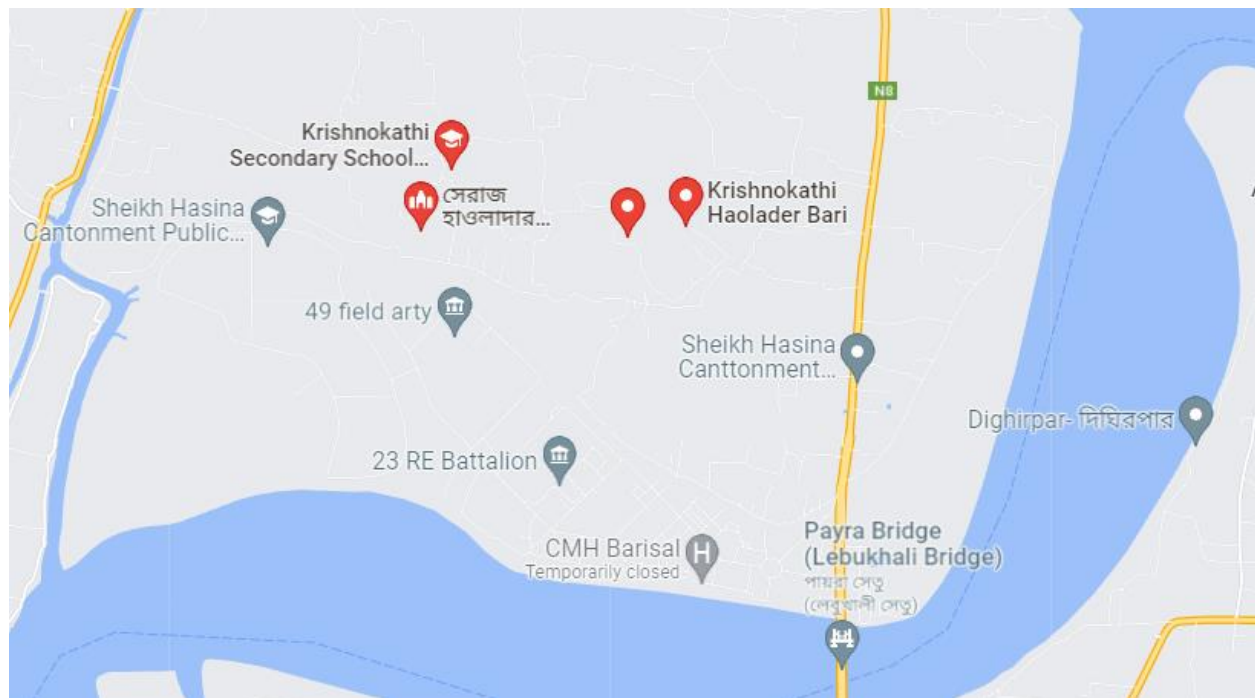**Fig. Location of Payra River, Krishnokathi (**22°28'11.8"N 90°19'06.2"E)

Availability of Irrigation Water

- To find out the availability of water we need to Assess total Water resources. River is not the only water resource other than river ponds, groundwater, rainwaters are also valuable water resources for krishnakathi village.
- Availability of water influenced by water requirement of sectors. Such as domestic use, industry and environmental needs.
- In krishnakathi village prioritizing water use for irrigation is necessary. Because most if the lands are agricultural lands.
- As Water availability can be change seasonally. Seasonal Consideration should be in concern.

Irrigation method

Based on the availability of irrigation water considering other sectors. Krishnakathi village is suitable for Furrow Irrigation. River payra flows beside the village as the river discharge is good enough for canal system. By using shallow channels to direct water form canal to base of the crop rows we can have an efficient furrow irrigation method. This method is less complex but initial cost is high.

Cropping Pattern

As krishnakathi is not a severe flood prone area versatile crops grows here. In Furrow method water efficiency is good and the availability of water in dry and monsoon season is enough for harvesting. Crop's timing given below,

Period	Crops Name
November- April	Rice, Vegetables, Tomatoes and Cucumbers, Sunflower and Soybeans
April – August	Rice, Jute, Mangoes
Whole year	Guavas and Bananas

Crop Name	Area Cultivated (in hectares)	Crop Period (in days)	Depth of Root Zone (in cm)	Daily Consumptive use of Water (in cm)
Rice	25	130	70	1.25
Jute	10	150	95	1.2
Sunflower	10	90	90	0.6
Tomato	8	70	55	1.0
Guava	15	120	60	3

Irrigation Data

Soil type	: Silty Clay Loam Soil
Field Capacity:	: 30%
Optimum Moisture Content	: 15%
Readily Available Moisture	: (30-15) %= 15%
Dry density of soil, ρ_d	: 1.33 g/cm^3
ρ_w	: 1 g/cm^3
Cultivated Command Area (CCA)	: 32 hectares

Irrigation Water Requirement

For Rice:

Water stored in the root zone = $\rho d/\rho w * d * R * A * M$

$$= \frac{1.33}{1} * 70 * 15\%$$

$$= 13.97 \text{ cm}$$

1.25 cm water is consumed by the crop in 1 day

13.97 cm is consumed by crop the crop in (13.97/1.25) = 11 days

Crop Period = 130 days

Base Period, B = 108 days

Total required water for irrigation, Δ = Consumptive use of water * Base Period

$$= 1.25*108 \text{ cm}$$

$$= 135 \text{ cm}$$

$$= 1.35 \text{ m}$$

Duty, D = 8.64 * B/Δ

$$= 8.64* 108/1.35$$

$$= 691.2 \text{ ha/m}^3\text{/s}$$

Intensity of rice, $I_{rice} = \dfrac{Area\ of\ crop}{CCA} * 100\%$

$$= \frac{25}{32} * 100$$

$$= 78,125\%$$

Discharge Required for Rice, $Q_{rice} = A_{rice} / D_{rice}$

$$= 25/ 691.2 \text{ m}^3\text{/s}$$

$$= 0.036 \text{ m}^3\text{/s}$$

For Jute:

Water stored in the root zone = 18.95 cm

Crop Period = 150 days

Base Period = 119 days

Total required water for irrigation, Δ = 1.43 m

Duty, D = 719 ha/m^3/s

Intensity of Jute, I_{jute} = 44.25%

Discharge Required for Jute, Q_{jute} = 0.04 m^3/s

For Sunflower:

Water stored in the root zone = 17.955 cm

Crop Period = 90 days

Base Period = 30 days

Total required water for irrigation, Δ = 0.18m

Duty, D = 1440 ha/m^3/s

Intensity of Jute, $I_{sunflower}$ = 31.25%

Discharge Required for Jute, $Q_{sunflower}$ = 0.00694 m^3/s

For Tomato:

Water stored in the root zone = 11 cm

Crop Period = 70 days

Base Period = 48 days

Total required water for irrigation, Δ = 0.48 m

Duty, D = 864 ha/m^3/s

Intensity of Jute, I_{Tomato} = 35.4%

Discharge Required for Potato, Q_{Tomato} = 0.01 m^3/s

For Guava:

Water stored in the root zone = 11.97 cm

Crop Period = 120 days

Base Period = 112 days

Total required water for irrigation, Δ = 3.36 m

Duty, D = 288 ha/m^3/s

Intensity of Jute, I_{Tomato} = 46.875%

Discharge Required for Potato, Q_{Tomato} = 0.0521 m^3/s

Total Discharge, Q = Qrice + Qjute + Qsunflower +Qtomato +Qguava

= 0.036 m^3/s + 0.04 m^3/s + 0.00694 m^3/s + 0.01 m^3/s +0.0521

= 0.14504 m^3/s

Time Factor (T.f) $= \frac{Actual\ Discharge}{Design\ Discharge}$

Therefore,

Design discharge, $Q_{design} = \frac{Actual\ Discharge}{Time\ Factor}$

$= \frac{0.14504}{0.75}$

$= 0.194\ m^3/s$

Again,

Capacity Factor (C.F) $= \frac{Average\ Discharge}{Design\ Discharge}$

Q_{avg} = Capacity Factor * Design Discharge

=0.85*0.194

=0.1649 m^3/s

This amount of discharge is sufficient for Furrow method.