

SCOPING STUDY FOR AQUATIC-AGRICULTURAL RESEARCH IN HIGHLY SALINE AREAS OF BANGLADESH

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ABSTRACT

This paper focuses on scoping studies, to assess the feasibility of aquatic-agricultural research in coastal saline area of Bangladesh. To reveal the rural communities requirement, a scoping study has been done in very high saline area of southwest coastal area in a bottom up approach. The location of the scoping study was in four villages (Khanjia, Shehara and Gopalpur, Soalia) of two polders (polder 3 and polder 5), respectively. Structured questionnaire was used to interview 50 male and female participants in all villages along with the government and private sector official. Questions were on water issues, major cropping systems, livestock, aquaculture, homestead farming, women participation, environment, nutrition, training, sources of inputs and overall constraints. It was observed Polder 5 is very high saline, among which Soalia is extreme saline than Gopalpur. Polder 3 is also very high but Khanjia is less saline than Shehara. In all location fresh water for household is a constraint, drainage is not sufficient that increases salinity and water governance conflict among elite exists. People are not aware of advanced agricultural and fish farming technologies. They have limited excess to good seeds, fingerlings and training. To solve this issues field research, motivation, policy and institutional level work need to be done.

Keywords: very high saline, coastal area, scoping study

1. INTRODUCTION

Definitions of scoping studies are few and far between. At a general level, scoping studies might 'aim to map rapidly the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before' (Mays et al., 2001). Arksey and O'Malley (2005) defined scoping study as a systematic review that tends to address broader topics where many different study designs might be applicable. It is less likely

to seek to address very specific research questions or, consequently, to assess the quality of included studies. Scoping study is important for researchers and research funders that includes broader topic with range of study designs relevant.

The coastal saline area of Bangladesh is divided into 5 categories namely very high saline, high saline, saline, moderate saline and low saline (SRDI, 2010). The agricultural research in coastal area of Bangladesh (BD) has spread a lot in mostly moderate saline and low saline area (Ritu et al., 2015; Mondal et al., 2015 and Saha et al., 2015). But very limited review has been done in very high saline areas in a bottom up approach to reveal the rural communities requirement. These paper will focus on the scoping study that has been carried out on April 2015 to perceive as one part of an ongoing process of reviewing, the ultimate aim of which is to produce a full systematic review to disclose research issues in very high to high saline land of southwest coastal Bangladesh.

2. RESEARCH METHODS

2.1 Study Site

Coastal region of BD is saline. But intensity of salinity is higher in southwest part than that of northwest part (SRDI, 2010). The coastal saline area of BD has a number of polders to protect from saline water flooding (CZPo, 2005) and reduces soil salinity (Fig.1). The scoping study was conducted in the very high saline (Satkhira district) area. Two polders (polder 3 and polder 5) were selected (Fig. 2 and 3) for scoping study for future aquatic agricultural research. Two villages were selected in each polders for interviewing male and female farmers, GO and NGO officials. Polder 3 was under Kaliganj upazila and polder 5 was under Shyamnagar upazila of Satkhira district. Two villages of polder 3 was Khanjia and Shehara and in polder 5 Gopalpur and Soalia were the 2 villages.

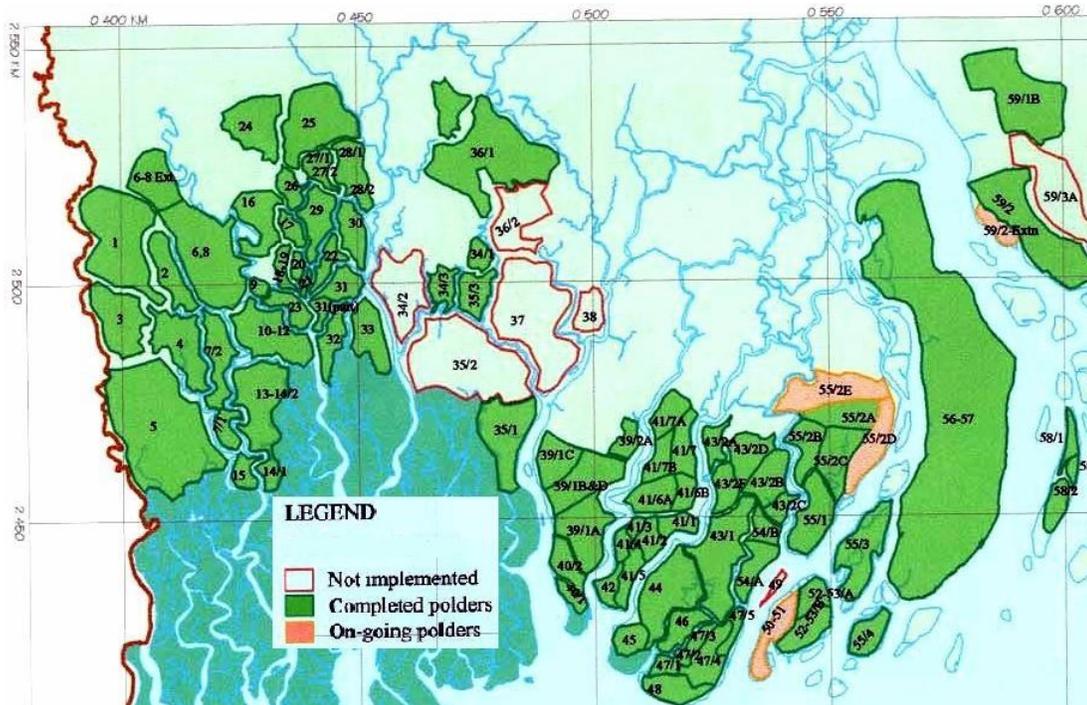


Fig. 1: Polders in the coastal saline areas of Bangladesh.

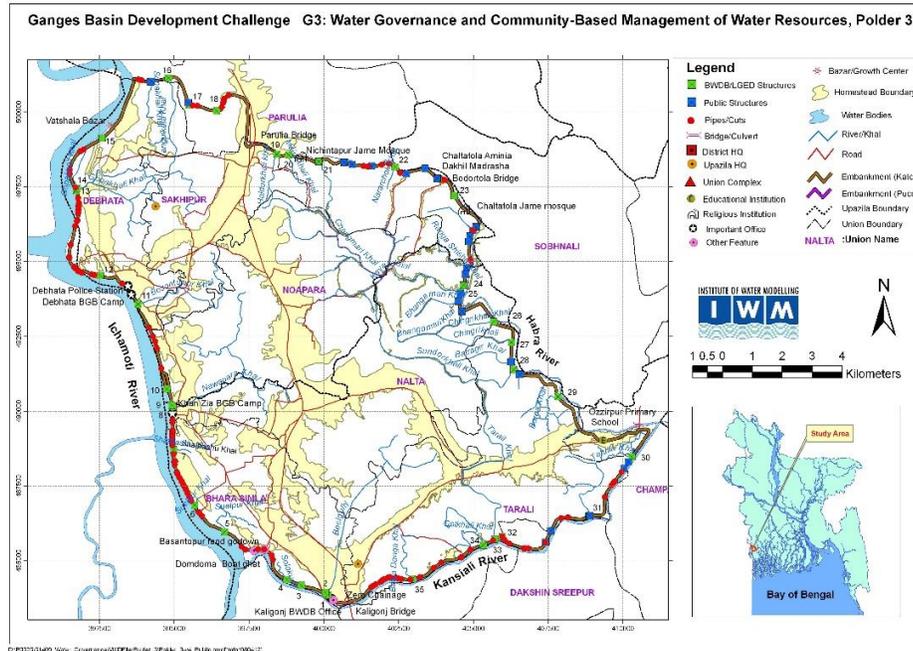


Fig. 2: Polder 3 of Sathkhira district, Bangladesh.

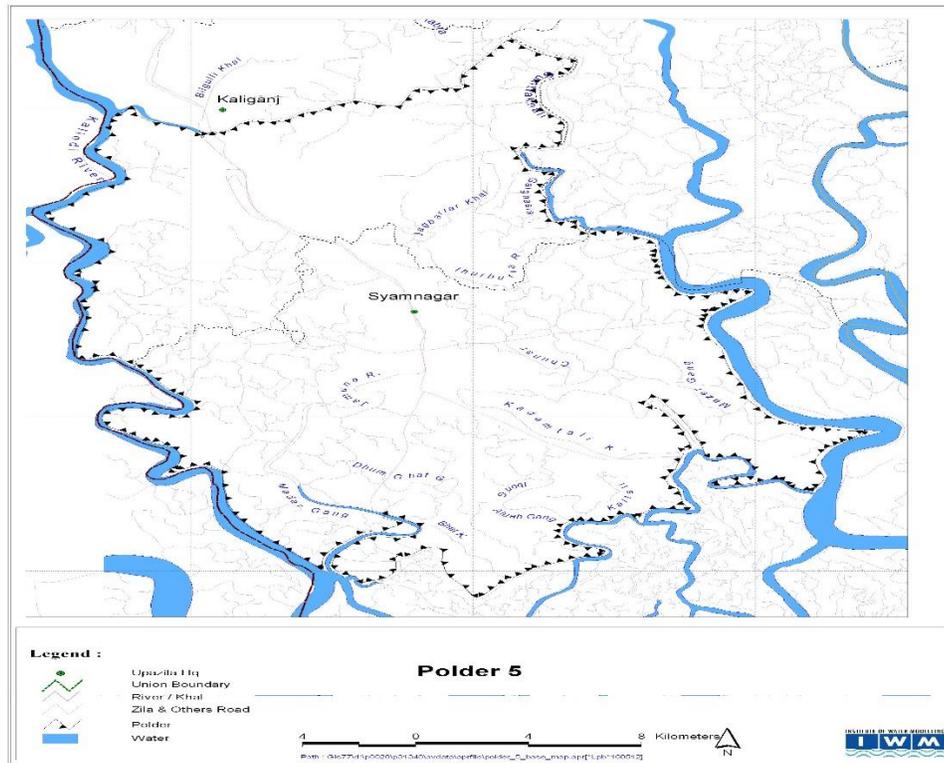


Fig. 3: Polder 5 of Satkhira district, Bangladesh

2.2 Scoping Study Process

Structured questionnaire was prepared to find out information on (i) water issues, its availability, uses for agriculture and domestic purpose, governance and women participation; (ii) Major cropping systems and crops grown in field and homestead crop; (iii) livestock, poultry farming; (iv) Aquaculture, types of fish grown; (v) Training on crop cultivation, livestock, Fisheries, their seed, fertilizer availability, sources of inputs (vi) overall constraints on each topic.

In each village 50 male and 50 female participants were interviewed. Similarly in each upazila level government and private sector officials were interviewed. Among them Department of Agricultural Extension (DAE) officer, Department of Fisheries (DOF) officer, Bangladesh Agricultural Development Corporation (BADC), BRACK, PROSHIKa

After completing the interviews and field visit all information was compiled and presented in a tabular and point format.

3. RESULTS

3.1 Water availability, uses and governance

Among the four villages of very high saline area in two polders, Soalia is very high saline and Gopalpur, is moderately high saline location. Khanjia and Shehara is high saline area. Thus Soalia showed clear difference in almost all aspects compare to the other three location. As Khanjia and Shehara shows almost similar behavior in terms of water availability, water governance, cropping system as these two villages belongs to same upazila. The water availability for crop and domestic use and governance, is shown in Table 1 and 2. In the very high saline area, drinking water is scarce. Women has to bring water from shallow tube wells that are far away from their home. The water management committee and sluice gates of polders are operated by the influential persons and thus creates water logging, increases salinity. General people are not satisfied with the water governance system.

Table 1: Fresh water availability and management

Khanjia and Sehara	Gopalpur	Soalia
Fresh water availability – Aug-Dec	Fresh water availability – Aug-Dec	Fresh water availability– Aug-Sept
Sluicgate operated by influential <i>gher</i> owners		
Each <i>gher</i> owner pay Tk10/bigha/year to the “committee” for O&M	Each <i>gher</i> owner pay Tk50/bigha/year to the “committee” for O&M	Rich <i>gher</i> owner took control of the canal and resource for O&M
No women in the committee		
Happy with present management	Not happy with present management	

Table 2: Fresh domestic and drinking water availability

Khanjia and Sehara	Gopalpur	Soalia
Available in pond during Jul-Mar for domestic use (cooking, washing, bathing)		Available in pond/ditch during Aug- Dec. But it become saline through intrusion
Drinking water is scarce in all location		
Drinking water collected from 2 STW (3km away)	from 2 STW in the village (1 km away) and one pond sand filter	from STW (1 km away)
Salinity, arsenic and iron is a common problem an all location		
80% women carry the water twice a day		
Rainwater is use for domestic and drinking purpose for a short time (max 3 months)		
Proposed solution from the community: Deep tubewell and supply water system Rainwater harvesting Pond reservoir construction		

3.2 Cropping System, Crop, Livestock and Aquaculture

Wet season rice (aman rice), mainly BR 23 is common variety grown in all four locations (Table 3) followed by saline water shrimp (*Bagda*) and other fish in the shrimp pond that are locally called *white fish*. *Gher* (fish pond) owners do not want to open the sluice gate to drain out excess rainwater to save the fish in the pond. Dry season is very limited. The main cash crop of these saline areas is mainly shrimp. Farmer rear cattle, goat, chicken duck and sheep in all 4 villages at homestead level that are done by women. Due to scarcity of grassing land scarcity of milk is year round. Homestead vegetables, seasonal fruits and timber tree is grown in three villages except Soalia (Table 4). Because, soil salinity of Soalia increases due to increase of saline water shrimp cultivation that create the scenario like no trees or vegetables in Soalia, even the coconut trees are dying due to salinity. *Golda* (non-saline water shrimp) is the main fish cultured in Khanjia with a limited *Bagda* (saline water shrimp) (Table 5). In Shehara village, *Bagda* is cultured (15%) instead of *Golda* in ponds with other fish, which indicates Shehara has higher salinity

level than Khanjia. Gopalpur also has the similar trend as Shehara but the percentage of *Bagda* culture is higher (60%) but less than Soalia (90%).

Table 3: Cropping system, crops and livestock

Khanjia and Sehara	Gopalpur	Soalia
Aman – Bagda and white fish		
HYV is dominating, very less local variety (1%). BR23 is the popular variety		
Aus and boro (dry season rice) is grown in pocket areas by pond water irrigation and rainfed		None
Fuel, fodder and oil crop (sesame, mustard, moisna) are very low		None
Cash crop: Shrimp, Vegetables, Beattle leaf,		Shrimp, white fish
Food crop: Rice, pulse (khesari)		Rice
Livestock: Cattle: 40% Goat: 70% Chicken: 90% Duck: 35% Sheep: 10%	Livestock: Cattle: 30% Goat: 80% Chicken: 80% Duck: 35% Sheep: 35%	Livestock: Cattle: 45% Goat: 70% Chicken: 90% Duck: 0% Sheep: 2%
Milk shortage year round		
>70% women are involved in livestock rearing Women are involved in different activities of crop production 90% women collect fuel (dry leaf, dead stick)		

Table 4: Homestead crops/plants

Khanjia and Sehara	Gopalpur	Soalia
Vegetables grown in monsoon and winter (gourds, spinach, red amaranth, beans, eggplant, okra, potato, cauliflower, cabbage, olcopy)		Very limited vegetables as household is small.
Fruits: Mango, guava, banana, blackberry, coconut, sobeda (Chiko), date, palm, Jamrul, jujubee. But not everyone has all the fruit trees		Fruit trees: coconut, date, palm
Other trees: timber trees (rain tree, neem, Mahogany)		Other trees: a few timber (rain tree)

Table 5: Aquaculture system

Khanjia	Shehara	Gopalpur	Soalia
Pond aquaculture-25%	Pond aquaculture-25%	Pond aquaculture-65%	Pond aquaculture-90%
Golda-2%	Golda-0%	Golda-0%	Golda-0%
Golda/white fish-85%	Golda/white fish-0%	Golda/white fish- 0%	Golda/white fish-0%
Bagda-5%	Bagda-0%	Bagda-0%	0%
Golda+white fish-95%	Bagda+white fish-15%	Bagda+white fish-60%	Bagda-0%
Rice-Fish-90%	Rice-Fish-5%	Rice-Fish-10%	Bagda+white fish-90%
			Rice-Fish-30%

3.3 Environment, nutrition and training

Extreme saline area destroyed the environment that no plant vegetables or tree is growing plants of mangrove area is increasing. In all areas, Fish and plant diversity is decreasing, that influenced the nutritional level of those areas. Farmers are not getting enough training on modern technology of agriculture, aquaculture and improve livelihood. No organization is working to motivate them to improve the land and environment except providing microfinance, though poor people do not like salinity and saline fish farming.

Table 6: Information sources, GO, NGO and Private Sector

Khanjia and Sehara	Gopalpur	Soalia
Information source: discussing other farmers, from DAE , DOF, BADC and Private sectors		
NGO's: Khanjia: No NGO reported to be working Shehara: BRAC, DAM, SUS, ASA, UTTARAN	NGO's: SHUSHILON, BRAC, SETU, Uttaran, SUS, , ASA, Jagoroni Chokro Grameen Bank, BARSA * Mainly micro finance	NGO's: ASA, Jagoroni Chokro, BRDB, Grameen bank, BARSA * Mainly micro finance
Training or activities: Sehara: BRAC (fish), DAM (poultry) SUS (vegetables) ASA (MFI) UTTARAN (poultry)	No one reported of receiving any training	No one reported of any training
Private Sectors for crop : ACI, Bayer, Laal teer, Syngenta, Novartis, Biofuel, For fish: Mega feed, Quality, Modern, Saudi Bangla, Niribili, Balaka, Bengal		
<p>Access to Market: Markets are mostly within 3 km (accessible) Due to low production, and HH consumption, very little left to sell. Middlemen would come and buy from farmers directly. Not many farmers would go to market and sell. Middlemen saves their time and cost. If the production could get higher, prices would get higher too.</p>		

Table 7: Nutrition and health

Khanjia and Sehara	Gopalpur	Soalia
<p>malnutrition of pregnant mothers and children under 5, stunting and underweight Sever lack of hygienic sense (even don't wash hand) Female disease Hungry months are September-November They need to buy pulse, rice, vegetables, fruits, fish, egg, meat. So most of the time they are in shortage. They get health services Health complex, community clinic. Common diseases: Diarrhoea, dysentery, anaemia, Fever and cough, worm, ARI, pneumonia, iron and folic acid deficiency, psychological disorder and suicidal tendency.</p>		

Table 8: Environment and Biodiversity

Khanjia and Sehara	Gopalpur	Soalia
Fish and plant species are decreasing		
Rice: local variety (costly) chinikani, patnai about to disappear		No local variety
Fish: Boal, Koi, Sing, Magur, Snakehead.		
Plant: coconut, mango, jackfruit, amloki, kotbel, defol, horitoki, chirota, Joyfol, Arjun are decreasing. Only neem and timber tree (rain tree and mahogany) are increasing.		Keora and Geoa are increasing

Table 9: Constraints and Emerging issues

Khanjia and Sehara	Gopalpur	Soalia
<p>Constraints: Drinking water shortage Increasing soil and water salinity Drainage and siltation in river and canal bed Unauthorized structure construction and polder damage Viral disease in shrimp Quality seed, feed and fertilizer Inadequate training Shortage of fodder Electricity supply Health, hygiene and sanitation Inadequate nutritious food People are migrating</p>		
<p>Farmers capacities, willingness and history of leading local development agendas and efforts: Rainwater harvesting system by water reservoir Installation of DTW Tried to get electricity connection About 90% community people are poor, who are deprived from the benefit of shrimp farming and unable to raise their voice even in the local policy level ****All small farmers, specially shrimp growers want to return back to the fresh water system</p>		

4. CONCLUSION AND RECOMMENDATION

The scoping study was conducted to observe the problem and prospect that can generate research question and research issues in very high to highly saline land of southwest coastal Bangladesh.

According to the scoping study, it was observed as per water issue that people does not have access to freshwater for household use and for agriculture. Salinity intrusion is affecting agriculture. There is lack of effective drainage. It is needed to find mechanisms for settling water conflicts favors elite.

From the technical point, accessibility of appropriate technology (quality seeds of saline tolerant crops, disease free post larvae, drought tolerant crops) is less. They do not have availability of local seeds (crops seeds or fingerlings). People needs technical support to cope with field problems. There is less capacity building approaches (training techniques, quality, duration and structure, credible trainer). Furthermore, top down training implementation does not always fulfil farmer's needs and demands

In needs institutional approach to resolve poor management of sluice (by BWDB/Polder Mgt Com); poor maintenance of polders and access roads (by BWDB and community); inadequate or poor design of poverty alleviation and livelihood programs; and lack of coordination and integration of GO-NGO-Private sectors efforts.

From the study information gathered for policy making that current aquaculture practice favors saline based ventures relative to agriculture or fresh water aquaculture; favorable programs for HYVs ; current rules for polders are for drain-out only (rules should now look at both drain out and inflow)

Overall cultural observation was that perceptions that farmers have limited capacity to learn; tendency of elite to coerce the "poor" (when consolidating land for *gher*); belief that corruption is part of the game; and relief mentality. Lastly women Roles in society defined by religion/culture.

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