



## MONITORING AND LAND USE MANAGEMENT APPROACH TO SALINITY FOR HATIYA & RAMGATI SOIL SERIES OF NOAKHALI DISTRICT

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### Abstract

In Bangladesh coastal area covers about 2.85 mha which is approximately 30% of the net cultivable land. Among these 2.85 mha, 0.833 mha is affected by varying degree of salinity. Cropping intensity of the area is 133%, which is much less than the country average of 180%. Besides salinity, tidal surge, scarcity of good quality irrigation water, lack of salt tolerant germplasm etc is the main factors for crop intensification in the area. It is observed that the salinity of the area is mainly seasonal. Salinity reaches peak in Rabi and Kharif-1(March to May) and lowest in Kharif-2(June to October). Using salt tolerant germplasm and modern management practices can double cropping intensity of the area. To achieve this goal, continuous monitoring of salinity, strong Government policy and intensive farmer's motivational program is needed.

**Key words:** Land Use Management, Salinity, Hatiya & Ramgati Soil Series.

### Introduction

In greater Noakhali district total coastal area is about 0.22mha. The tidal lands on the coastal plain including the Chittagong coastal floodplain and the Matamuhuri tidal floodplain occupy less than 6%. Estuarine floodplains occupy about 18% of the total coastal area located in greater Noakhali, Barisal, Patuakhali and a smaller area of Chittagong districts (Karim et al., 1982). Out of 2.86 million hectares of coastal and offshore lands about 1,056 million ha (SRDI, 2010) of arable lands are affected by varying degrees of salinity. The salinity of the area is mainly caused by capillary rise of saline ground water, tidal surge, seasonal variation of rainfall and absence or inadequate vegetative covers. The main land use of the area is one wet land rice crop. There are also some dibbling Aus & Rabi crops adjacent to homesteads. Most of the land remains fallow in the dry season (January- May) because of soil salinity, lack of good quality irrigation water and late draining condition (Karim et al., 1990; and SRDI, 2001).

**Table 1.** General Information of the Monitoring Sites

Site no.	Location	Land type	Soil series	Present Land use
1.	Sullagutia	Medium High land	Hatiya (Poorly drained silty clay loam soil. Structure: Moderate, coarse, prismatic and angular blocky.)	RC(Khesari)-F-TA (Local)
*2.	Mannan Nagar	a) High land	Ramgati (Imperfectly poorly drained, silt loam, calcareous soil. Structure: moderate to strong, coarse, and prismatic.	Rabi & Kharif vegetables (with irrigation)
		b) Medium High Land	Ramgati	RC (sweet potato, maize, sunflower etc.)-F-TA (HYV)
3.	Char Jubilee	Medium High Land	Ramgati	F-F-TA (L)
4.	Khaser hat	Medium High land	Ramgati	F-F-TA (L)
5.	Bhuiyan hat	Medium High land	Ramgati	F-F-TA (L)

\* Site no. 2 is on MCC farm.

At present, northern part of the area within the polder is flooded mainly with rain water. The most significant feature of hydrology in relation to agricultural development is the seasonal shallow flooding. Highland, medium highland and medium low land, low land and very lowland occupies about 5%, 50%, 10%, 4% and 1% land respectively, in coastal areas. In these areas, flood water recedes from about 23% area within October, from 34% area in November to mid December and from 19% area in late December (SRDI, 2010) or in early January, particularly in the southeast coastal areas (Sattar, 2002; Sattar and Mutsaers, 2004). The land of the area remains fallow not only during peak period of salinity but also on the period of declining salinity. Cropping intensity is 133 % as compared to the national average of 180 %. Using suitable varieties, building of water reservoir, applying modern agricultural & management practices and year round monitoring of soil salinity can increase crop yield of the area.

### Objectives

1. Determine soil and water salinity round the year;
2. Identify the present land use and crop tolerance to salinity;
3. Study the influence of rainfall on desalinization and
4. Provide necessary data base to develop appropriate technology for future reclamation and management practices.

### Materials and Methods

To monitor salinity status of the area 5 representative sites had been selected at Sudharam & Subarna Char Upazila starting from north to extreme south. The soil series are Hatiya & Ramgati and land type is medium high land except 2a, which is high land. Soil samples at various depths (0-10cm, 10-30cm, and 30-60cm) water samples from surface, ground and river & other related information are being collected in every month. Conductivity Measuring Bridge determined the EC of soil and water. For soil sample 1:1 soil-water pests are made and in case of water sample EC is measured directly. For soil samples EC was corrected by correction factors.

### Results and Discussions

It observed from the data that the salinity problems of the area are mainly seasonal. The affect of salinity becomes severe during Rabi & Kharif-1 season and lowest in Kharif-2 season. Salinity of selected sites ranges from S0 (<2) to S5 (>15dS/m). The salinity of the coastal areas is mostly NaCl type. The predominant cation of the coastal areas is Na<sup>+</sup> followed by Mg<sup>++</sup>, Ca<sup>++</sup> and K<sup>+</sup>. The predominant anion is Cl<sup>-</sup> followed by SO<sub>4</sub><sup>--</sup>, CO<sub>3</sub><sup>--</sup> and HCO<sub>3</sub><sup>-</sup>. High Mg/Ca ratio causes problems to soil fertility, soil physical properties and plant growth. pH of soil solution varies from 6.6 to 8.3 depending on season and soil series. The high pH is a characteristic feature of all coastal saline soil. Although, K is generally high in saline areas than other areas, the excess Na is likely to cause deficiency of K and causes decrease crop yield. Therefore, it should be better to apply K along with N & P for better yield.

Total area of Sudharam & Subarna Char Upazila where monitoring sites situated is 94,795 ha. Medium high land dominates the landscape of the two Upazila. Out of 94,795 ha, about 56,034 ha of Land is affected by different degree of salinity. Cropping pattern of the area is dependent on the intensity of salinity. In low saline areas local Aus, Aman and Rabi crops are grown. The Rabi crops are sweet potato, groundnut, chili, pulses and winter vegetables.

In most cases, the salinity of the area starts to rise from November/ December and reaches peak during March-April and starts to fall with the advent of rainfall and it is minimum during July-October. The fluctuation of salinity is controlled by rainfall its intensity, duration, timing and temperature.

### Problems for Crop Intensification

The main problem for crop intensification in this area is salinity in dry season. In addition to this others were:

- Non-availability of appropriate germplasm;
- Scarcity of sweet water during dry season;
- Lack of available moisture during dry season.
- Evenness of the topography.
- Heaviness of soil texture
- Occupation of most of the land by vested group(non-farmers) and their absence in the area;
- Poor condition of the farmers;
- Lack of communication and marketing facilities.

### Mitigation of problems

- Digging of existing channels and construction of sluice gates to reserve water for dry season;
- Innovation of more salt tolerant rice varieties;

- Cultivation of other relatively more salt tolerant crops like maize, sugar beet, sunflower, soybean, chili, tomato, lettuce, onion cauliflower, carrot, cow pea, groundnut etc.
- Evaluation of suitable fertilizer–crop-water management system;
- Strengthening of the management of the existing embankments and polder areas and construction of more embankments;
- Extensive forestation with multipurpose tree species;
- For specific crops like soybean, groundnut, sunflower, maize, cowpea etc. remunerative production packages should be provided as inputs to anchor the farmers;
- Extensive use of organic matter and
- Mulching
- Soil dressing with sand to change soil texture.

### Conclusion

Salinity commences with the beginning of dryness of soil (usually Nov-Dec) and attains its peak during the month of April-May and starts to decline with the advent of rainfall and reaches at its minimum level during July-Sept. So the fluctuation of soil salinity is controlled by rainfall, its intensity, duration & timing. Scarcity of good quality irrigation water during dry season limits cultivation of Rabi crops. In this area appropriate management practices for crop production is not available. With appropriate technologies consist of suitable varieties, sound cultural practices and adequate fertilizer management in coastal saline area can contribute to produce higher yield.

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