UNIVERSITY OF BARISHAL

A Project On

Title : **Salinity intrusion and vulnerability of southern costal belt people in Bangladesh.**

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Course Level : **Basic**

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Table of Content

Serial No.	Headlines	Page No
01	**Abstract**	1
02	**Introduction**	1-2
03	**Objectives Of the Study**	2
04	**Major Research Questions**	3-4
05	**Project materials and Method**	5-7
06	**Discussion on Major Findings**	7-11
07	**Recommendation**	11-12
08	**Limitations of The Study**	12
09	**Conclusion**	13
10	**APPENDIX**	13
11	**References**	14

Abstract:

In Bangladesh's coastal regions, one of the main issues is salinity intrusion. The issue gets worse, particularly during the dry season, when there is insufficient rainfall to reduce the saline concentration in surface water and remove salt from the soil. In Bangladesh, crop productivity has been found to be largely attributed to salinity. Thus, a study on the impact of saline intrusion and coastal region vulnerability in Bangladesh has been conducted. Key informant interviews and unstructured interviews were the two main strategies used to gather primary data. Research has shown that an increase in salinity causes agricultural productivity, the expansion of producing vegetation, and a detrimental effect on socioeconomic situations of the study areas people. Moreover, in maximum cases, people of the study area are changing their occupations such as shrimp farming, prawn collection, shopkeeper, labor, etc. Some of them work in urban mills and factories. Some people migrate from coastal areas to urban areas.

Introduction:

A silent but ubiquitous threat to millions of people's lives and livelihoods, salinity intrusion poses a serious hazard to Bangladesh's southern coastal region. This region is a hotbed of ecological diversity and natural beauty, tucked between the Bay of Bengal to the south and a maze of rivers and tributaries to the north. But its residents have to deal with saltwater constantly seeping into their freshwater supplies, which is a result of both natural occurrences and human activity. Fundamentally, salinity intrusion is the introduction of saline water into ecosystems that are normally freshwater, drastically changing the delicate equilibrium that these communities have depended on for many generations. The two main forces behind this phenomenon are the unstoppable rise in sea levels caused by climate change and the artificial barriers to freshwater flow caused by dams, embankments, and upstream diversions. Coastal areas experience flooding due to rising sea levels, which causes population displacement and submergence of arable land. Meanwhile, changes to riverine systems upset freshwater's normal flow, allowing saltwater to infiltrate farther inland than before. The effects of salt intrusion are felt deeply in the fabric of coastal life, causing harm to the socioeconomic environment and eroding community resilience. In the field of agriculture, once-fertile soils become sterile and unyielding due to the sneaky effects of salinization. The brackish embrace of saltwater incursion causes traditional crops, such rice, which is a cornerstone of the Bangladeshi diet, to wither, depriving farmers of their only source of

food. The threat of poverty looms large over these coastal communities, shattering livelihoods and jeopardizing food security, so prolonging a cycle of suffering and disenfranchisement. However, the threat posed by saline intrusion is not limited to fields; it also reaches into the homes of people it impacts, tainting priceless freshwater supplies and endangering public health.

Objectives Of the Study

The specific objectives of the study are-

a) To assess the social, economic, and physical condition of people.

b) To identify the impact of salinity intrusion on agriculture.

c) To identify the impact of salinity intrusion on occupation.

Major Research Questions:

1. What is the impact of salinity intrusion on agricultural production in a coastal area?

2. What is the impact of salinity intrusion on occupation?

3. What is the impact of salinity intrusion on health?

4. How water salinity affects the socio-economy of those areas?

Project materials and Method:

To conduct the research, a mixed-method that is the researcher has used both qualitative and quantitative methods. The mixed-method has been selected to make the breadth and depth of understanding and corroboration while offsetting the weakness inherent to using each approach by itself. And by the mixed method, we made the deliberate intervention of the study. The quantitative method has been used to present numerical data regarding the research topic. On the other hand, the qualitative approach has been used not to be collected in numerical terms and to describe the research's intensity and contour.

Sources of Data: The data required to conduct this research have been collected from the two sources. Namely-

Primary Sources:

Most of the data of the research have been collected from the primary sources. A field survey has been conducted at 10 unions of Dashmina and Kala Para Upazila in Patuakhali District for collecting the data. People from different union of the two upazila are chosen as the study population. A questionnaire survey, and 14 Case Study methods have been selected for this study.

Secondary Sources:

Secondary data have been collected from the recent research works and journal articles, international studies and reports, national data and the reports, newspaper reports, information from different websites.

Study Area:

The locations for the study were selected through the initial visit and observation of the gender-based vulnerability of water due to climate change-induced salinity. The name of the two Upazila's are Dashmina and Kala Para under Patuakhali district, Barishal division. Six Union from each upazila were selected for the study.

Data Collection Techniques:

The following data collection methods have been chosen to collect data and information from the study area in the research topic-

- Case Study
- Questionnaire survey
- Observation

Sampling Techniques:

Sampling refers to the population that is selected for investigation. In this study, random sampling techniques are employed. Simple random sampling technique will be employed to select representative sample respondent. The study involves a nonprobability sampling technique to draw the necessary sample from the target population. In this study, purposive sampling techniques also have been used in selecting respondents. By using purposive sampling techniques 14 cases have been selected.

Sample Size:

To carry out the study, the sample size is selected for 50 respondents from the two upazila (kalapara and dashmina) and random sampling procedure will be followed that is represented orderly in the following table 1.

SL NO.	Respondent categories	Respondents Quantity	Sample techniques
01	Male	35	Random Sampling
02	Female	15	
03	Total	50	

Data Analysis:

After gathering the data, another laborious task had to face, such as organizing the raw data in a form in which they can be analyzed suitably. When the collected data was analyzed then at first recording was checked again and again, whereas any information was not missing. All the data recorded in this study were written in the Bengali language after listening repeatedly and then translated into English.

To analyze the collected data researchers have followed a mixed method that is consisted of the following-

a) Quantitative Method:

To analyze the data by using quantitative methods, researchers have used Statistical Packages for Social Sciences (SPSS) software.

b) Qualitative method:

In this stage different qualitative data analysis methods have been used.

Data Presentation, Analysis & Findings.

Data collected through Questionnaire Survey:

The researcher conducted a questionnaire survey at Kalapara and Deshmina upazila under Patuakhali district from 50 respondents based on random sampling from the citizen. The questionnaire contains both the open-ended and close-ended questions by which the researchers have tried to know the volume impact of salinity intrusion and vulnerability of southern coastal area of the Respondents: A total of 50 respondents were asked the required information by the questionnaire survey. Occupation of the Respondents: The researcher collected data from different types of respondents. Among the respondents, the key respondents are Farmers student, service holders, businessman, teachers and others.

Data Analysis through Questionnaire Survey:

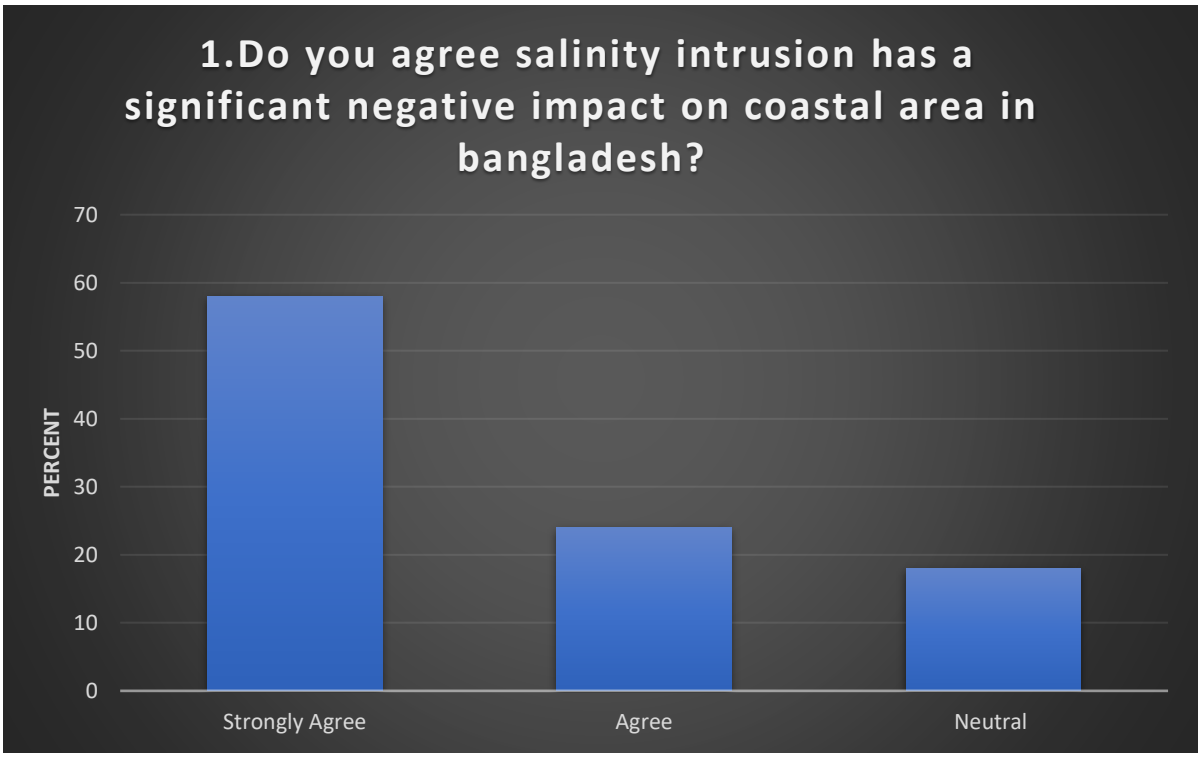
Frequency Table:1

1. Do you agree salinity intrusion has a significant negative impact on costal area in Bangladesh?

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
strongly agree	29	54.7	58.0	58.0
agree	12	22.6	24.0	82.0
neutral	9	17.0	18.0	100.0
Total	50	94.3	100.0	
Missing System	3	5.7		
Total	53	100.0		

Bar Chart 1:

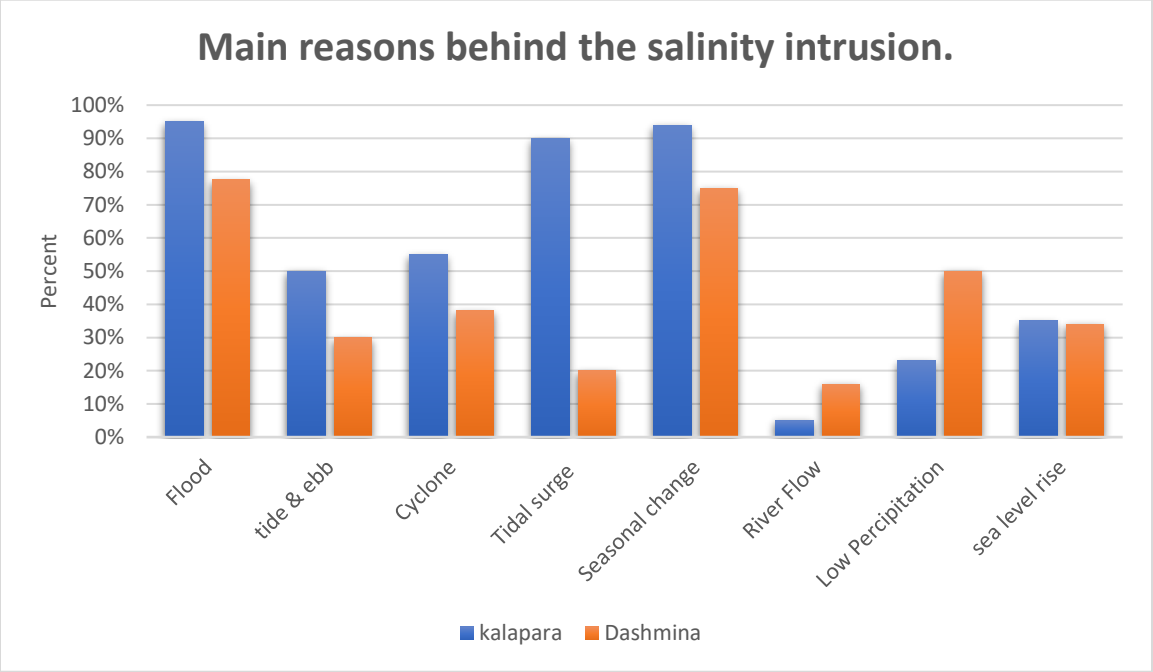
1.Do you agree salinity intrusion has a significant negative impact on coastal area in bangladesh?



Interpretation:

Interpretation: Based on the frequency table-1 and the bar chart-1 within 50 respondents 58% respondents were strongly agree, 24% respondents are agreed, and 18% respondents are neutral with the question. From the response of respondents, the researcher got a finding that the impact of salinity intrusion has strongly negative.

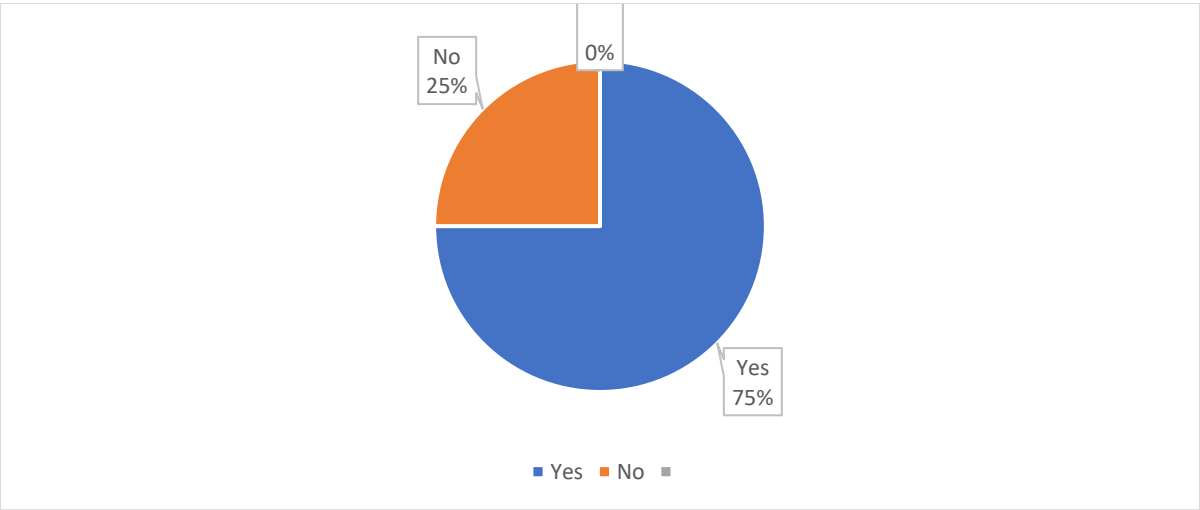
Main reasons behind the salinity intrusion.



Interpretation:

The coastal belt is exposed to saline water due to environmental and climate change. This infiltration of salinity does far more harm to the coastal areas. Numerous factors, including floods, tides, cyclones, tidal surges, and rapid sea level rise, can lead to salinity intrusion. More so than other reasons, the flood is connected to it. They are rendered defenseless when the flood brings this salty water since they are unable to escape it without bearing. Flood water is the primary source of almost all salinity intrusion. In Kalapara, flooding causes 95% of the salinity, while in Dashmina, it is 77.5%. The lower water flow, low precipitation, tide and ebbs are also responsible for saline intrusion water. Sometimes the salinity is caused by natural forces and sometimes human activities. The rise of sea level also contribute to this salinity in Kalapara and Dashmina is about 32.5%.

Pie chart:



Interpretation:

According to the frequency table-2 and pie chart-1 response of respondents 75% are affected and 35% are not affected by salinity related problems. On the basis of respondent's response, the researcher taken a finding that impact of salinity intrusion is more physical than psychological.

Data collected through Case study:

Case 1:

Respondent's personal information

Md.Jakaria Islam (age 24) is a college student of Mudupara village in Dhankhali union, Kalapara Upazila, Patuakhali district. He is unmarried and his family member is 5.

Effect of water salinity

He said that effect of water salinity in Kalapara Upazila, located in the Patuakhali District of Bangladesh, is multifaceted and impacts agriculture, drinking water supply, health, and the local ecosystem. Such as-

1. Agriculture: - Soil Degradation: Soil salinization, which lowers crop yields and soil fertility, is caused by high saline levels in irrigation water. Vegetables and rice, two common crops, are especially impacted.

Crop Damage: Osmotic stress, nutritional imbalances, and toxicity from certain ions, such as salt and chloride, are some of the ways that salinity can directly harm crops.
2. Drinking Water: - Water Quality: There is a serious health risk associated with sources of drinking water that are more salinized. It may result in kidney issues, cardiovascular illnesses, and hypertension.

Access Issues: Communities are forced to look for alternate water supplies, frequently at a higher cost and greater distance, as a result of saline intrusion in freshwater sources.
3. Health: - Diseases of the Water: The frequency of waterborne illnesses may increase with salinity in the water. It may also have an impact on a mother's health and cause problems.

Nutritional Impact: Food insecurity and malnutrition are two outcomes of decreased agricultural productivity that have an effect on the general health of the community.

4. Ecosystem: - Biodiversity Loss: Fish and other aquatic organisms may be impacted by salinity changes that modify the ecosystem's makeup. There may be additional effects on mangrove forests, which are vital to coastal ecosystems.

Fishery Decline: Many freshwater fish species are not able to withstand salinity, which has an adverse effect on local fish populations and fishing-dependent livelihoods.
5. Livelihoods: - Economic Impact: The local population, many of whom depend on these sectors for their livelihoods, suffers financial losses as a result of decreased agricultural productivity and declining fisheries.

Migration: People may be forced to migrate to urban areas due to economic challenges and worsening living conditions, which would alter the population and put more strain on the infrastructure of cities.

6. Educational Disruptions:

Natural Disasters: Salinity issues often coincide with natural disasters like cyclones and floods, causing school closures and educational disruptions.

Discussion on Major Findings

In the findings, it can be seen that the agricultural production of Kalapara and Dashmina Upazila under the Patuakhali district decreases day by day for salinity intrusion. Salinity intrusion is one of the serious problems in southern coastal belt people. From the statement of the problem, it was seen that the salinity intrusion in the coastal area is going a serious implication for the coastal land which was traditionally used for rice production. In the finding, it was found that salinity limits agricultural production, especially rice production. Agricultural activities, as well as cropping intensities, have been changing the farmers can't grow multiple crops in a year.

The most farmer cultivates rice at one time a year. Without rice, they can't cultivate another crop in this area for salinity.

- **Decrease rice production**
- **Low productivity of vegetables:**
- **Damage other agricultural production**
- **Increase shrimp cultivation:**
- **Increase shrimp cultivation:**
- **Negative effect on sweet water fishes: 6 Scarcity of pure water:**
- **Socio-Economic losses: Changing occupation:**
- **Effect on Health**:
- **Negative impact on Environment:**

Recommendation

Reduce saline water intrusion:

Reducing salinity intrusion in the coastal areas of Bangladesh involves a combination of engineering solutions, sustainable agricultural practices, community engagement, and effective policy implementation.

The Tentualia and Andar Manik River is now being dredged:

Without taking into account the negative impacts on the populations along waterways. As a result, there was a significant increase in localized suffering as a result of the dumping of saline sand. It resulted in a salinized water logging issue, which made the already dire circumstances even worse. This severely affected the lives and means of subsistence for hundreds of impoverished people and their tiny homes

Awareness building:

Designing strong advocacy and awareness build-up program for overcoming the myths, wrong beliefs, men made provision is an urgent need to protect the life of women in the study area. Women and men have to share responsibilities for water in the house.

Build a strong embankment:

During cyclones, river dams break and water enters the locality, resulting in long-term salinity problems. For this, we need to build strong dams.

Collect sweet water:

To collect sweet water government must take initiative to dig at least five pounds in each village to retain rainwater.

Agricultural subsidy:

Government provides a subsidy to encourage farmers to cultivate crops. Government also work for reduce salinity related vulnerability.

Limitations of The Study

Every research has some limitations regarding timing, cost, and staffing along with other shortcomings regarding the nature, scope, objectives, or of the research. A student being researcher having no experienced knowledge however the possible best effort was given to conduct the study scientifically. Some limitations of the study are given below:

1. As the study was conducted for academic purposes & there was not enough time to conduct this research. For this reason, the collected data of the study area may not represent the overall situation of the area.
2. Local people feel shy to speak so it is very problematic to collect data from them.
3. Most of the respondents in the village are illiterate so they cannot give proper information which is related to research.

Conclusion

Bangladesh's coastal regions are among those affected by salinity intrusion. The effects of saline intrusion are always felt by those who live along the coast; those in Bangladesh's southern coastal regions are particularly vulnerable. The results of the investigation validated this susceptibility once more. Since salinity intrusion may have detrimental effects on human health, food security, agriculture, fisheries, water, economic activity, etc., it is regarded as one of the biggest threats to the global environment. Bangladesh is perhaps one of the nation's most severely impacted by saline intrusion. The extremely salinized water hindered rice production. Salinity inhibits the growth of Sweetwater fish. Salinity also makes it more difficult to produce crops. Farmers in this area occasionally switch to other occupations. This region is known for its prawn farming. This place has extremely poor water quality. There are many people in this area that struggle to get clean drinking water. The residents of this area occasionally have skin or water-related illnesses. In this case, the government and other neighborhood organizations ought to take the required actions to encourage rice production and enhance living standards.

APPENDIX

1. Do you agree salinity intrusion has a significant negative impact on costal area in Bangladesh?

o Agree o Strongly Agree o Neutral o No Knowledge

2. How salinity intrusion t impact on costal area's people?

o Negative impact o Great negative impact o A Little negative impact o No impact

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