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Climate change affecting Tilapia farmers of Shubornochor and Hatia

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Abstract: Farming of Tilapia generates food for a lot of poor farmers in the District of Noakhali, Bangladesh. Noakhali has a lot of stagnant water bodies including ponds with dykes and ponds without dykes in the mainland and the newly accredited lands. Paddy lands with stagnant water is a very good ground for culturing tilapia and some other species of fish. This study considered extensive survey including Focus Group Discussion (FGD) to find out which environmental change challenge them the most to in generating income from Tilapia culture. It was found that increased rainfall (53.33%, 40% and 43.33% by different respondent group) challenged them the to earn money from Tilapia culture the most in Shubornochor while it was storm surge (43.33%, 46.67% and 53.33% by different respondent groups) in Hatia.
[Mehedi Mahmudul Hasan, Md Abdullah Al Mamun. **Climate change affecting Tilapia farmers of Shubornochor and Hatia.** *Nat Sci* 2021;19(1):37-42]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). http://www.sciencepub.net/nature. 5. doi:10.7537/marsnsj190121.05.

Keywords: Tilapia, age group, storm surge, rainfall

1. Introduction

Climate is changing faster recently than in periods earlier. The direct effects of increased temperature to water bodies may be reduced levels of dissolved oxygen and the amplified toxicity produced by pollutants (Ficke et al., 2007). On the other hand, production may be hampered due to environmental externalities affecting the farmers. Poor fish farmers are vulnerable to storm surges, excessive rain, drought, salinity intrusion and other environmental hazards in coastal regions like Bangladesh (Hasan and Bhowmik 2016). Allison et al. (2009) suggests that climate change hazards are expected to lead to increased poverty to fish farmers in countries that rest on fisheries properties and which have to fight to be resilient to climate change. Changing climate will result into river bank destruction, salinity intrusion, inundation, impairment of infrastructures, crop production disaster, fisheries resources destruction, destruction of biodiversity, etc. along the coastal zone of Bangladesh. In addition, a one-meter rise in sea level will distress the country's massive seaside and flood plain areas affecting development related goals and increasing vulnerabilities of the environmental refugees (Sarwar, 2005).

Shubornochor and Hatia are situated in Noakhali district. A lot of poor people are involved in aquaculture and fisheries practices in these coastal areas of Bangladesh (Sarwar, 2005). The people of these areas face risks for climate change. The most important risks arrived from climate issues include storm surges due to flood, excessive rain, salinity intrusion, droughts, eutrophication in stagnant water bodies etc. This study selected 90 farmers from each region of different age groups involved in Tilapia culture and collected information regarding the most happening events of climate disasters that hamper their socio-economic condition.

2. Materials and Methods

Study Area

This study was conducted in Shubornochor and Hatia of Noakhali District of Bangladesh.

Extensive field visits and Focus Group Discussions

Extensive surveys were conducted to poor farmers farming sites for collecting data regarding their vulnerabilities from the changing climate that affect their income.

Three FGDs were arranged in the community offices with the Tilapia farmers. Farmers informed about their problems in Tilapia farming and the events make them vulnerable to run their production (Hasan and Bhowmik, 2016).

3. Results

Respondents of this study were the farmers or people involved with Tilapia farming. Respondents had ponds, shared ponds or they used work with others who had ponds. Table 1-6 provide the information of responses from the farmers mentioning the most vulnerability created by the event (1= most dangerous, 0= less dangerous in comparison to the others).

Table 1. Age group below 20 in Shubornochor

Storm surge	Excessive rain	Drought	Salinity intrusion
.00	1.00	.00	.00
.00	1.00	.00	.00
.00	1.00	.00	.00
1.00	.00	.00	.00
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.00	1.00	.00	.00
.00	1.00	.00	.00

Table 2. Age group 21-40 in Shubornochor

Storm surge	Excessive rain	Drought	Salinity intrusion
.00	.00	1.00	.00
1.00	.00	.00	.00
.00	1.00	.00	.00
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1.00	.00	.00	.00
1.00	.00	.00	.00

Table 3. Age group 41-60 in Shubornochor

Storm surge	Excessive rain	Drought	Salinity intrusion
1.00	.00	.00	.00
.00	1.00	.00	.00
.00	1.00	.00	.00
.00	1.00	.00	.00
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1.00	.00	.00	.00
1.00	.00	.00	.00
1.00	.00	.00	.00
.00	1.00	.00	.00

Table 4. Age group below 20 in Hatia

Storm surge	Excessive rain	Drought	Salinity intrusion
1.00	.00	.00	.00
1.00	.00	.00	.00
.00	1.00	.00	.00
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1.00	.00	.00	.00
1.00	.00	.00	.00
.00	.00	.00	1.00
.00	1.00	.00	.00

Table 5. Age group 21-40 in Hatia

Storm surge	Excessive rain	Drought	Salinity intrusion
.00	1.00	.00	.00
1.00	.00	.00	.00
1.00	.00	.00	.00
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.00	1.00	.00	.00
.00	1.00	.00	.00
1.00	.00	.00	.00
1.00	.00	.00	.00

Table 6. Age group 41-60 in Hatia

Storm surge	Excessive rain	Drought	Salinity intrusion
1.00	.00	.00	.00
.00	1.00	.00	.00
.00	1.00	.00	.00
.00	1.00	.00	.00
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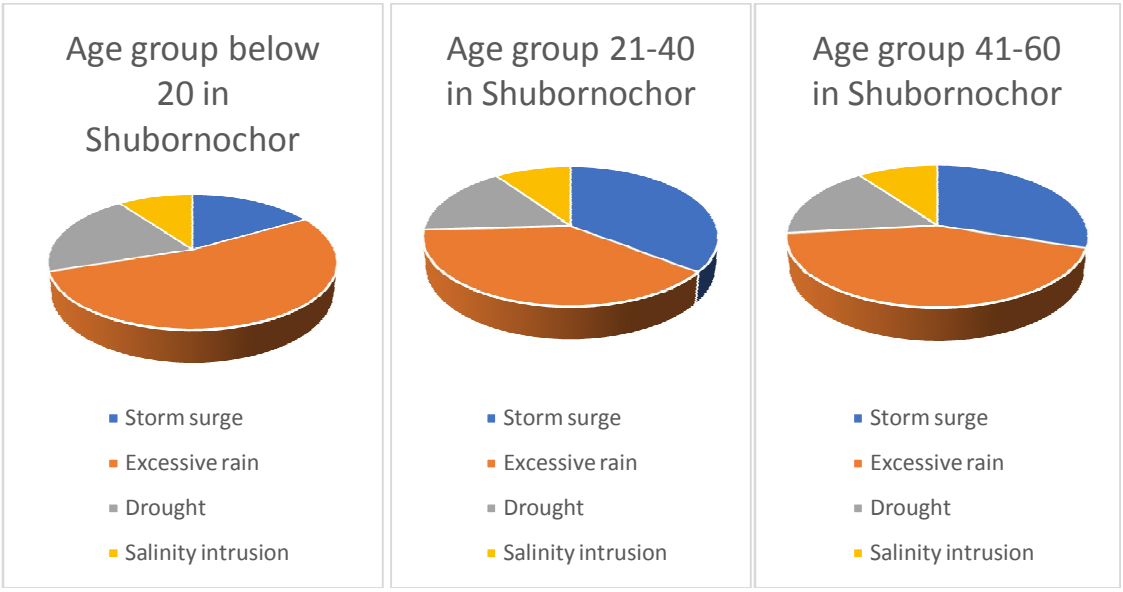

Figure 1. Response from different age groups regarding the environmental events creating problem for their business in Shubornochor

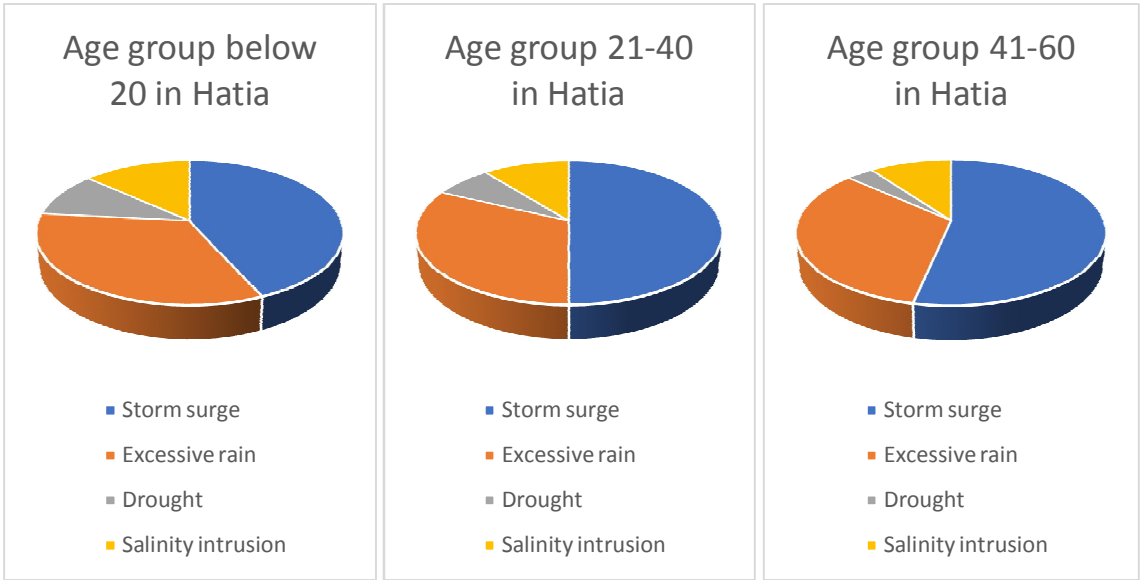

Figure 2. Response from different age groups regarding the environmental events creating problem for their business in Hatia

Table 7. Descriptive statistics for the percentage of people replied with mentioning vulnerable to different events for three age groups

	Minimum	Maximum	Mean	Std. Deviation
Storm surge for below 20	16.67	43.33	30.0000	18.85147
Storm surge for 21-40	36.67	46.67	41.6700	7.07107
Storm surge for 41-60	30.00	53.33	41.6650	16.49680
Excessive rain for below 20	33.33	53.33	43.3300	14.14214
Excessive rain for 21-40	30.00	40.00	35.0000	7.07107
Excessive rain for 41-60	33.33	43.33	38.3300	7.07107
Drought for below 20	10.00	20.00	15.0000	7.07107
Drought for 21-40	6.67	16.67	11.6700	7.07107
Drought for 41-60	3.33	16.67	10.0000	9.43280
Salinity intrusion below 20	10.00	13.33	11.6650	2.35467
Salinity intrusion for 21-40	10.00	10.00	10.0000	.00000
Salinity intrusion for 41-60	10.00	10.00	10.0000	.00000

It was found that increased rain (53.33%, 40% and 43.33% by age group below 20, 21-40 and 41-60) challenged them the to earn money from Tilapia culture the most in Shubornochor while it was storm surge (43.33%, 46.67% and 53.33% by age group below 20, 21-40 and 41-60) in Hatia (Figure 1 and 2). Descriptive statistics for the percentage of people replied with mentioning vulnerable to different events for three age groups are mentioned in Table 7.

4. Discussions

In our study it was found that farmers are affected by storm surges and excessive rain. The marketing value chain can also get hampered due to climate risks. Fish farmers when face problems due to climate change in different steps of producing to selling, their incomes decrease. In this study it was found that most of the respondents of Shubornochor had been facing problem due to storm surges. Chand et al. (2012) indicated events like cyclone and littoral flooding as 'extreme risk'; and storm surges and erosion of land as 'high risk' in the Sundarbans of Bangladesh which is situated at the south-west coastal region of Bangladesh. Since salinity intrusion occurs with inundation, surges and tropical cyclones, it did not impose negatively in the minds of poor famers as a vulnerability. Storms, tropical cyclones etc. provided by more moisture, produce increased and intense precipitations which are broadly found to be happening, even in places where total precipitation is

decreasing (Trenberth, 2008). Tilapia is a tough species which occurs around the year once seeds are stocked. Climate change impacts on the fish seed transport to the ponds and matured fish transport to markets both of which increased the costs for the producers. Customers are not willing to pay more than the range of 140-150 BDT/kg in that area. Excessive rainfall floods the ponds through breaking the dykes and overflows in the ponds which have no dykes. As Tilapia is a hardy species, climate change may have not impacted its production, but the producers face problem due to the climate vulnerabilities.

Acknowledgement

Authors would like to thank the Community Based Organizations for allowing to contact the farmers through field visits and arranging Focus Group Discussion with Tilapia farmers. Authors would like to thank Ministry of Science and Technology, Government of Bangladesh for the continuous support in research and Noakhali Science and Technology University for research scope and allowances.

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1/10/2021