

COLLECTIVE DECISION MAKING OF THE COMMUNITIES  
IN SELECTING A FARMING STRATEGY IN THE SOUTH  
WEST COASTAL ZONE OF BANGLADESH : ANALYSIS OF  
VARIOUS STATES OF A TRANSFORMING  
SOCIAL-ECOLOGICAL SYSTEM (SES)

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**COLLECTIVE DECISION MAKING OF THE COMMUNITIES IN  
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**ANALYSIS OF VARIOUS STATES OF A TRANSFORMING SOCIAL-  
ECOLOGICAL SYSTEM (SES)**

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**ABSTRACT**

The farming landscape in the south west coastal zone of Bangladesh is seeing a swift shift from the subsistence rice farming to cash crop shrimp farming. As shrimp farming utilized the brackish water ecosystem of the coastal zone to boost itself, many farmers still continue to maintain the traditional rice farming. This study took the Social-Ecological Systems (SESs) transformation perspective to discuss the stability of existing situations and applied game theory to analyze the decision making process of the farmers in selecting a farming practice.

Before the 1960, the locals used temporary earthen embankment under the supervision of the land lords, *zamindars*, to save their farmland for the dry months but monsoon when they would flood the land by breaking the embankments themselves. The ecological process was broken after the devastating floods of the late 1950s. Government established the top down engineering solution suggested and funded by the donors, polder (Dewan, Mukherji, & Buisson, 2015). The closed dyke system facilitated the farmers in having more cropping season but its benefits didn't last long. Soon the rivers started to get shallow and water started to get trapped inside the polder causing chronic waterlogging. Shrimp farming took benefit of this curse of the rice farmers as it

the trapped water can be used to make shrimp ponds. The polders that were initially built to keep the saline water out were being used for the opposite reason. But the transition from rice to shrimp isn't of the smoothest one as shrimp farming brings in salinity that the rice can no longer tolerate, but it still took place because shrimp is more profitable than rice. Current falling market price coupled with shrimp virus, shrimp farming's future is also clouded in Bangladesh (Hossain, et al., 2014).

SESs allow studying the social systems (e.g., farmers) and the ecological systems (e.g., farmlands) as a whole. The transformation of SESs is the most complex part of the study as it tends to be abrupt and uncertain. The context of changing agro-ecological landscape in south west coastal zone of Bangladesh provides a backdrop to understand the uncertainty a little better. For the ease of the study, the context is simplified in three scenarios: Rice Equilibrium, ongoing transformation from rice to shrimp and shrimp equilibrium.

The first objective of this research is to check the stability of the equilibrium states to confirm their resilience. The stability is investigated by establishing a crisis in the equilibrium state and testing its impact on the key elements of the social and ecological systems to create a 'window of opportunity' (Moore, et al., 2014) which hints the next transformation opportunity for the system and makes it unstable.

The second objective explores the decision making of the farmers in choosing a strategy of farming. The salinity brought by one person can change others farmland and thus maintaining the equilibrium or to decide to transform is a collective decision. Game theory is applied to understand the farmers making farming choice collectively. Rice equilibrium is the risk dominant equilibrium and by theory (Harsanyi & Selten, 1988) should be the preferred by the

population rather than the payoff dominant equilibrium, shrimp. What and how the farmers made their decision to maintain the risk dominant equilibrium or chase the payoff dominant one is investigated.

The three case studies representing the selected states for this research: Bichat - shrimp farming equilibrium, Rajapur - ongoing transformation from rice to shrimp and Eksora- rice equilibrium.

The three neighboring *beels*(ecological entity of low lying farmland) are situated in Anulia union, Assasuni sub-district, Satkhira district of Bangladesh.

The results for objective one suggests that the present crisis in Bichat, shrimp virus, is capable to disrupt the stability of the shrimp equilibrium by effecting two key elements of SES: capital and practice. As the farmers of shrimp equilibrium continue to deal with the existential crisis and leave the farming profession, rice farmer in Eksora continues their struggle with waterlogging without much change in the SES structure.

The game theory explains the perception of strategies that allows the farmers in each case to go for a different strategy. The perception for rice and shrimp varies from one farming group to another. In Bichat, the risk dominant equilibrium was broken on the early onset of shrimp farming's advance in the 1990s by a formation of coalition among a few farmers when rice farming was struggling. Power politics came into play to break the rice farming equilibrium of Rajapur recently even though diseases put shrimp farming at a negative. Eksora maintained their rice farming equilibrium by shifting their economic focus from farmland to trade.

The rice farmers of Eksora formed a pattern of crisis management over time by sharing similar impacts and vulnerabilities. Shrimp virus is a relatively new challenge for the shrimp farmers

and the four farming groups of Bichat have yet to formulate a pattern in its management. As a result the impact of the crisis is larger on a few and those few abandon the farming leaving the system vulnerable to change.

The findings also imply the inherent injustice of the transformation which is explored from three perspectives: structural injustice, ecological injustice and generational injustice. Structural injustice allows the affluent farmers powered with their wealth and social position get away with their decision's impact on the marginal farmers, selecting shrimp farming which is only lucrative for them, as they couldn't be bound legally but morally. Ecological injustice limits the marginal farmers to decide their farming strategy independently and the generational injustice occurs when the current generation limits the next generation's choice only to shrimp farming.

This research unveils inherent dynamics of the farming society in south west coastal zone of Bangladesh and how their choice of a farming strategy implicates both ecological and social restraints. Their future options are very limited and can push them in a direction (intensive shrimp farming) that would intensify the current deficiencies. But they can also strengthen the rice farming and move forward with Tidal River Management (TRM) to counteract the shrimp transformation.

*Key words:* SESs, Collective decision making, Farming strategy, Shrimp and rice, Bangladesh