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Study on the Agri-business Climate Change Interactions in Bangladesh

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Abstract

This paper identifies and analyses climate change impacts, their cascading consequences and the livelihood implications of these impacts on smallholder agricultural communities of coastal Bangladesh. Six physically and socio-economically vulnerable communities of south-western coastal regions were studied. Primary data was collected through focus group discussions, a seasonal calendar, and historical transect analysis. Three orders of impacts of climate change on smallholder farmers are identified and described. The first order impacts involve increasing erosion of the capacity of local communities to mitigate vulnerability to climate change impacts. This situation led to the second order impacts, which significantly transformed the agricultural landscape and production patterns. The cumulative effects of the first and second order impacts sparked the third order impacts in the form of worsening community livelihood assets and conditions. The findings of this paper can contribute to the formulation of sustainable adaptation policies and programs to manage the vulnerability of local communities to climate change impacts in the country effectively.

Keywords: Agri-business, Climate Change, Interactions, adaptation; agriculture; vulnerability.

INTRODUCTION

Interactions between plants, nutrients, and disease pathogens are very complex and not completely understood. Nutrition, although frequently unrecognized, has always been a primary component of disease control. Most soils and environments where plants are cultivated contain an abundance of disease pathogens. On the most basic level, plants suffering a nutrient stress will be less vigorous and more susceptible to a variety of diseases. In this respect, all nutrients affect plant disease. However, some nutrient elements have a direct and greater impact on plant diseases than others. This paper discusses the more significant nutrients and their interactions with disease. Disease resistance in plants is primarily a function of genetics. However, the ability of a plant to express its genetic potential for disease resistance can be affected by mineral nutrition. Plant species or varieties that have a high genetic resistant to a disease are likely to be less affected by changes in nutrition than plants only tolerant of diseases. Those that are genetically highly susceptible will likely remain susceptible with nutritional regimes that greatly improve the disease resistance in less susceptible or tolerant plants. It is clear that the severity of most diseases can be reduced and the chemical, biological, or genetic control of many plant pathogens enhanced by proper nutrition. Fertilizer recommendations are developed to optimize nutrient uptake and provide the crop with adequate nutrients for normal growth and yield. In most situations, this level of nutrients will also be sufficient to enable the crop to maximize disease resistance. However, there are cases where nutrient applications higher than needed for optimum growth can result in improved disease resistance.

OBJECTIVES

The main goal of the research is to reduce the poverty in Bangladesh enhancing agribusiness growth, generating employment and income in the rural areas.

The major objectives as may be straight way mentioned are:

- i. To identify the main problems of Agribusiness in Bangladesh.
- ii. To know the Post harvest parameters to be prioritized in Agribusiness
- iii. To identify the business to be prioritized in Agribusiness

METHODOLOGY

The major methods and materials involved in the studies were:

Laboratory and field testing of symptoms and documentation locating cluster symptoms sites as per soils of different Agro-ecological Zones (AEZ) and SRDI Maps.

Sites

- Red High land AEZ 25-27 Barind, 28 Madhupur, AEZ 11-13 Ganges
- Gray Medium high land soils: AEZ 8-9 Brahmaputra FP, AEZ 5/15/20- Atrai basin 5, AEZ 15 Arial Beel, AEZ 20 Surma Kusiara FP,

Indicator crops

- Vegetables: Cole and Tomato
- Field crops : Maize and Pulse
- Spices: Chili and Onion
- Fruits: Papaya and Jujube

The whole study has been arranged to perform the studies through the following methods.

1. Analyzing the AEZ database and biotechnological nature of the environment through direct interview survey and discussion.
2. Interpreting the AEZ outputs identifying the biotechnological potentials analyzing the database and the country's requirements.
3. Analyzing the global environment situation and its probable changes

The work will be done through physical visits, collection of documents, recording recent information and development plans, and discussing cross- cutting issues.

The data will be reported in designed formats covering soil and biotechnical information.

Agro-Ecological Zones (AEZ) of Bangladesh

The Agro-ecological Zones of Bangladesh may be defined as the Zone classified on the of land type, soil characteristics, water or soil regime and agro-climatic factors.

There are 30 AEZ identified in Bangladesh. This is an output of Soil Survey done by SRDI funded by UNDP which started mid sixty's and ended by late ninety's. The zoning was done computer aided mechanisms and contributed by NARS organizations. The AEZ is the latest semi-technical report on the soils and agricultural systems of Bangladesh.

Table 1: AEZ: Major location

AEZ	AEZ name	Major area Districts	Minor area Districts
1	Old Himala Pied plain	Panchagar, Thakugaon	Dinajpur
2	Active Tista Floodplain	Nilphamari, Rangpur, Lalmonirhat	Kurigram, Gaibanda
3	Tista Meander Floodplain	Greater Rangpur, Panchagar, Dinajpur	Bogra, Joypurhat, Noagaon, Rajshahi

Table 2: AEZ: Soil, crop and area

AEZ No.	AEZ name	Soil texture colour	Special crop	Area in sq. km
1	Old Himalayan Piedmont plain	Sandy grey	Litchi, Mango	4 008
2	Active Tista Floodplain	Sandy grey	Tobacco	836
3	Tista Meander Floodplain	Loamy grey	Tobacco	9 468

Table 3: AEZ Problems

AEZ	AEZ name	Soil	Climatic	Disaster
1	Old Himalayan Piedmont plain	Acidy	Cold wave	Drought
2	Active Tista Floodplain	Low fertility	Cold wave	Flood
3	Tista Meander Floodplain	Acidity	Cold wave	Flood

The principal methods and materials to be used in the study are briefly mentioned here the methods and materials in the form of action schedule are given here in a broad tabular form.

Action	Methods	Material
Identifying the major climate change parameters	Survey	Questionnaire
Specifying the vulnerable livelihood aspects of change climate situation	Focal Group Discussion (FGD)	
Analyzing the adaptation factors	Interpretation	Tabulated data
Documenting climate change biodiversity evidences	Documentation and collection	Camera
Recommending the Adaptation Technologies.	Prioritization scoring	List of technologies.

Sample size: About one hundred families were selected for the study. Sampling method: Random sampling method was used for the study using a specific questionnaire.

Sources of data: Data were collected through direct interview using the questionnaire and also through Focus Group Discussion (FGD) using one checklist guidelines.

Sources of data: Primarily data were collected from the target area using interview schedule. Interview was done with the beneficiary or stakeholder people who are or may be affected by climate change disasters. Some secondary data were also collected from Books, Journal, Research Report, and Internet and through focus group discussions (FGDs).

Analysis: Data were analyzed and presented in tabular and graphic forms. At the end of the study a report with a summary and recommendations and presented specifying the gaps, missing link, if any, cross-cutting issues, and an action plan at the end.

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RESULTS AND DISCUSSION

The results obtained from the studies are mentioned in this chapter Plant symptom occurrence as per soil land characters: Percent of frequency distribution

Table 4: Plant symptom occurrence as per soil land types and nutrients: Percent of frequency distribution

	Red highland	Gray medium Highland	Darkgray lowland	Mean
NPK	43	31	19	31
NPK+pest	53	36	24	37.7
CaMgS	49	42	28	39.7
CaMgS+pest	62	51	35	49.3
ZnBFe	34	2	11	15.7
ZnBFe+pest	69	5	32	35.3
Mean	51.7	27.8	24.8	34.8

Figure 1: Plant symptom occurrence as per soil land types and nutrients: Percent of frequency distribution

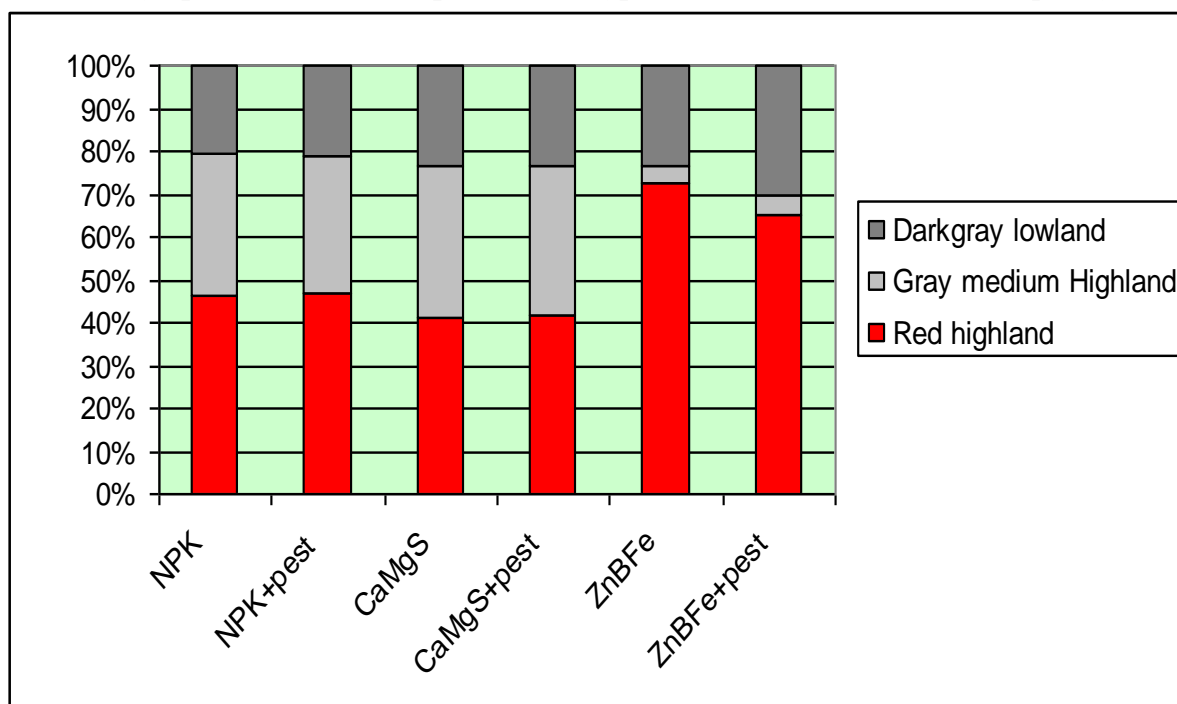
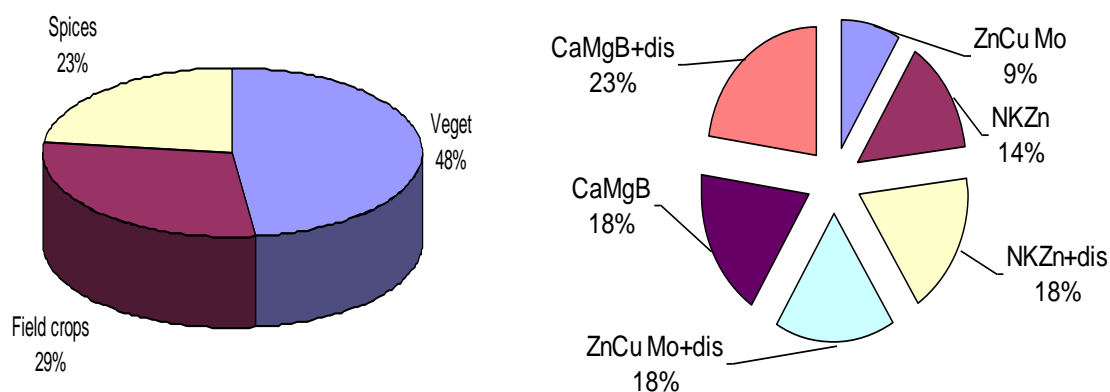


Table 5: Plant symptom occurrence as per Crop types and nutrients: Percent of frequency distribution

Problem elements	Vegetables	Field crops	Spices	Mean
NKZn	43	31	19	31.0
NKZn+dis	53	36	24	37.7
CaMgB	49	42	28	39.7
CaMgB+dis	62	51	35	49.3
ZnCu Mo	34	12	11	19.0
ZnCu Mo+dis	69	15	32	38.7
Mean	51.7	31.2	24.8	35.9

Figure 2: Pie chart showing the Plant symptom occurrence as per Crop types and nutrients



**Table 6: Plant symptom occurrence as per Problem types and crops:
Percent of frequency distribution**

Problem Elements	Vegetables	Field crops	Spices
Nutr defic	56	40	49
Plant dis	44	34	37
Insect pest	33	21	28
Nutr defic dis	72	61	55
Nutr defic pest	65	53	57
Dis pest	60	52	44
Nutr defic dis Pest	73	63	60

Agribusiness Development

Agribusiness is a complex of interlinked activities related to the commercial production of agricultural commodities (including crops, livestock, fisheries and forestry), transformation of agricultural commodities into products, provision of inputs to the production of agricultural commodities (including planting and genetic material, agrochemicals, equipment and pharmaceuticals), and the marketing and distribution of agricultural commodities and products.

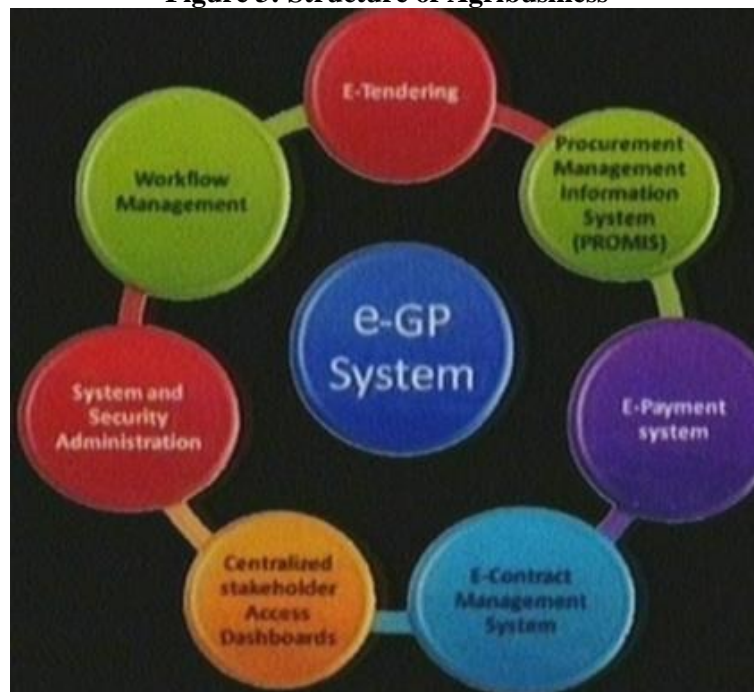
The definition encompasses four major sectors: i. Input Sector (farm service and supply). ii. Commercial Farm Production Sector. iii. Product Sector (storage, processing, marketing, whole- retailing, exports). iv. Service Sector (education, banking, finance, investment and technical advice).

An agribusiness marketing system consists of suppliers of production inputs and services, commercial producers (farmers), market intermediaries, agro-processors and other agribusiness related entities. Agribusiness systems differ according to the commodities involved and their particular economic, political, social and physical environment. A country's agribusiness sector generally embodies a wide variety of agribusiness systems.

Agribusiness seemed to be of Potential Issue Requiring E-procurement

Agribusiness systems in Bangladesh are characterized by large numbers of small-scale farmers, a generally weak base of input suppliers, limited technical and market information services, multi-layered procurement and distribution channels, few post-harvest facilities and services and a relatively small agro-processing sector. Physical infrastructure is often inferior, unreliable or lacking. Although corruption is endemic, systemic inefficiencies represent a much more important barrier to further agribusiness sector development. The agriculture sector employs more than 60% of the total Bangladeshi labor force.

Thus the greatest opportunities for poverty alleviation as well as the acceleration of economic growth for the nation tie in the rural areas. An essential first step will be to increase farm family incomes. This will entail intensification of grain production, diversification into higher value crops and making significant improvements in non-crop agriculture including livestock and aquaculture in order to foster efficient, profitable farming systems. Higher farm family incomes will result in opportunities for increased off-farm employment, through the development and growth of rural non-farm private enterprises. The majority of these will be small and medium enterprises. The greater proportion of these enterprises will be agribusiness related. In the context of Bangladesh, the vast majority of farmers and agro-based entrepreneurs operate at subsistence or near-subsistence levels.

Figure 3: Structure of Agribusiness

The structure of agribusiness enterprises is characterized by two main features:

- The predominance of small-scale units in production, processing and distribution;
- The lack of a well-organized system linking production to the market.
- Contrary to common opinion, the small scale of farms is not necessarily the main reason for the low level of agribusiness development in the country. Other countries in Asia such as Indonesia and Viet Nam, with a similar farm structure, have been able to achieve considerable development in agribusiness. The most serious problem of the agribusiness sector in Bangladesh seems to be the weakness of linkages among farmers, traders, processors and service providers.

Problem responses for agribusiness development due to change of climate reflected by AEZ:

- a. No market Streaming-----32
- No processing Center-----46
 - No costing and pricing: ----29
 - Exim-porter unknown: ----11
 - Price un-controlled: -----58

The problems prioritized by the respondents show that the absence of central streaming market channel and lack of processing centers scored equally 36. The lowest scored was no costing and pricing commission. The respondent reported that they were not aware of such authorities and also they do not know the importers or exporter and the functions and responsibilities of such organizations were not clear as regards their business interest.

Table 7: Cost related factors

a. Total cost- Production + processing	b. Processing cost	c. Prod + Promo+ makt cost	d. Adl tech + input costs	e. Capital est. costs	f. Others
29	21	38	51	60	2

The Agribusiness factors prioritized by the respondents show that the additional suitable technology and its inputs costs scored highest being more than 30 followed by Production cost + promotion cost+ marketing costs.

The lowest scored was no costing and pricing commission. The respondent reported that they were not aware of government incentives and also they do not know the agribusiness field staff or exporter companies and the functions and responsibilities of Agricultural Extension organizations as regards their business credits.

SUMMARY AND RECOMMENDATION

In view of the results obtained from the studies the following recommendations may made to be followed by respective policy make, extensions and scientist.

1. As the crop production related field problems are getting diversified day by day and young farmers and entrepreneurs are coming in action, the production package services should be given in both clinical and symptomatic formats.
2. In depth training should be done to the service consultants giving legal registration through appropriate council and done for medical, dental, legislation, veterinary services, architects etc.
3. A format for clinical diagnosis and symptomatic prescription has been developed through these studies.

A study was conducted to interpret and find out the effects and present trends of Agro-Ecological Zones (AEZ) and climate changes in Bangladesh. The nature and intensity of Climate change and change of parameters used for Agro-Ecological Zones were found to be at par In terms of global warming, disasters in Bangladesh and governments climate change mitigation projects considered by the national Agricultural Research System (NARS), soil Resources Development Institute (SRDI) and Department of Agricultural Extension. Ministry of Agriculture along with Ministry of Food and Disaster Management taking development programs for increasing food production identifying the potential Agro-Ecological Zones of Bangladesh.

The results showed that the changes in climate and AEZ were very clear from the last decade. The results indicated that the extreme temperature and thermal zones of the country as expressed by the period is increased by about 34% as compared to the results of sixty's. It caused water stress in the soil, change of crops and varieties leading to the changes in cropping patterns. Bangladesh has been divided in to 30 Agro-Ecological Zone and 89 Sub zones on the basis of land soil and agro climatic factors. Out of these 30 AEZ a major group may isolated from the present study as mentioned here.

The summary of the studies done and the suggestive recommendation on the finding s and situation basis (FSB) are briefly mentioned here sequentially. As per objective of research, the summary and recommendations are mentioned i. identification of constraints, ii. Identification of potentials and the final iii. Recommendations given for agribusiness development in Bangladesh. The major constraints and potentials highlighted by the respondent are:

RECOMMENDATIONS

There are numerous constraints to the development and growth of agribusiness enterprises in Bangladesh, as noted above. There are also, however, the constraints and the promising opportunities for the sector are discussed here highlighting most important issues. The agribusiness sectoral issues frequently mentioned by the different respondents and the comment they made in their explanation, and indicative recommendations made by sectoral persons are briefly mentioned here. The response in these matters of agribusiness development is similar giving emphasis on improving regulatory environments, creating a contact point for agribusiness administration, establishing Agro-export processing zones, organizing agribusiness foundation activities, enhancing research, development of agro-technologies and participation of rural peoples ensuring income generation. Considering all the findings obtained from the appraisal from different groups, sectors, levels and professionals, the following major points reflecting the agribusiness aspects are mentioned here in brief.

1. Considering all the agribusiness constraints and potentials analyzed, explained and summarized above, the following points mention may be as prime suggestions which will lead to formulate practical recommendations for the development of agribusiness in Bangladesh.
2. Bangladesh continues to show improved economic growth, GDP increasing by 5.7% in 2005-06 and expected to increase in subsequent years. With the GDP at current prices exceeding Tk. 3,500 billion, the agriculture sector continues to account for 23% of GDP. Sustainability of product price can ensure this development through a most capable multidisciplinary Agro-tech commission working in the concept of domestic Agro commodity is the base of all other activities.
3. Agriculture and agribusiness were estimated to account for about 35% of GDP in 1999-2000, being about 40% ten years earlier. The most likely reasons as stated for this are the, non-uniform method of GDP calculation, decline in relative importance of agriculture together with the continued reliance of most Bangladeshi consumers on basic agricultural products. In the context calculation methods of GDP over years need rigorous review as done in other agro-based countries of the world.
4. Although there has been considerable emphasis on crop diversification, this should be more strengthened involving agribusiness in the farming system because the crop-based agribusiness is likely to benefit these poorer farmers as the marketing of raw materials and products in the market chain management.

5. Production of maize and potatoes has increased significantly and these two crops may be reaching a take-off point where commercial production is a possibility but it is only possible through price stability, increased productivity transferring improved technologies and agro-technical compliance of agriculture ICT.
6. The production of pulses, sugarcane, jute, tea and tobacco need closer attention in respect of Eximport policies and prices, research back up education and training.
7. While Bangladesh has a wide range of but a specific agribusiness policy for government departments is a must for looking after *AGRIBUSINESS for the, by the end of the AGRICULTURIST'S*.
8. Policies that have specific relevance to agribusiness development include the NAP, land and soil policies, input-output policies, and eximport policies.
9. The import of commodities essentially required and correct supplement to domestic agriculture and agribusiness may be free of VAT, which provides a further incentive to the sector.
10. Inconsistencies in the tax structure are being continuously eliminated by the Government regularly.
11. Attention to identifying and resolving the underlying problems would undoubtedly have a greater benefit than increasing the policy distortions that try to favor agribusiness development.

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