

DRAFT



NATIONAL AGRICULTURAL EXTENSION POLICY (NAEP)



Government of the People's Republic of Bangladesh
Ministry of Agriculture (MOA)

2012

Minister
Ministry of Agriculture Food, and disaster
Management & Relief Government of the
People's Republic of Bangladesh



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MESSAGE

It is my pleasure to know that the Department of Agricultural Extension has updated the New Agricultural Extension Policy (1996) as National Agricultural Extension Policy (2012) addressing the key constraints, emerging issues and strategic shifts of agriculture sector in the context of present global scenario to maintain food security of rapidly growing population.

The Policy emphasizes on integrated extension service. In order to achieve the mission and vision of the Policy, the public and private Agricultural Extension Services will play an increasingly important role in motivating, educating and assisting farmers to adopt improved farming practices leading to increased farm production.

I believe that the National Agricultural Policy (NAEP) will create an enabling environment for continued growth in food production and commercial crops and contribute to enhance farmers' income and growth of agro-based industry through proper utilization of existing resource base, organizing farmers and developing market linkages of agricultural produce.

I hope that the Policy will support the Government's priority to agricultural development as a means of poverty alleviation and socio-economic emancipation.

(Matia Chowdhury)



FOREWORD

The agriculture sector including crop, livestock and fisheries contributes over 20 percent of Gross Domestic Product in Bangladesh and provide employment to nearly 80 of its people. The Government of the People's Republic of Bangladesh is committed to the continuous development of agriculture and its sustainability to maintain food security of a progressively increasing population and socio-economic emancipation of its people through high value agriculture and value addition through agro-industrialization. In this endeavor, updating the New Agricultural Extension Policy (1996) as National Agricultural Extension Policy (2012) is a very timely effort.

The National Agricultural Extension Policy concentrates on decentralized and demand-led extension to meet farmers' needs, emphasizes on coordinated extension service delivery and encourages effective research-extension-farmer linkages.

The National Agricultural Extension Policy has set the principles outlined strategies for the effective functioning of public and private extension service providers through creation of National Agricultural Extension System (NAES) with the Department of Agricultural Extension as the Lead Agency. The policy "seeks to ensure that effective co-ordination is established to increase the efficiency of agricultural extension". The key to successful implementation of the policy lies in forging a broad-based understanding amongst extension providers, farmers and other stakeholders.

I believe that the policy will enable all extension providers and agencies to work more closely with farmers and other organizations for agricultural development in the country in the light of lesson learned from the National Agricultural Technology Project.

I hope that a sound implementation strategy will be formulated within a very short time and the policy is made operational.

(Monjur Hossain)
Secretary

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I. Acronym

1.	AEZ	Agro Ecological Zones
2.	AWD	Alternate Wetting and Drying
3.	BADC	Bangladesh Agricultural Development Corporation
4.	BBS	Bangladesh Bureau Statistics
5.	BCCSAP	Bangladesh Climate Change Strategy and Action Plan
6.	CIP	Country Investment Plan
7.	DAE	Department of Agriculture Extension
8.	DAECC	District Agricultural Extension Coordination Committee
9.	DLS	Department of Live Stock
10.	DOF	Department of Fisheries
11.	DTW	Deep Tube Well
12.	FG	Farmers Group
13.	FIAC	Farmers Information and Advice Centre
14.	FO	Farmers Organization
15.	GAP	Good Agricultural Practices
16.	GB	General Body
17.	GDP	Gross Domestic Product
18.	HID	Human Institution Development
19.	HQ	Head Quarter
20.	HYV	High Yielding Variety
21.	ICT	Information and Communication Technology
22.	IPM	Integrated Pest Management
23.	MIS	Management Information System
24.	MSE	Mini and Small Entrepreneur
25.	NAECC	National Agricultural Extension Coordination Committee
26.	NAEP	New Agricultural Extension Policy
27.	NAEPICC	National Agricultural Extension Policy Implementation and Coordination Committee
28.	NAES	National Agricultural Extension System
29.	NARS	National Agricultural Research System
30.	NDMP	National Disaster Management Plan
31.	NFP	National Food Policy
32.	NGO	Non Government Organization
33.	NIB	National Institute of Biotechnology
34.	PLA	Participatory Learning and Action
35.	PM&E	Participatory Monitoring and Evaluation
36.	PPP	Public-Private-Partnership
37.	PRA	Participatory Rural Appraisal
38.	RPRA	Rapid and Participatory Rural Appraisal
39.	SES	Specialist Extension Services
40.	SESP	Specialist Extension Service Provider
41.	SME	Small and Medium Entrepreneur
42.	STW	Shallow Tube Well
43.	UAECC	Upazila Agricultural Extension Coordination Committee

II. Executive Summary

This document presents a revised National Agricultural Extension Policy (NAEP) which sets extension policy directions for transferring technologies to crop, fisheries and livestock sector development. Here, key elements of lesson learnt from existing policy, macroeconomic scenario, agro ecology /bio-ecological zones and current issues in agriculture such as natural disaster, production stagnation, land ownership and tenancy, poor soil health status, decreasing agricultural land, irrigation water scarcity, lack of good agricultural practices, high demand of quality seeds/planting materials etc., livestock and fishery issues including emerging challenges and perspectives have been pointed out for strong consideration. In light of these elements, this policy document has been formulated.

The mission of this NAEP is to provide efficient and effective decentralized demand responsive integrated extension services to all categories of farmers, producers and small & medium entrepreneur (SME) in agriculture through farmers group (FG) and their federations at union, upazila, district and national level, to enable them to optimize their use of resources, in order to promote sustainable agricultural, agri-business and socio-economic development.

Wide range of people directly and indirectly involved in agricultural growth will be benefited from NAEP. The primary beneficiaries of the policy are: all categories of farmers, especially the small and marginal farmers comprising about 86% of the farming community through “Farmers Group” and their federations (Farmers Organization-FO) at union, upazila, district and national level.

The NAEP is built on nine (9) key principles:

1. Increasing production (horizontal and vertical) and productivity as a whole;
2. Cost effective efficient decentralized demand responsive extension services;
3. Targeting and mobilizing farmers group (FG) and their federations (FO);
4. Bottom-up planning and implementation;
5. Coordinated and integrated extension services through NAES;
6. Development of agri-business and contract farming for export promotion;
7. Adoption to climate change and development of specialized extension service for climatically distressed areas;
8. Broad based extension support (in-time input support and subsidies, credit, price enhancement etc.); and
9. Digitalized agricultural extension services (e-agriculture).

The goal of the National Agricultural Extension Policy is to: “Encourage the various partners and agencies within the National Agricultural Extension System (NAES) to provide efficient and effective coordinated services which complement and reinforce each other, in an effort to increase the efficiency and productivity of agriculture in Bangladesh for ensuring food security and business development”.

To achieve the above goal in relation to different agriculture related policies of Bangladesh, the NAEP includes following key pillars:

1. Provision of coordinated and integrated extension services through “NAES”
2. Support to farmers groups (FG) and their federation (Farmers Organizations)
3. Targeting, mobilizing, capacity building and registration of “Farmers Group”
4. Implementation of market-led, demand responsive, pluralistic, decentralized bottom-up extension system
5. Development and Strengthening FIAC as “One-Stop Service Center”
6. Support to development of agri-business and market linkage
7. Digitalized agriculture (e-agriculture)
8. Strengthening research-extension-farmers linkages
9. Strengthening biotechnological development and adoption
10. Information dissemination and extension methodologies
11. Advocacy and policy guidance
12. Strengthening urban agriculture
13. Disaster management and adoption to climate change
14. Specialist Extension Services (SES) for climatically distressed areas
15. Strengthening “Public-Private-Partnership (PPP)” in Agricultural Extension
16. Strengthening supply of quality seeds and other inputs
17. Emphasizing organic farming/ green farming
18. Mainstreaming women in agriculture
19. Private sector development
20. Emphasizing homestead gardening
21. Thrust on farm mechanization
22. Efficient and effective dissemination of technology
23. Industry linkage for enhancing agro-based industries
24. Credit & Insurance
25. Role of Extension Worker
26. Strengthening Monitoring and evaluation

Therefore, this NAEP will enhance as well as ensure the capability of the concerned extension departments of the Ministry of Agriculture (MOA) and the Ministry of Fisheries and Livestock (MOFL) to play strategic role in the light of new and emerging challenges for national development in sustainable manner.

Bangladesh: National Agricultural Extension Policy 1996, revised in 2012 **[Draft for discussion]**

III. Background

1. Agriculture in Bangladesh is unique as it is sustained by the world's largest deltaic planes characterized by natural flooding at the confluence of three mighty river systems of the world, the Padma (Ganges), Jamuna (Brahmaputra) and Meghna which together with about 800 rivers and tributaries draining into Bay of Bengal. The sector is responsible for feeding about 151.5 million people (2.54 percent of the world's population), making the country largely food secure. Since independence in 1971 the food production has increased three fold. The primary sector continues to be the economic foundation of the country with 85 percent of the total population dependent on agriculture, contributing 20 percent of the total GDP and reasonably growing at about 4 percent per annum.
2. The performance of the sector assumes criticality due to persistent pressure on it to produce 0.3 million tones of additional food to feed about two million new mouths every year. In addition to the ever increasing demands from the swelling population, the sector has to support the livelihoods of 18 million farm households, 70 percent of whom owns less than '3 bighas' (0.4 hectares) of land. The situation is compounded by the fact that about 45 percent of the farm households are poor and about 53 percent are virtually landless who depend on the sector for employment. Development of the sector assumes greater significance in reducing poverty especially in rural Bangladesh. In addition the sector is highly vulnerable to climate change consequences of increasing frequencies of prolonged droughts, devastating floods and irreversible aftermaths of salinity intrusion.
3. The geo-physical and bio-climatic setting together with the socio-economic and environmental demands call for a paradigm shift in agricultural extension for the country. Government of Bangladesh synthesized this National Agricultural Extension Policy benchmarked on the long term impacts on agricultural production, well-being of rural communities and environmental sustainability in addition to mitigating the adverse effects of climate change challenges.

IV. Key Constraints of the Sector

4. The Agricultural Extension Policy has been drawn up to strategically address the following key challenges of the current production systems and aim for a rebound and turnaround of the agricultural sector.
5. **Proneness to Natural Disasters:** About 6 geographic zones of the country have been identified as ecologically constrained areas; (i) Persistent droughts resulting from erratic rainfall in north western and western parts, (ii) Increasingly frequent and severe floods in

the central part, (iii) Flash floods in northern and eastern parts, (iv) Salinity intrusion in to south western and south central part, (v) erratic rainfall in Chittagong Hills and (vi) Tropical cyclones and storm surges in the coastal areas, which together constitute about 41 percent of area of the country.

6. **Increasing Pressure of Population on Land:** The net area available for cultivation is declining due to conversion of agricultural land to non agricultural uses for varied needs of the growing population. The annual average rate of decline has been around 28.8 thousand hectares making the current cultivated area to 7.94 million hectares (2009). The cropping intensity is at 181 percent.
7. **Preponderance of Tiny, Marginal and Small Holders:** The average size of own land declined significantly to 0.28 hectares (2008). Marginal farmers who cultivate 0.5 to 1.49 acres are about 24 percent and small farmers who cultivate 1.50 to 2.49 acres are about 11 percent. The proportions of landless who have tiny holdings less than 0.49 hectares are a majority 53 percent. The proportions of medium farmers who cultivate 2.5 to 7.49 acres are only 11 percent and large farmers who cultivate over 7.5 acres are a miniscule 1 percent. The tiny, marginal and small holders rent in land under share cropping arrangement, who are called 'barga chashis' are common across the country. Inequality in access to and tenure of land act as disincentive for sustainable investments practices and usage.
8. **Issues in Input Supply:** Lack of timely supply of adequate quantities of quality seeds, appropriate fertilizers and plant protection chemicals at fair prices continue to constrain the production system.
9. **Degrading Soil Health:** Rising cropping intensity, poor fertilizer and water management, recurrent floods and drought situations have led to depletion of soil nutrients, declining soil organic matter contents and overall soil degradation.
10. **Shortage of Working Capital:** Use of modern technology, irrigation and improved varieties make the production system capital intensive. The already resource poor tiny, marginal and small holders find it difficult to access the banking system for investing in productive assets and operations due to governance issues, stringent collateral requirements, complex procedures and exorbitant interest rates. The micro finance activities are neither adequate nor friendly to the not so credit worthy poor holders.
11. **Food Safety Issues:** Indiscriminate use of chemicals and pesticides raise issues of safe production of produce causing concerns of health hazards to human, livestock and fisheries. Integrated Pest Management (IPM) practices though have been initiated but limited knowledge and availability of the inputs are limiting wide spread application. Also there is no approved Good Agricultural Practices (GAP) in Bangladesh or "Bangla GAP" standards ensuring quality agricultural product with tolerable level of traceability for export market as well as domestic consumption.

12. **Inefficient Use and Scarcity of Irrigation Water:** About 6.36 million hectares is under irrigation and Boro rice is the main irrigated crop. Inefficient use of water and unwise lifting of underground water fosters the depletion of underground water, which causes drawdown, salinity intrusion and unavailability of irrigation water as well as drinking water. On the other hand, high siltation of the rivers and water bodies, and low rainfall lead to low recharge of aquifers leading to drawdown problems and scarcity of irrigation water. Improper fielding of Shallow Tube Wells and Deep Tube Wells and inefficient use of surface water also causes scarcity of irrigation water.
13. **Slow Mechanization in Agriculture:** Scarcity of draft power necessitates increased use of mechanical power and machines in agricultural production system. The desired level of mechanization could not be achieved due to limited capital or credit facilities coupled with fuel and energy cost.
14. **Skewed Focus on Cereal Crops:** Though self sufficient in food production, cereal production has been remaining stagnant. Diversification of the production system focusing on increased production of high value crops and value added enterprises are still to catch up. Extension activities narrowly focus on productivity and production enhancement with very little attention on improving producer's access to markets and removing constraints in developing farm enterprises and agribusiness.
15. **Lack of Orchestrated Management of Sub Sector Activities:** Crop, livestock and fisheries converge at the farm level, with most of the farmers following integrated farming approach, the extension agencies plan their activities and functions separately for the key sub sectors. The need for coordinated functioning of the three extension agencies is the need of the hour for strengthening integrated farming systems and to achieve farmer level synergies.

V. Emerging Policy Perspectives

16. Policy Guidelines in the past and innovative programs being implemented like National Agricultural Technology Project, have already brought about path breaking improvements in the sector. The strategic shift and directions of change have already set in. The new Agricultural Extension Policy will build on these emerging perspectives and potentials already demonstrated.
17. **Increasing Public Investment in Agriculture Sector:** The public investment for extension support has gradually increased to 1.22 percent of the AGDP.
18. **Priority setting of the Research Agenda:** The thematic areas for pursuing agricultural research and technology development have been identified and prioritized through wider stakeholder consultations including farmers. An innovative and competitive model for inviting, screening, funding and monitoring research proposals is in place and promising

appropriate technologies are being developed, validated and disseminated among farmers through Extension.

19. **Amendments to the Bangladesh Agriculture Research Council Act:** BARC act has been amended for improving the governance, management and development of the National Agricultural Research System for achieving an impedance match among the strengths, weaknesses, opportunities and emerging threats of the primary sector and making it more responsive to national priorities.
20. **Farmer Group based Demonstration and Adoption:** Mobilization and development of Common Interest Groups of farmers, are working as the village level hubs for demonstrating newer and improved technologies. These specialized crop fisheries and livestock farmer institution have been gradually achieving widespread adoption among farmers within the groups and outside.
21. **Decentralized One Stop Extension Unit at Union Level:** Housed within the new Union Parishad Complex, Farmer Information and Advisory Centers (FIAC) are emerging as the local extension units providing integrated advisory services on crop, livestock and fisheries to all categories of farmers.
22. **Supply chain Activities for High Value Agriculture:** Though on a pilot basis, initiatives are under way to develop and tap the potential of promising high value crops with a clear focus on farm based livelihood development and income improvements through crop diversification and market linkage.
23. **Bottom up Micro Extension Planning:** Extension activities are being systematized and streamlined with the preparation of Micro Extension Plans for Farmer Groups, its gradual consolidation and aggregation at union level and upazilla level. The implementation of micro extension plan follows a coordinated arrangement among Agriculture (DAE), Livestock (DLS) and Fisheries (DOF) departments.

VI. Other Driving Policies

24. The Agriculture Extension Policy is synthesized within the context of and drawing lessons from the following policy framework and approaches already in operation.
 - National Agricultural Policy - 1999
 - National Food Policy - 2006
 - Bangladesh Climate Change Strategy and Action Plan-2008
 - National Seed Policy
 - Flood Action Plan
 - National Disaster Management Plan (2007 - 2015)
 - Country Investment Plan - 2010

- Perspective Plan (2010 - 2021)
- National Livestock Policy - 2007
- National Fisheries Policy - 1998

VIII. Mission

25. The mission of National Agricultural Extension Policy is to provide efficient, effective, coordinated and de-centralized, demand responsive and integrated extension services to help farmers in Bangladesh access and utilize better know how, improve productivity, optimize profitability and ensure sustainability thereby ensuring the well being of their families.

IX. Vision

26. The vision is to become self reliant to meet the entire food demand of its population as well as competitively produce high value produces for global markets with the objectives of alleviating rural poverty, maintaining nutritional standards, accelerating economic growth and sustaining natural resources.

X. Key Objectives of the Policy

27. Considering the Constraints and Emerging Policy Perspectives, the objectives of the Extension Policy is to

- Improve the productivity and production of primary food crops to sustain National Food Security
- Increase farm income and employment through increased diversification of the sector with high value crops and farm enterprises linked with domestic and international markets
- Improve longer term sustainability of the use and conservation of Natural Resources including mitigation of climate change induced vulnerabilities.
- Mobilize, build and develop farmer groups and organizations for better access to technologies, information and markets through aggregation, economies of scale and building social capital.
- Help alleviate poverty among tiny, small and marginal farmers including removal of nutritional imbalances and ensuring food safety.

Strategic Shifts and Guiding Principles

28. The National Agriculture Extension Policy draws from the fore-going constraint analysis and derives the following strategic approaches considering the competitive and strategic advantages for Bangladesh.

29. **Differentiated Approach to Suit Location Specific Demands:** Depending upon the biological diversity, climate variability, land forms, land use and soils, the country is sub divided in to agro-ecological zones. In addition, there are ecologically constrained areas resulting from proneness to natural disasters and emerging vulnerabilities from climate change issues. The concentration and spread of poverty and incidence of malnutrition among rural masses vary across the length and breadth of the country. This policy recognizes a zoning and matrix approach using agro-ecological zones, ecologically constrained areas, incidence of poverty and malnutrition, to define varied as well as unique spatial and geographic demands for extension services as defined in the map given in Appendix-I and constraints and technology gaps matrix given in Appendix-II. The approach will increase the efficiency of extension efforts by defining location specific and purpose specific extension approach, tools and messages so that the objectives set under the policy are better achieved.
30. **Targeting the Tiny, Marginal and Small Holders:** The contexts, constraints and capacities vary across different sub groups of farm households. In order to reach out to all categories, optimize impacts and to ensure equity of benefits the extension services have to match the needs and priorities of different sub groups of farmers. Participatory targeting methodologies will be implemented to identify small holders and their sub groups.
31. **Recognizing Farmers as Partners in Development:** This policy recognizes direct roles for farmers in defining, managing and implementing extension activities. Inclusive, accountable and empowered Farmer Groups at village level partner with extension agencies to improve the effectiveness of extension efforts.
32. **Synergizing Producer Organizations to Address Value Chain Constraints:** The key objectives of increased income and employment opportunities for the farm households will be achieved through aggregation of farmer groups into higher level producer organizations. The producer organizations are viable, economic enterprises for enhancing farmer's access to resources, technology and markets on a sustainable basis based on the principles of promoting collective activities with more pronounced benefits through all stages of production cycle. The producer organizations aim at increasing incomes of farmer members through cost reduction, productivity and quality improvement as well as risk and disaster mitigation measures.
33. **Reinventing Integrated Whole Farm Approach:** Shifting of focus from productivity enhancement to income improvement and nutritional considerations call for integrating crop, livestock and fisheries production. This will help supplement and complement benefits from the production sub systems. Kitchen gardens/nutrition gardens and backyard poultry are also integral part of the integrated approach.
34. **Value Added Facilitation Style of Extension Agents:** Farmer centered learning and internalization of knowledge is the prime requirements for sustained and improved

behavior changes. This calls for a radical change from the current advisory and prescriptive styles of extension to more of facilitation. Such facilitation needs more farmer friendly approaches of guiding, mentoring and handholding to help farmers take informed decisions based on evaluation of alternate choices.

35. **Pluralistic and De-centralized Approach:** Enhancing outreach and sustained meaningful benefits to farmers can only be ensured through collaborative efforts of public, non-governmental and private initiatives. Locally based arrangements for guidance and harmonizing to suit unique local characteristics and farmer needs will be promoted with adequate coordination and monitoring. A bottom up participatory need identification, prioritization and program planning approach will be strengthened.
36. **Enhanced Capacity Building of Extension Personnel:** The broadened scope and renewed strategy require capacity building of extension personnel. Concerted efforts to develop knowledge, skills and mental conditioning of the extension officers and specialists in additional areas of facilitation skills, farmer institution building, supply chain development etc. would be a priority for maintaining staff motivation and effective performance.
37. **Investment in Common Productive Assets to Augment Information Support:** In order to comprehensively mitigate constraints in the different stages of production cycle, and to realize better income for farmers the new policy recognizes the importance of investing in productive common assets, equipment and machinery.
38. **Promoting e-Agriculture:** Innovative use of information and communication technologies will be promoted in all possible stages of agricultural production cycle. However, the tools used will be farmer friendly easy to access as well as cost effective.
39. **Copping with Climate Changes and Balancing Environmental Issues:** Technology adaptations to climate change induced vulnerabilities and a long term resilient strategy on environmental and human health will be promoted.
40. **Refocus on Social Safeguard Considerations:** Special needs of women farmers, young farmers, farmers in special constrained areas will be addressed through tailor made extension approaches and packages.
41. **Alignment, Harmonization and Coordination:** The Country Investment Plan (CIP), the national planning fund mobilization and alignment tool, presents a coherent set of 12 priority investment programs for Bangladesh to improve food security and nutrition through food availability, access and utilization; out of which 7 programs are directly relating to issues addressed in this policy. Following the Paris declaration, all external sources of funding for the sector will be aligned to strengthen the NAEP for ensuring cohesion, coordination and to avoid duplications. The policy is also aligned with the sixth five year plan. Therefore NAEP will ensure effective coordination of interventions

as outlined in the CIP among development partners, Ministry of Health and Family Welfare, Ministry of Fisheries and Livestock and the Ministry of Food and Disaster Management.

XI. Components of the Policy

42. In order to realize the vision and objectives, The National Agriculture Extension Policy proposed to harness and channelizes resources to implement the following activities on a priority basis.
43. **Coordinated and Integrated Umbrella for Extension:** a National Agricultural Extension System (NAES) encompassing crop, fisheries and livestock sub sectors will be promoted. The apex responsibility will be shared on rotation basis among the line departments at district and upazilla level. However the national level coordination will be lead by Department of Agricultural Extension (DAE).
44. **Inclusive Farmer Organization at Village and Higher Levels:** In order to restore decision making in the hands of the farmers and to have direct access to resources and markets, inclusive farmer groups will be mobilized, supported and strengthened as representative organizations of crop, livestock and fisheries farmers of all categories. These accountable institutions will perform and govern the primary sector activities in accordance with comprehensive guidelines and rules of business. Building upon the village level, farmer organizations, higher level Producer Organizations will be established, mandated with activities covering entire production cycle. The performances of Producer Organizations will be based on economies of scale, enhanced bargaining capacity, equity of benefits, participation in decision making and risk reduction. Farmer groups at the village level and higher levels will be registered under appropriate laws for legal recognition.
45. **Strengthening the One Stop Service Centre - FIAC:** In order to ensure two-way flow of information between farmers and other stakeholders (local government, extension, research, private sector, NGOs), Farmers Information and Advice Centers (FIAC) housed within the UP complex or UP office will be further developed and strengthened under the leadership of DAE. Field extension personnel and local service providers of extension agencies (at least DAE, DLS, DoF) will provide one stop integrated services for all kinds of farmers as per roaster schedule. In the course of time, FIAC will be strengthened with furniture, ICT facilities, small agricultural equipments, information materials, mobile phone facilities and demand responsive information center for all categories of farming communities/farmers.
46. **Fortifying Information with Supply Chain Development:** The extension services will be broadened to support farmer institution building and addressing issues of input supply including seeds and planting materials, quality assurance of produce, market and price information provision, linkages with processors and exporters, brokering market

linkages, post harvest management etc. through farmer institutions. Technical and financial support provision will cover entire spectrum of activities in the production cycle of nationally critical sub sectors and produces.

47. **Ensuring Food Safety:** Good Agricultural Practices (GAP) standards for agricultural production and post harvest management will be developed and disseminated to promote quality of produce, ensure phyto-sanitary standards and less traceability for domestic and export consumption market.
48. **Innovative Improvements for e-Agriculture:** Use of ICT for linking marketing system with production system will be implemented through web based and mobile based technologies. Digitized data bases and management information system will be set up at upazilla, district and national level. Mobile based text messages and voice messages will utilized for early warning on pest and disease outbreak, natural disasters as well as to disseminate critical information.
49. **Demand Responsive Research-Extension-Farmer linkage:** The core of the NAEP will be strengthening the multi-way cyclical feedback and response system and linkage among farmer, research institution and extension system. The process includes but not limited to (a) the early involvement of researchers in extension planning and work on demand-based on-farm technology validation; (b) demonstrations, field days, fair, horticulture nursery, workshops and farmer exchange visits including increased use of communications technologies for training and dissemination of extension related information; (c) imparting training to the extension service providers on the newly developed technologies from the research institutes; (d) participatory action research involving extension service providers and farmers; (e) participatory annual technology review workshop and (f) feedback procedure.
50. **Newer Technology for Sharper Focus on Hot spots:** Adoption of biotechnologically develop technologies on crops, livestock and fisheries will be strengthen in collaboration with NARS institutes and National Institute of Biotechnology (NIB). This will benefit the poor farmers located in deeply flooded areas, char land, flash flood prone areas, coastal tidal surge and salinity prone areas, and hilly areas.
51. **Strategic Communication and Policy Governance:** The National Agricultural Extension Policy Implementation and Coordination Committee (NAEPICC) will be a permanent body to serve as a forum for the NAES organizations and for the overall co-ordination of NAEP chaired by Secretary, Ministry of Agriculture. Honorable Minister, Ministry of Agriculture would be the Patron of the Committee.
52. **Promoting Urban Agriculture:** Urban agriculture (especially urban horticulture) will be promoted in any fallow land, roadside and in the roof-top of the high raised buildings to meet up the demand of a portion of horticultural product and restoring a good

environment for the urban people. The opportunity of the horticultural farming with high technology will be emphasized for strengthening urban agriculture.

53. **Mainstreaming Disaster Preparedness and Adaption to Climate Change:** To combat with disasters, the farmers group will be trained to adopt short duration varieties, late varieties, salinity tolerant varieties, drought tolerant varieties and other available technologies. It is recognized that farmers of Bangladesh have adjusted their cropping pattern by growing a range of indigenous and high yielding varieties of rice and other crops. The climate change adaptation in agricultural extension may include but not limited to: (i) integrated approach involving concerned ministries and departments; (ii) resilient extension practices for different climatically stressed and saline conditions; (iii) strengthen capacity of NAES organization as a whole and (iv) documenting and promoting indigenous farmer practices against disasters and vulnerabilities.
54. **Specialized Extension Services for Climatically Distressed Areas:** The following Specialist Extension Service Providers (SESP) will be developed and provided: (i) development of area specific climate resilient specialized cropping patterns; (ii) field level trials of climate resilient specialized cropping patterns and associated water management system in collaboration with agricultural research and related organizations/institutes; (iii) development of organized seed production, preservation and supply system for area specific adopted varieties; (iv) identification/development of area specific production technologies (i.e., mulching, water management, polytunnels, raised beds, floating beds, rain water reservoirs etc.) for crop production in the vulnerable areas; (v) development of early warning and weather forecasting for crop production against diseases, insects, drought, floods, storms, tidal surges etc.; (vi) development of the capacity of the SESP in special areas by the concerned NAES organizations.
55. **Strengthening “Public-Private-Partnership (PPP)” in Agricultural Extension:** For high-value, market led, export oriented sub sectors and producers private sector driven development will be promoted in: (i) commercial production, processing and marketing; (ii) agro-technology extension services; (iii) market information system (development, expansion and flow); and (iv) establishment and management of agricultural product collection centers, wholesale market etc.
56. The registration and regulations of private establishments in the agriculture sector will be simplified for encouraging the development of private sector in seed production, processing and marketing, non-urea fertilizer production and marketing, irrigation equipments manufacturing and marketing, mini and small SME in village level etc. There will be provision for low interest credit facilities and creating marketing opportunities. There is also an urgent need to adjust education and training to the needs of the private sector and provide working conditions in line with what is necessary for growth and increased employment and income in agriculture, livestock and fisheries. The leaders of the private sector, on their part, must focus more on productive investment, growth and employment. In accordance with the definition used by the Government of Bangladesh,

the following categorization of enterprises: (i) Microenterprise—one to 9 employees, (ii) Small enterprises—10 to 49 employees, (iii) Medium enterprises—50-99 employees and (iv) Large enterprises—100 or more employees, out of which (i) and (ii) will be considered in agriculture sector. The policy development and legal aspects in agriculture sector will be the responsibility of the public sector, where as the private sector will play the role of implementer of the policy framework.

57. **Strengthening Supply of Quality Seeds and Other Inputs:** A coordinated effort will be made by the extension organizations for production, processing, preservation and distribution of quality seeds of HYVs (crops, livestock, fisheries etc.), timely availability of the fertilizer giving emphasis on organic culture, low use of pesticides providing more emphasis on the use of IMP technologies (sex pheromones and related technologies), efficient irrigation water management providing more emphasis on the preservation and use of rain and surface water and Alternate Wetting and Drying (AWD) irrigation system and other efficient irrigation systems (e.g., buried pipe, sub-surface irrigation, pukka nala etc.).
58. **Actively Promoting Organic Farming/ Green Farming:** Pest attacks are one of the most important limiting factors for satisfactory production of different crops. Pest-induced crop losses range between 30%-52% every year, which means the crop losses are anywhere between one-third to one half of attainable crop production. The crop losses are a higher percentage of output in the developing countries than in the developed countries - with a substantial absolute value of crop losses in South Asia. Several bio-rational based pest management packages have been developed and became highly popular among the farmer communities. IPM packages for toxic pesticide free vegetable viz. eggplant, tomato, beans, cucurbits, okra etc. production are becoming much popular and extended throughout the country. Bio-control agents are being commercially utilized for pest management. It is true that progress has been made in the IPM research, development and adoption, which is not enough for the safeguard of our environment and total cropping system. Utmost importance will be given to disseminate bio-rational based management to ensure productivity, food safety and safe environment in collaboration with private sectors.
59. **Mainstreaming Women in Agriculture:** Participation of women in agriculture will be encouraged through developing women farmer groups, encouraging women SME development in agri-business, developing confidence for raising voice through grass root level women farmers' organization, creating gender awareness in both women and male farmers. In addition women farmers are encouraged to lead and occupy decision making positions in higher level farmer organizations.
60. **Emphasizing homestead gardening :** The development of home gardening that build on traditional practices, local conditions and cultural context, and that are conducted by extension service providers that are well-established in the community, can be a sustainable means of improving micronutrient intake among high-risk groups and

improving household food security, will be emphasized. In addition, home gardening programs can be implemented successfully and cost-effectively on a national scale using a collaborative model that fits local conditions. As women are usually the main caretakers of the home garden, such programs empower them, thus ensuring better utilization of the income from the garden for food and increasing family welfare. These benefits will be important contributions towards poverty alleviation and food security in Bangladesh. Emphasis will be given on the establishment of improved homestead gardens that have more types of vegetables and productive throughout the year.

61. **Thrust on Farm Mechanization:** The government has already given due importance to agricultural mechanization in the National Agricultural Policy. In the Policy it is included that “The Government will encourage production and manufacturing of agricultural machinery adaptive to our socio-economic context. Manufacturing workshops and industries engaged in agricultural mechanization activities will be provided with appropriate support.”

The policy realize the shortage of farm power and will promote projects to mechanize different crop production operations like tillage, seeding transplanting, fertilizing, weeding, herbicide spraying, harvesting and threshing, with 25% subsidy price to the farmers to purchase different farm machinery to perform the above mentioned operation in time which will be emphasized for a certain period of time.

62. **Efficient and Effective Dissemination of Technology:** Getting a technology adopted, even when it has obvious advantages is often very difficult. Many technologies require a lengthy period, often of many years from the time they become available to the time they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of dissemination of a technology. Implementation modalities including the target groups are important in determining the dissemination and adoption of new technologies in the field. Furthermore, the rate of adoption depends on the behavioral change and risk taking capacity of the farmer categories: the (i) innovators, (ii) early adopters, (iii) early majority, (iv) late majority and (v) laggards.

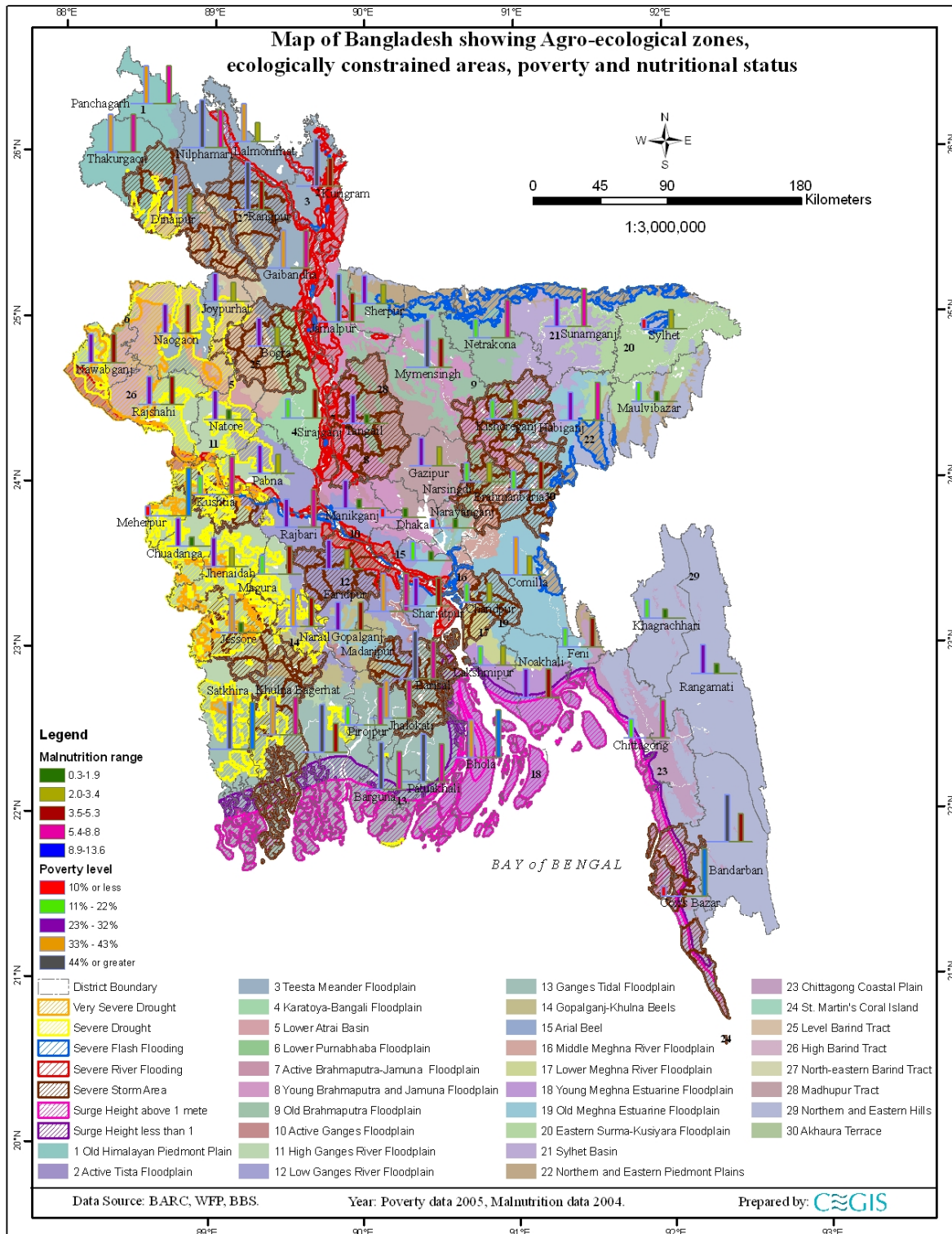
Change in attitude, skill and knowledge of the farmers and their groups will be enhanced through “need-based single topic one day training program” and involving risk taking farmers (category i & ii) in adopting new technologies through adaptation trial and demonstration.

63. **Industry Linkage for Enhancing Agro-based Industries:** The development of agriculture depends on the transformation of agricultural products into the commercial industrial product as per preference of up-growing consumers. The industry linkage will be enhanced through continuous supply of agricultural products by contract farming with farmers groups and their federations at union, upazilla, district and national level and linked with agro-based potential industries in home and abroad.

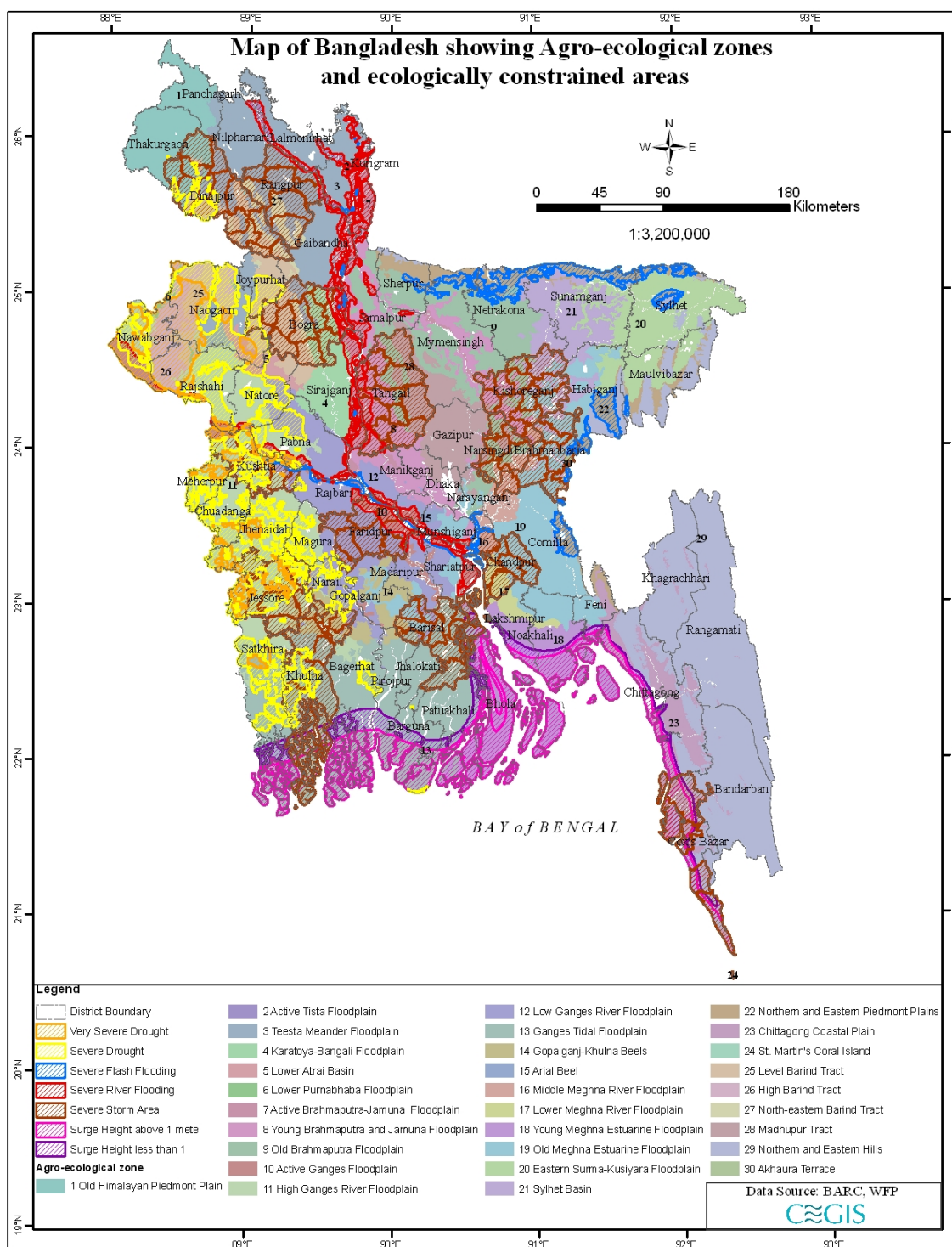
64. **Credit and Insurance:** Continued production with high productivity along with adoption of input intensive innovative technologies require optimum amount of working capital in time. This will be enhanced through group savings, linking with the financial institutes and banks. The linking process will be initiated by the farmer organizations (FOs) at upazilla and district level with the facilitation of the extension agent. Crop insurance, though matter of debate, may be introduced for the save of small and marginal farmers from damage-shock of their crops by sudden disaster.
65. **Enabling and Guiding Role of Extension Workers:** The role of extension agent will be the “Facilitator but not the doer”. They will guide and help the private sector, FGs and FOs in decision making process, creating demand view, identifying the local resources, linking with the market and financial institutes, public resource institutes in home and abroad within the legal framework. The capacity of the extension agent will be enhanced through intensive technical and HID training, higher studies and on-spot coaching. Adequate logistic support will be provided for efficient and effective extension support at all level.
66. **Strengthening Monitoring and Evaluation:** Participatory monitoring and evaluation (PM&E) will be introduced at all level of extension initiative. Participatory monitoring and evaluation (PM&E) is a process through which stakeholders at various levels engage in monitoring or evaluating a particular program, share control over the content, the process and the results of the M&E activity and engage in taking or identifying corrective actions. PM&E will focus on the active engagement of primary stakeholders (FG, FOs etc). In the course of PM&E processes, it will be ensured that the (i) primary stakeholders are active participants – not just sources of information, (ii) capacity of local people is build up to analyze, reflect and taking action, (iii) joint learning of stakeholders at various levels have been taken place adequately, and (v) catalyzes commitment for taking corrective actions.

Appendix I

Map of Bangladesh showing Agro-ecological Zones, ecologically constrained areas, poverty and nutritional status.



Map of Bangladesh showing Agro-ecological Zones and ecologically constrained areas.



Policy Implication Matrix

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies*
1	Himalayan Piedmont Plain	Old Himalayan Piedmont Plain	North-western part of Dinajpur, most of Panchagarh & Thakurgaon.	<ul style="list-style-type: none"> • Mainly noncalcareous brown floodplain soils, grey floodplain soils & black terrai soils. • Mean annual rainfall 1780-2290 mm. • Temperature max. 36° C and min. 9° C. • High to medium high flash floods occur following seasonal heavy local rainfall. 	<ul style="list-style-type: none"> • Transplanted Aman • Aus paddy or kaon (foxtail millet). • HYV boro • Sugar cane, potato, wheat, mustard, pulses. • Jute 	<ul style="list-style-type: none"> • Surface water supplies are limited for dry season irrigation. • Predominant soils are rapidly permeable. • Variable extent of flooding/water logging from year to year. • Flash floods in depressions. • Late drainage of soils in depressions. • Seasonal water logging. • Late start & early end of rainy season and high temperature & low humidity delay sowing of aus & jute. • Soil fertility problem. • Poor road communication • Remoteness from the urban services. 	<ul style="list-style-type: none"> • Lack of suitable wheat varieties for late planting. • Lack of short duration cereals and pulses varieties. • Dearth of drought tolerant crop varieties. • Need for heat tolerant variety of wheat. • Need for low water consuming cropping patterns/crop varieties. 	<ul style="list-style-type: none"> • Improve soil & crop management by dibbling, line-sowing or dry transplanting aus paddy. • Increase use of fertilizers and organic manures. • Improve field drainage for dry land crops. • Expand rainfed HYV aus & dry land rabi crops. • Promote the use of dug wells or hand pumps/tubewell. • Identify local schemes for flood protection & drainage. • Provide more all-weather roads. • Improve processing and marketing facilities.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies*
2	Barind Tract	High Barind Tract	Naogaon, Nawabganj, Rajshahi.	<ul style="list-style-type: none"> The region has been tilted upward along the western edge. Deep grey terrace soils. Mean annual rainfall 1300-1400 mm. Temperature max. >40° C and min. <20° C. All the land stands above normal flood-level. Mainly drought prone area. 	<ul style="list-style-type: none"> Transplanted aman Broadcast Aus HYV boro Gram, barley & mustard 	<ul style="list-style-type: none"> Unreliable low pre & post monsoon rainfall. Soils which are poorly drained in rainy season become very dry in dry season. Low natural soil fertility. Generally inadequate surface water. Some areas contain high Iron - in groundwater which adversely affects the crop. Worse internal communication. Big land-ownership makes difficult to organize cooperative activities. 	<ul style="list-style-type: none"> Need for low water consuming cropping patterns/crop varieties. Lack of appropriate technique for removal of iron and arsenic in irrigation water. Dearth of drought tolerant crop varieties. Lack of short duration cereals and pulses varieties. 	<ul style="list-style-type: none"> Need to increase the use of fertilizers and manures for crop management. Improve maintenance of field bunds and drainage outlets between fields so as to retain water on fields more efficiently and to reduce the risk of gulley erosion during heavy rainfall. Promote the use of dug- wells. Increase the number of tanks & re-excavate derelict tanks to provide additional irrigation water. Increase the thickness of the cultivated layer above the ploughpan without destroying bearing capacity when the soils are wet. Grow dry land crops after transplanted aman. Conduct water management trials on rainfed and irrigated land to increase the efficiency of water use. Build more all-weather roads.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies*
		Level Barind Tract	Bogra, Natore, Naogaon, Gaibandha, Jaipurhat, Dinajpur, Rangpur, Sirajganj.	<ul style="list-style-type: none"> • Almost level area, elevation nearly 60-90 cm. • Deep & shallow grey terrace soils. • Mean annual rainfall 1300-1500 mm. • Temperature max. 40° C, min. 20° C. 	<ul style="list-style-type: none"> • Transplanted aman • Broadcast HYV aus • HYV boro paddy • potato & wheat 	<ul style="list-style-type: none"> • Soils which are flooded in the rainy season become very dry in the dry season. • Low organic matter content & low soil fertility. • Uncertain groundwater supplies in some areas. • Big land-ownership. • Poor rural road communication 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Dearth of drought tolerant crop varieties. • Need for low water consuming cropping patterns/crop varieties 	<ul style="list-style-type: none"> • Improve soil and crop management by increased use of fertilizers and manures on all soils. • Promote the supplementary irrigation of kharif & early rabi crops using tanks, dug wells and existing DTWs/STWs during drought season. • Construct flood protection
				<ul style="list-style-type: none"> • Seasonal flood occur during heavy local rainfall. • Mainly drought prone area. 		especially in the rainy season.		<ul style="list-style-type: none"> infrastructures and improve drainage to protect the HYV boro & kharif crops from early & flash floods. • Expand cultivation of transplanted HYV aus or aman, using quick-maturing varieties. • Re-excavate old tanks and khals (canals), excavate new tanks. • Concentrate extension efforts on progressive medium

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies*
		North-eastern Barind Tract	Gaibandha, Jaipurhat, Dinajpur, Rangpur, Bogra.	<ul style="list-style-type: none"> • The region stands slightly higher than adjoining floodplain land. • Deep red-brown & brown mottled terrace soils. • Mean annual rainfall 1800-2000 mm. • Temperature max. >40° C, min. <15° C. • Soils are acidic. • Most of the region is better drained. • A few valleys are seasonally deeply flooded. • Mainly drought prone area. 	<ul style="list-style-type: none"> • Field crops include aus, t.aman, mesta, mustard, potato, sugarcane and mashkalai (blackgram). 	<ul style="list-style-type: none"> • Low moisture holding capacity of soil. • The red soils are strongly phosphate fixing. • The brown-mottled soils are neither well suited for dry land nor for wetland kharif crops because of these uncertain hydrological conditions. • Poor road communication during rainy season. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Dearth of drought tolerant crop varieties. • Need for low water consuming cropping patterns/crop varieties. 	<ul style="list-style-type: none"> • Increase use of organic manures on all soils for growing dryland crops. • Increase use of fertilizers.. • Use mulching of red & brown soils for cultivating dry land crops. • Apply supplementary irrigation to kharif crops from dug wells and tanks during drought. • Improve field drainage of red and brown soils to protect dry land crops from water logging during heavy rainfall.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies*
3	Madhupur Sal Tract	Madhupur Tract	Jamalpur, Gazipur, Mymensingh, Tangail.	<ul style="list-style-type: none"> • Deep red-brown terrace soils & noncalcareous floodplain soils. • Mean annual rainfall 2030-2290 mm. • Temperature max. 34° C, min. 11° C. • Areas of floodplain alluvium moderately deeply flooded. 	<ul style="list-style-type: none"> • Mainly rainfed aus, t.amam & also HYV boro. • Mustard, jackfruit, sugarcane, wheat, potato, vegetables. 	<ul style="list-style-type: none"> • Complex relief & soil patterns. • Low moisture holding capacity of soil & low natural fertility. • Both uncertain flash flood & deep flooding occur. • Poor road communication in interior areas, especially in rainy season. • Big land-ownership and also dominance of absentee landlords. 	<ul style="list-style-type: none"> • Lack of short duration/flood tolerant varieties of paddy. • Lack appropriate of water management technique for the complex relief area. 	<ul style="list-style-type: none"> • Increase use of fertilizers and organic manures. • Provide deeper ploughing to break up the ploughpan in red & brown upland soils. • Improve maintenance of field bunds on soils to protect erosion. • Expand command areas of existing irrigation facilities by lining channels, leveling fields, full-time pump operation through rotational irrigation. • Create terraced fields for paddy cultivation. • Adapt new crops varieties. • Re-excavate old tanks and khals, excavate new tanks. • Construct road, embankments and culverts. • Dug channels below culverts.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
4a	Tista Floodplain	Active Tista Floodplain,	Kurigram, Lalmonirhat, Nilphamari, Rangpur, Gaibandha.	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils. • Mean annual rainfall 1270-2290 mm. • Temperature max. 38° C, min.10° C. • Most areas are shallowly flooded in rainy season. 	<ul style="list-style-type: none"> • Cheena, kaon or early aus, t.aman, jute and sugarcane. 	<ul style="list-style-type: none"> • About one-third of the land remains barren, mainly on new char land. • Poor soils on new chars. • Shifting river channels which constantly erode agricultural land & displacing settlements. • Uncertain crop production due to risk of bank erosion. • Variable flood-levels within the rainy season & between years. • Backward socio-economic conditions due to big land holdings by absentee owners. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Lack of management techniques for bringing new alluvial soils quickly under cultivation. • Absence of techniques for avoiding or mitigating natural disasters. • Lack of appropriate quick growing woody plants varieties. 	<ul style="list-style-type: none"> • Increase production of suitable crops like non-rice cereals, mustard, potato, etc. on silty soil. • Use more fertilizers on silty soils & more manure on sandy soils. • Make kharif crop production more secure by growing early aus paddy & jute. • Grow quick growing trees in those areas which have most distant from active river channels. • Increase economic security by giving priority in the settlement of new chars to farmers who have lost land by bank erosion. • Improve road communication • Construct flood shelters & embankment. • Promote industrial & agricultural development in neighboring region to attract people out of the insecure char areas.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
		Karatoya-Bangali Floodplain,	Eastern half of Bogra, most of Sirajganj.	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils. • Mean annual rainfall 1500-1800 mm. • Temperature max. 40° C, min. 15° C. • Most areas are deeply flooded in rainy season. 	<ul style="list-style-type: none"> • Aus, aman, jute, pulses, oilseed, wheat, potato, mustard, chilli, sugarcane. 	<ul style="list-style-type: none"> • Uncertain depth & extent of rainwater in basins. • Deep flooding & heavy soil consistence in basin clays. • Irregular relief & complex soil patterns near river channel. • Sometimes shortage of surface water for jute retting. • The plough pan in soils used for t. aman restricts root development of other crops. • Risk of extensive crop damage if the Brahmaputra embankment is breached by flood. 	<ul style="list-style-type: none"> • Lack of practical means of increasing the thickness of soil without destroying the bearing capacity. • Lack of appropriate low water consuming method of jute retting. 	<ul style="list-style-type: none"> • Increase use of fertilizers in all soils and organic manures especially in light textured soils. • Improve crop management by dibbling/line-sowing aus on permeable soils and transplanting on impermeable soils. • Promote the use of dug wells & hand pumps for supplementary irrigation. • Excavate khals/tanks. • Improve flood control & drainage. • Improve marketing facilities. • Provide all weather roads.
		Lower Atrai Basin	Naogaon, Natore, Bogra, Sirajganj, Rajshahi.	<ul style="list-style-type: none"> • Low-laying area. • Noncalcareous grey floodplain soils. • Mean annual rainfall 1500-1600 mm. • Temperature max. >40° C, min. <15° C. • Most areas are deeply & often rapidly flooded in rainy season. 	<ul style="list-style-type: none"> • Local boro, HYV boro, deepwater aman. 	<ul style="list-style-type: none"> • Deep seasonal flooding. • Rapid flash flooding. • Slow drainage after heavy rainy season. • Occasional drought. • Heavy clay soils which are very heavy to cultivate. • Poor dry season road communication. 	<ul style="list-style-type: none"> • Lack of submergence tolerant modern rice varieties. • Dearth of appropriate technique for tillage of heavy clay soils. 	<ul style="list-style-type: none"> • Increase use of fertilizers and organic manures. • Expand command areas of existing irrigation facilities. • Provide additional DTWs/STWs. • Identify local schemes for flood & drainage protection. • Improve external & internal road links.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
		Tista Meander Floodplain	Most of greater Rangpur, eastern part of Panchagarh & Dinajpur, northern Bogra, parts of Jaipurhat, Naogaon, Rajshahi.	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils. • Mean annual rainfall 1500-2300 mm. • Temperature max. >40° C, min. <20° C. • Most areas are shallowly flooded in rainy season. 	<ul style="list-style-type: none"> • T.aman, aus, jute, wheat, potato, spices, vegetables & tobacco. 	<ul style="list-style-type: none"> • Droughty, infertile, sandy, ridge soils. • Wetness of ridge soils during periods of heavy rainfall. • Plough pan and slow drainage of basin soils after rainy season. • Occasional serious flood. • Sometimes shortage of surface water for jute retting. • Irregular relief & complex soil patterns. 	<ul style="list-style-type: none"> • Lack of practical means of increasing the thickness of soil without destroying the bearing capacity. • Lack of appropriate low water consuming method of jute retting. 	<ul style="list-style-type: none"> • Increase use of fertilizers and organic manures. • Improve crop management by dibbling/line-sowing of aus on permeable soils and transplanting on impermeable soils. • Improve jute retting facilities. • Promote the use of dug wells & hand pumps for supplementary irrigation. • Improve marketing facilities. • Provide all-weather roads.
4b	Ganges Floodplain	Arial Bil	Munshiganj, Dhaka.	<ul style="list-style-type: none"> • Low lying basin area. • Relief is locally irregular. • Calcareous dark grey floodplain soils & calcareous brown floodplain soils. • Mean annual rainfall 1900-2150 mm. • Temperature max. >35° C, min. <15° C. • Mainly deeply flooded in rainy season. 	<ul style="list-style-type: none"> • Local boro paddy, aus, aman, potato, pulses, mustard, wheat, vegetables. 	<ul style="list-style-type: none"> • Deep and sometimes early flooding. • Predominantly heavy clay soils. • Empolderment & pump drainage would be difficult and expensive to provide because of the rapid run-off from the predominant clay soils. 	<ul style="list-style-type: none"> • Lack of submergence tolerant/deep- water modern rice varieties. 	<ul style="list-style-type: none"> • Improve crop management by dibbling/line-sowing aus on loamy ridge soils. • Employ more efficient method for applying fertilizers. • Use land leveling in crop fields. • Create small polders with pump drainage and irrigation facilities. • Identify small embankment for flood protection. • Make raised cultivation platforms. • Use more fertilizer & pesticide. • Improve water communication.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
		High Ganges River Floodplain	Nawabganj, Rajshahi, Pabna, Kushtia, Meherpur, Chuadanga, Jhenaida, Magura, Jessore, Satkhira, Khulna.	<ul style="list-style-type: none"> • Most areas have a complex relief. • Calcareous dark grey floodplain soils & calcareous brown floodplain soils. • Mean annual rainfall 1400-1800 mm. • Temperature max. 40° C, min. 20° C. • Mainly shallowly flooded area but extensive flooding occurs due to heavy rainfall. 	<ul style="list-style-type: none"> • Aus paddy, jute, pulses, oilseed, wheat, potato, sugarcane, tobacco, cotton, turmeric, garlic, onion, mustard. • Banana & mango are mainly cash crops. 	<ul style="list-style-type: none"> • Uncertain flood levels. • Crops on both ridge & basin exposed to the risk of drought, flood & waterlogging. • Heavy, cracking, basin clays which are difficult to plough both when wet & dry. • Poor materials for road foundation, road surfacing, embankment etc. because of the plastic, shrink-swell properties of soils • Big land ownership. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus varieties. • Dearth of drought tolerant crop varieties. • Lack of post-harvest handling and marketing techniques for fruits. 	<ul style="list-style-type: none"> • Improve crop management by dibble- sowing aus paddy on ridge & transplanting aus and deepwater aman on basin. • Increase use of organic manure on loamy ridge soils. • Grow dainchya (<i>sesbania sp</i>) as a fuelwood crop. • Excavate/re-excavate old river, khals, & tanks. • Use field leveling. • Expand cultivation of dryland cash crop. • Undertake large-scale embankment project..
		Low Ganges River Floodplain	Natore, Pabna, Goalundo, Faridpur, Gopalganj, Madaripur, Magura, Manikganj, Munshiganj, Dhaka, Narail, Khulna, Kushtia, Shariatpur, Bagerhat, Barisal.	<ul style="list-style-type: none"> • Most areas have a complex relief. • Calcareous dark grey floodplain soils & calcareous brown floodplain soils. • Mean annual rainfall 1600-2000 mm. <ul style="list-style-type: none"> • Temperature max. >40° C, min. <20° C. 	<ul style="list-style-type: none"> • Aus & aman paddy, HYV boro, capsularis jute, potato, pulses, sugarcane, tobacco, cotton, spices, mustard. 	<ul style="list-style-type: none"> • Widespread deep flooding near basin. • Doughtiness of ridge soils. • Heavy clays remain wet in rain but quickly dry under sun which is not suitable for cultivation. • Limited surface & ground water supply for irrigation in some areas. • Sometimes shortage of surface water for jute retting. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Dearth of drought tolerant crop varieties. • Need for low water consuming cropping patterns/crop varieties. • Lack of appropriate low water consuming method of jute retting 	<ul style="list-style-type: none"> • Improve crop management by dibble-sowing of aus paddy on ridge & transplanting aus and deepwater aman in basin. • Increase use of organic manure on loamy ridge soils. • Grow new crops to prevent disease. • Grow dainchya as a fuelwood crop.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
				<ul style="list-style-type: none"> • Medium to shallowly flooded area. 		<ul style="list-style-type: none"> • Widespread zinc, sulphur, iron deficiency problem in topsoil. • Ufra (nematode) disease of paddy is prominent. • Poor road communication. 		<ul style="list-style-type: none"> • Expand cultivated land. • Excavate/re-excavate old rivers, khals, and tanks. • Promote the use of dug wells & hand pumps for supplementary irrigation. • Make regulations for flood protection areas to prevent the uncontrolled spread of settlement and industry onto valuable agricultural land.
		Lower Purnabhaba Floodplain	Western part of Naogaon, northern part of Chapai Nawabganj.	<ul style="list-style-type: none"> • Low floodplain area. • Calcareous dark grey floodplain soils & calcareous brown floodplain soils. • Mean annual rainfall 1270-1780 mm. • Temperature max. 37° C, min. 11° C. • Moderately deeply flooded area. 	<ul style="list-style-type: none"> • Deepwater aman, traditional boro. 	<ul style="list-style-type: none"> • Heavy clay soils: sticky & plastic when get wet. • Hard & cracking soils when get dry. • Deep & rapid flooding area. • Drought in pre-monsoon season. • Relatively long cold winter delaying planting of boro paddy. • Poor road communication in rainy season. • Remote from growth centres and urban markets. • Probably big (& often absentee) land ownership. 	<ul style="list-style-type: none"> • Lack of appropriate tillage method for heavy clay/ hard & cracking soils • Dearth of low temperature tolerant boro rice varieties. • Lack of appropriate low water consuming method of jute retting 	<ul style="list-style-type: none"> • Increase use of fertilizers & find out more efficient methods of applying them. • Increase supplementary irrigation from bils, tanks and wells. • Test t.aus in June on higher land & deepwater aman after harvesting boro paddy. • Improve external & internal road links.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
4c	Brahmaputra-Jamuna Floodplain	Old Brahmaputra Floodplain	Sherpur, Jamalpur, Tangail, Mymensingh, Netrakona, Kishoreganj, Narsingdi, Narayanganj.	<ul style="list-style-type: none"> • Most areas have broad ridges & basins. • Noncalcareous dark grey floodplain soils. • Mean annual rainfall 2000-4000 mm. • Temperature max. 40° C, min.15° C. • Shallowly flooding area. 	<ul style="list-style-type: none"> • Aus, local boro, broadcast aman, jute, potato, wheat, tobacco, lentil, groundnut, sugarcane & vegetables. 	<ul style="list-style-type: none"> • Risk of early flooding & flash flood. • Uncertain depth of flooding from year to year. • Heavy clay basin soil & droughty soil on ridge are difficult to cultivate. • Puddled topsoil & strong ploughpan in soils used for t.aman, which prevent the cultivation of dryland crops. • Sometimes shortage of surface water for jute retting. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Dearth of drought tolerant crop varieties. • Need for low water consuming cropping patterns/crop varieties. • Lack of appropriate low water consuming method of jute retting • Lack of awareness about inter-cropping with sugarcane. • Lack of appropriate tillage method for removing ploughpan. 	<ul style="list-style-type: none"> • Increase use of fertilizers& organic manures and in more efficient ways. • Provide deeper ploughing to increase moisture holding capacity of soils. • Improve crop management by field leveling, making field drains. • Transplant deepwater aman on basin margin soils (already practiced in some areas). • Make raised cultivation platforms for intensive cultivation of cash crops in flood prone areas. • Grow dainchya as a fuel wood crop. • Provide more all-weather roads.
	Active Brahmaputra and Jamuna Floodplain	Eastern part of Kurigram, Gaibandha, Bogra, Sirajganj & Pabna, western part of Sherpur, Jamalpur, Tangail & Manikganj	<ul style="list-style-type: none"> • This region has an irregular relief. • Local difference in elevation is mainly 2-5 meters. • Noncalcareous grey floodplain soils. 	<ul style="list-style-type: none"> • Aus, deep water aman, jute, cheena, mustard, pulses, groundnut & sugarcane. 	<ul style="list-style-type: none"> • Shifting river channels, constantly eroding cultivated land & settlement. • Irregular relief, complex soil patterns & changing soils. • Uncertain land ownership & backward socio-economic condition. • Poor communication. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Lack of management techniques for bringing new alluvial soils quickly under cultivation. • Promote different types of economic activities. 	<ul style="list-style-type: none"> • Increase production of dry land crops. • Use more fertilizers on silty soil & more manure on sandy soil. • Grow quick maturing trees. • Construct flood shelters. • Promote different types of economic activities. 	

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
				<ul style="list-style-type: none"> • Mean annual rainfall 1500-2500 mm. • Temperature max. 40° C, min. 20° C. • Seasonally flooded area. 				
		Young Brahmaputra and Jamuna Floodplain	Western part of Sherpur, Jamalpur & Tangail, Manikganj, Gazipur, Mymensingh, Kishoreganj, Narayanganj.	<ul style="list-style-type: none"> • This region has a complex relief. • Noncalcareous grey floodplain soils. • Mean annual rainfall 1500-2500 mm. • Temperature max. 40° C, min. 15° C. • Shallowly flooding area. 	<ul style="list-style-type: none"> • Aus, aman, jute, local boro, wheat, barley, cheena, maize, kaon, mustard, groundnut, pulses, chilli, sweet potato, summer vegetables. 	<ul style="list-style-type: none"> • Occasional high flood & late flood damaging crops. • Complex soil & irregular relief patterns. • Shifting channels of river causes loss of land by bank erosion, burial of older soils by possibly thick layer of raw new alluvium & silting up of drainage channels. • Infeasibility of building major irrigation/drainage headworks on the river. 	<ul style="list-style-type: none"> • Lack of quick-maturing HYV aus and HYV aman varieties. • Lack of management techniques for bringing new alluvial soils quickly under cultivation. • Lack of appropriate quick growing woody plants varieties. • Lack of awareness about newly developed crop varieties/cultural practices. 	<ul style="list-style-type: none"> • Increase use of fertilizers & organic manures in more efficient ways. • Provide deeper ploughing to facilitate root penetration. • Improve crop management by field leveling and making field drains. • Expand cultivation of cash crops. • Provide additional DTWs/STWs. • Identify local schemes for providing protection against early floods & drainage.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
4d	Surma-Kushiara Floodplain	Eastern Surma-Kusiyara Floodplain	Habiganj, Moulvi Bazar, Sunamganj, Sylhet	<ul style="list-style-type: none"> • 3-6 m local differences in elevation. • Noncalcareous grey floodplain soils. • Mean annual rainfall 4320-5840 mm. • Temperature max. 33° C, min. 12° C. • Ridges are shallowly flooded & basins are deeply flooded in rainy season. • Surface water utilized for dry season irrigation & fish production. 	<ul style="list-style-type: none"> • Field crops include aus, t. aman, local boro, mustard, potato, sweet potato, pulses, vegetables, spices and fruit trees. 	<ul style="list-style-type: none"> • Occasional flash flood destroys crops. • Very heavy rainfall hamper harvesting, drying and storage of crops. • Predominance of heavy soils prevents cultivation of dryland. • Slow drainage of basin centres. • Poor road communication throughout the year. • Remote from growth centres and urban markets. • Much big (& often absentee) land ownership. • Conflict between fishing & agricultural interests for use the water remaining in haors after rainy season. 	<ul style="list-style-type: none"> • Lack of submergence tolerant modern rice varieties. • Dearth of appropriate technique for tillage of heavy clay soils. • Lack of quick-maturing HYV aus and HYV aman varieties. • Lack of awareness about newly developed crop varieties/cultural practices. 	<ul style="list-style-type: none"> • Increase use of fertilizers & in more efficient ways. • Expand use of HYVs, t. aus and deepwater aman. • Increase provision of field drains for direct seeded crops. • Control pest/disease through proper management. • Identify schemes for flood protection & drainage. • Improve facilities for grain drying, storage & marketing. • Improve arrangements for providing & rescheduling agricultural loans. • Provide more dry season roads.
4e	Meghna Floodplain	Lower Meghna River Floodplain	Chandpur, Lakshmipur, Noakhali.	<ul style="list-style-type: none"> • The region has slightly irregular relief. • Noncalcareous grey floodplain soil. • Mean annual rainfall is 2000-3000 mm. • Temperature max. >40° C, 	<ul style="list-style-type: none"> • Aus, aman, jute, chilli, potato, wheat, kaon, mustard. 	<ul style="list-style-type: none"> • Deep seasonal flooding. • Waterlogging due to heavy rain. • Riverbank erosion. • Exposure to cyclones. • Highly silty soil which are poorly aerated. • Slight topsoil salinity. • Presence of Ufra disease affecting paddy. 	<ul style="list-style-type: none"> • Lack of submergence tolerant modern rice varieties. • Dearth of salt tolerant crop varieties • Lack of appropriate techniques and crops for agricultural 	<ul style="list-style-type: none"> • Increase use of fertilizers & organic manures. • Improve crop management by field leveling and making field drains. • Provide additional pumps/tube well for irrigation • Provide more off-farm

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
				<ul style="list-style-type: none"> Mainly moderately deeply flooded. 			<ul style="list-style-type: none"> rehabilitation following natural disasters. 	<ul style="list-style-type: none"> Employment opportunities. Make raised platforms for intensive cultivation. Construct flood & road embankments. Provide more roads.
		Middle Meghna River Floodplain	Kishoregonj, Brahmanbaria, Comilla, Chandpur, Narsindhi, Narayanganj.	<ul style="list-style-type: none"> This region includes chars. Noncalcareous grey floodplain soil. Mean annual rainfall is 2200-2300 mm. Temperature max. >40° C, min. <15° C. Most of the areas are seasonally deeply flooded. 	<ul style="list-style-type: none"> Mainly deep water aman, aus, local boro, t.aman, jute, groundnut, chilli, mustard, wheat, khesari, sweet potato. 	<ul style="list-style-type: none"> Early rise of flood water. Poor communication (except by boat). Sandy soils & irregular relief. Exposure to cyclones and storm surges. River bank erosion along the channel. 	<ul style="list-style-type: none"> Absence of improved deep water aman rice varieties. Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. 	<ul style="list-style-type: none"> Increase use of fertilizers & organic manures. Improve crop management by field leveling and making field drains. Provide low-lift pumps/tube well. Make raised platforms for intensive cultivation. Construct flood & road embankments. Provide more roads.
		Old Meghna Estuarine Floodplain	Kishoregonj, Habiganj, Brahmanbaria, Comilla, Chandpur, Narsindhi, Narayanganj, Dhaka, Sariatpur, Madaripur, Gopalganj, Feni,	<ul style="list-style-type: none"> This region is mainly low- lying area. Noncalcareous dark grey floodplain soil. Mean annual rainfall is 2000-3000 mm. Temperature max. >40° C, min. <15° C. 	<ul style="list-style-type: none"> Aus, t.aman, HYV boro, chilli, mustered, wheat, khesari, potato, kaon, sesame. 	<ul style="list-style-type: none"> Moderately deep seasonal flooding. Slow drainage after rainy seasons. Very silty soils difficult to cultivate kharif dryland crops. Slight dry season soil salinity and salinity in deep groundwater in coastal region. High population density. 	<ul style="list-style-type: none"> Absence of improved deep water aman rice varieties. Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. 	<ul style="list-style-type: none"> Increase use of fertilizers & manures. Increase provision of field drains for direct seeded crops. Expand transplanted aus & aman. Expand cultivation of cash crops. Control pest/disease through proper management.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
			Noakhali, Lakshimpur, Barisal,	<ul style="list-style-type: none"> • Most of the areas are seasonally medium to shallowly flooded. 		<ul style="list-style-type: none"> • Lack of appropriate/ proper land use regulations to prevent industrial sprawl over flood protected agricultural land, as has happened in the DND project area. 		<ul style="list-style-type: none"> • Improve soil aeration by ploughing deeper. • Provide additional pumps/tube well for irrigation • Provide more off-farm employment opportunities. • Improve road communication
5a	Haor Basin	Sylhet Basin	Habiganj, Kishoreganj, Moulvi Bazar, Netrakona, Sunamganj, Brahmanbaria	<ul style="list-style-type: none"> • 3-6 m difference in elevation between river banks & basin. • Acid basin clays soils. • Mean annual rainfall 4320-5840 mm. • Temperature max. 33° C, min. 12° C. • Deeply flooded area. 	<ul style="list-style-type: none"> • Mainly local boro paddy, deepwater aman, t.aman, mustard etc. 	<ul style="list-style-type: none"> • Early flash flood destroys maturing boro, young aus & deepwater aman. • Deep flooding prevents growing of aman. • Heavy rainfall hamper harvesting, drying and storage of crops. • Predominance of heavy clays prevents cultivation of both wet & dryland crops. • Slow drainage of basin centres. • Mostly poor or non-existent road communication. 	<ul style="list-style-type: none"> • Lack of submergence tolerant modern rice varieties. • Absence of improved deep water aman rice varieties. • Dearth of appropriate technique for tillage of heavy clay soils. 	<ul style="list-style-type: none"> • Increase & more efficient use of fertilizers. • Control pest/disease through proper management. • Identify schemes for flood protection & drainage. • Adapted new crops for variation. • Make raised seed/crop beds. • Provide control structures on sloping river-bank soils. • Improve road communication • Construct flood shelters.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
						<ul style="list-style-type: none"> • Remote area from urban communication. • Much big (& often absentee) land ownership. • Conflict between fishing & agricultural interests for use the water remaining in haors after rainy season. 		
5b	Chalan Beel	Lower Atrai Basin	Natore, Pabna, Sirajganj and small areas extends to Rajshahi and Bogra.	<ul style="list-style-type: none"> • Low lying area. • Calcareous dark grey and brown floodplain soils. • Mean annual rainfall 1200-1600 mm. • Temperature max. 35° C, min. 11° C. • Deeply flooded area by heavy rainfall. 	<ul style="list-style-type: none"> • Mainly HYV boro paddy, • Deepwater aman, t.aman and t.aus. 	<ul style="list-style-type: none"> • Deep seasonal flooding. • Early, rapid flooding by flash flood. • Slow drainage after rainy season. • Occasional drought in the pre-monsoon. • Heavy clay soils which are very difficult to cultivate. • Poor or non-existent road communication. • Remote from growth/urban centres. • Much big (& often absentee) land ownership. 	<ul style="list-style-type: none"> • Lack of submergence tolerant modern rice varieties. • Dearth of appropriate technique for tillage of heavy clay soils. • Absence of improved deep water aman rice varieties. 	<ul style="list-style-type: none"> • Use more fertilizers & manure. • Increase provision of field drains. • Expand cultivation of HYVs aus, aman, wheat & mustard in suitable land. Expand command areas of existing irrigation facilities by channel lining, leveling fields. • Identify local schemes for flood protection & drainage. • Improve external & internal road links.
5c	Kaptai Lake	No AEZ included	Rangamati and small areas extends Khagrachhari.	<ul style="list-style-type: none"> • Rainfall 2790 mm • Temperature max. 33° C, min. 13° C. • Water bodies. 		No AEZ included.		

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
6	Gopalganj/ Khulna Peat Lands	Gopalganj- Khulna Bils	Gopalganj, Jessore, Khulna, Narail, Madaripur	<ul style="list-style-type: none"> • Peat soils & noncalcareous dark grey floodplain soils. • Mean annual rainfall 1780-2030 mm. • Temperature max. 37° C, min. 11° C. • Seasonally deeply flooded area. 	<ul style="list-style-type: none"> • Deepwater aman, t.aman, aus, HYV boro • Jute, sesame, sugarcane, vegetables, guava. 	<ul style="list-style-type: none"> • Poor peat soils with low bearing capacity. • Slow draining because of heavy clays. • Deep flooding. • Salinity in soil in some areas. • Lack of agricultural research experience/activities with peat soils. • Difficult communication system except by boat. 	<ul style="list-style-type: none"> • Lack of submergence tolerant modern rice varieties. • Dearth of appropriate technique for tillage of heavy clay soils. • Absence of improved deep water aman rice varieties. • Lack of agricultural research experience/activities with peat soils. 	<ul style="list-style-type: none"> • Leave peat soils under reeds (to provide thatching material). • Improve cultural practices, especially weeding. • Cultivate t. aus & deepwater aman on clay soil. • Increase use of fertilizers. • Make embankment to protect boro from flooding. • Make canals to bring in silty river water so as to bury peat soils with alluvium or use dredgers. • Make raised beds for cultivation of cash crops.
7a	Sundarban s	Ganges Tidal Floodplain	Bagerhat, Khulna, Satkhira, Pirojpur, Barguna, Jhalakati, Patuakhali, Barisal.	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils & acid sulphate soils. • Mean annual rainfall 2030-2790 mm. • Temperature max. 37° C, min. 11° C. • Tidally flooded area. 	<ul style="list-style-type: none"> • T.aman, khesari, chilli and coconut, palms. 	<ul style="list-style-type: none"> • Difficult communication system except by boat. • Dry season salinity of soils. • Extremely acid soil condition in pocket areas. • Heavy clay basin soil difficult to plough. • River bank erosion & flooding by early and late heavy rainfall. • Exposure of cyclones and storm surges. • Remote area. 	<ul style="list-style-type: none"> • Dearth of salt tolerant crop varieties. • Lack of agricultural research experience/activities with extremely acid soils. • Absence of appropriate technique for tillage of heavy clay soils. 	<ul style="list-style-type: none"> • Improve tillage on basin clays, or use stronger draught animal/power tillers. • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Expand command areas & number of pumps. • Use traditional irrigation equipment. • Make cross-dams in tidal creeks to retain water after high tide for irrigation.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
						<ul style="list-style-type: none"> • Big land ownership. 	<ul style="list-style-type: none"> • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. 	<ul style="list-style-type: none"> • Construct more cyclone shelters and improve communication facilities.
7b	Chakaria Sundarban	Chittagong Coastal Plain	Cox's Bazar	<ul style="list-style-type: none"> • Acid sulphate soils. • Mean annual rainfall 2290-2790 mm. • Temperature max. 33° C, min. 13° C. • Tidally flooded area. 	<ul style="list-style-type: none"> • T.aman, broadcast aus • Coconut, betel nut, palms. 	<ul style="list-style-type: none"> • Severe flash flood. • Exposure to saline cyclonic storm surges. • Soil salinity in dry season. • Burial of foot hill land with sand brought in by flash flood. • River bank erosion, wash-out of road, embankment, bridges, land and settlements. • Poor road communication. 	<ul style="list-style-type: none"> • Lack of appropriate technique for protection against flash floods. • Dearth of salt tolerant crop varieties. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. 	<ul style="list-style-type: none"> • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Expand cultivation of HYVs aus, aman, coconut, betel nut, betel leaf, etc. on suitable land. • Expand command areas of existing irrigation. • Provide improved spillways so that dams are not washed out. • Provide adequate facilities and funds for maintaining flood/coastal embankments. • Construct more cyclone shelters. • Improve domestic water supplies. • Provide more all-weather roads.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
8a	Coastal Plains	Chittagong Coastal Plain	Feni, Chittagong, Cox's Bazar	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils (non- saline) • Mean annual rainfall 2290-2790 mm. • Temperature max. 34° C, min.12° C. • Shallowly flooded area. 	<ul style="list-style-type: none"> • T.aman, broadcast aus • Coconut, betel nut, palms. 	<ul style="list-style-type: none"> • Severe flash flood. • Exposure of saline cyclonic storm surges. • Soil salinity in dry season. • Burial of foot hill land with sand brought in by flash flood. • River bank erosion, wash-out of road, embankment, bridges, land and settlements. • Poor communication. 	<ul style="list-style-type: none"> • Lack of appropriate technique for protection against flash floods. • Dearth of salt tolerant crop varieties. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. 	<ul style="list-style-type: none"> • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Expand cultivation of HYVs aus, aman, coconut, betel nut, betel leaf, etc. on suitable land. • Expand command areas of existing irrigation. • Provide improved spill-ways so that dams are not washed out. • Provide adequate facilities and funds for maintaining flood/coastal embankments. • Construct more cyclone shelters. • Improve domestic water supplies. • Provide more all-weather roads.
8b	Offshore Islands	Chittagong Coastal Plain	Cox's Bazar, Barisal, Bhola, Lakshmipur, Noakhali, Patuakhali	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils (non- saline) • Mean annual rainfall 2290-2790 mm. • Temperature max. 34° C, min.12° C. • Shallowly flooded area. 	<ul style="list-style-type: none"> • T.aman, broadcast aus • Coconut, betel nut, palms. 	<ul style="list-style-type: none"> • Severe flash flood. • Exposure of saline cyclonic storm surges. • Soil salinity in dry season. • Hill's soil degradation by flash flood. • River bank erosion washes out of road, embankment, bridges, land and settlements. • Poor communication. 	<ul style="list-style-type: none"> • Lack of appropriate technique for protection against severe flash floods. • Dearth of salt tolerant crop varieties. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. 	<ul style="list-style-type: none"> • Increase use of fertilizers and manures. • Expand cultivation of HYVs aus, aman, coconut, betel nut, betel leaf etc. on suitable land. • Expand command areas of existing irrigation. • Provide improved spill-ways to protect the dam. • Provide adequate facilities and funds for maintaining flood/ coastal

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
								<ul style="list-style-type: none"> embankments. • Construct more cyclone shelters. • Improve domestic water supplies. • Provide more all weather roads.
		Young Meghna Estuarine Floodplain	Barisal, Bhola, Chandpur, Feni, Lakshmipur, Noakhali	<ul style="list-style-type: none"> • Calcareous alluvium (saline). • Mean annual rainfall 2030-2790 mm. • Temperature max. 34° C, min. 12° C. • Seasonally shallowly flooded by rain water. 	<ul style="list-style-type: none"> • Mainly t.aman, HYV aman. • Pulses, chilli. 	<ul style="list-style-type: none"> • Dry season soil salinity problem. • Lack of non-saline fresh surface/groundwater for dry season irrigation. • Very silty soils low in organic matter, which provides little structural stability. • Seasonal flooding in depressions which is mainly too deep for existing aman HYVs. • Constant bank erosion & new char formation, which make it difficult to provide and maintain coastal embankments & sluices. • Highly cyclone prone area & also most susceptible to high storm surges. • Remoteness from urban markets and service centres, aggravated by poor communications 	<ul style="list-style-type: none"> • Dearth of salt tolerant crop varieties. • Lack of appropriate technique for augmenting fresh water for dry season irrigation. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. • Lack of proper maintenance of coastal embankments & sluices. 	<ul style="list-style-type: none"> • Improve soil & crop management by better cultural practices • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Promote dibble-sowing or transplanting of aus paddy to reduce damage by salinity. • Encourage early showing or mulching of dry land crops to reduce damage by salinity. • Provide deeper ploughing to facilitate root penetration. • Expand cultivation of quick-maturing crops. • Build cross-dams in creeks to store fresh water for irrigation use where rivers become saline before the end of pre- monsoon. • Construct more cyclone shelters, costal embankment & polder inside embankment.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
8c	Narikel Jinjira Coaral Island	St. Martin's Coral Island	Cox's Bazar	<ul style="list-style-type: none"> • Calcareous alluvium (saline). • Mean annual rainfall 2290-2790 mm. • Temperature max. 33° C, min. 13° C. • Shallowly flooded by rain water or saline tidal water. 	<ul style="list-style-type: none"> • T.aman, coconut, betel nut. 	<ul style="list-style-type: none"> • Relatively infertile soils with low moisture holding capacity. • Lack of fresh water for irrigation. • Exposure to cyclone & storm surges. • Remoteness from urban markets. 	<ul style="list-style-type: none"> • Lack of improved techniques for cultivation/management of coconut and betel nut. 	<ul style="list-style-type: none"> • Use large amounts of compost to increase soil fertility and moisture holding capacity. • Expand the area under coconut & betel nut. • Improve safe and reliable communication with the mainland. • Construct more cyclone shelters.
8d	Meghna Eastuarine Floodplain	Young Meghna Estuarine Floodplain	Barisal, Bhola, Chandpur, Feni, Lakshmipur, Noakhali, Barguna, Patuakhali, Chittagong.	<ul style="list-style-type: none"> • Calcareous alluvium (saline). • Mean annual rainfall 2030-2790 mm. • Temperature max. 34° C, min. 12° C. • Seasonally shallowly flooded by rain water. 	<ul style="list-style-type: none"> • Mainly t.aman, HYV aman. • Pulses, chilli. 	<ul style="list-style-type: none"> • Soil salinity problem in dry season. • Lack of fresh surface/groundwater for dry season irrigation. • Very silty soils with low organic matter, which provides little structural stability. • Seasonal flooding in depressions which is mainly too deep for existing aman HYVs. • Constant bank erosion & new char formation, which make it difficult to provide and maintain coastal embankments & sluices. • Highly cyclone prone area & also most susceptible to high storm surges. • Remoteness & poor communication from urban markets & service centres 	<ul style="list-style-type: none"> • Dearth of salt tolerant crop varieties. • Lack of appropriate technique for augmenting fresh water for dry season irrigation. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. • Lack of proper maintenance of coastal embankments & sluices. • Dearth of aman HYVs capable of withstanding seasonal deep flooding. 	<ul style="list-style-type: none"> • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Dibble-sowing or transplanting of aus paddy to reduce damage by salinity. • Encourage early sowing or mulching of dry land crops to reduce damage by salinity. • Provide deeper ploughing to facilitate root penetration. • Expand cultivation of quick-maturing crops. • Build cross-dams in creeks to store fresh water for irrigation use where rivers become saline before the end of pre- monsoon. • Construct more cyclone shelters, costal embankment & polder inside embankment.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
8e	Sandy Beach/ Sand Dunes	No AEZ included	Cox's Bazar	<ul style="list-style-type: none"> • Mean annual rainfall 2290-2790 mm. • Temperature max. 33° C, min. 13° C. • Sandy soil. 		No AEZ included.		
9a	Chittagong Hills and The CHTs	Chittagong Coastal Plain	Feni, Chittagong, Cox's Bazar.	<ul style="list-style-type: none"> • Non-calcareous grey floodplain soils (non- saline) • Mean annual rainfall 2290-2790 mm. • Temperature max. 34° C, min. 12° C. • Shallowly flooded area. 	<ul style="list-style-type: none"> • T.aman, broadcast aus • Coconut, betel nut, palms. 	<ul style="list-style-type: none"> • Severe flash flood. • Exposure of saline cyclonic storm surges. • Soil salinity in dry season. • Burial of foot hill land with sand brought in by flash flood. • River bank erosion, wash-out of road, embankment, bridges, land and settlements. • Poor communication. 	<ul style="list-style-type: none"> • Lack of appropriate technique for protection against severe flash floods. • Dearth of salt tolerant crop varieties. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters 	<ul style="list-style-type: none"> • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Expand cultivation of HYVs of aus and aman, coconut, betel nut, betel leaf etc. on suitable land. • Expand command areas of existing irrigation. • Provide improved spillways so that dams are not washed out. • Provide adequate facilities and funds for maintaining flood/coastal embankments. • Construct more cyclone shelters. • Improve domestic water supplies. • Provide more all-weather roads.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
		Northern and Eastern Hills	Khagrachhari, Chittagong hill tracts, Bandarban, Cox's Bazar, Moulvi Bazar, Habiganj, Mymensingh, Sunamganj, Comilla.	<ul style="list-style-type: none"> This region includes the country's hilly areas, which occupy about 12% area of total country. Yellow brown to strong brown hilly soils. Mean annual rainfall varies from 2000-5000 mm. Temperature max. exceed 40° C & min. fall below 20° C. Flash flooded but well drained area. 	<ul style="list-style-type: none"> Shifting jhum cultivation is widely practiced. Scrub thicket, grassland, bamboo, rubber are grown locally. 	<ul style="list-style-type: none"> Steep sloppy land. Roads are difficult/ expensive to build because of long, linear, hill ranges with steep slopes. Very strongly acid soils. Fertilizer nitrogen is rapidly leached during heavy monsoon rainfall. Area also exposed to cyclones. Flash floods are prominent. Risk of landslip erosion. Remoteness of areas. Tribal land ownership or illicit land ownership by plains people. 	<ul style="list-style-type: none"> Fertilizer management for steep hill soils. Lack of improved jhum cultivation techniques. Lack of proper management techniques for steep slopes. 	<ul style="list-style-type: none"> Grow dry land kharif crops and early rabi crops on hills with gentle slope. Prevent run-off on sloping lands for conservation of soils. Make field drains to protect waterlogging. Practice Integrated Crop Management (ICM) techniques to increase crop production. Identify local schemes for improving flood protection. Develop a cadre of technical officials- preferably of hill origin trained in hill farming techniques, including techniques for soil conservation, tree crop management and afforestation. Construct terraces on steep slopes to reduce land slips.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
9b	Sylhet Hills	Akhaura Terrace	Brahmanbaria, Habiganj.	<ul style="list-style-type: none"> Mainly broad, level, upland areas standing 3-6 m above broad piedmont valleys. Deep red-brown terrace soils & grey piedmont soils. Mean annual rainfall varies from 2000-4000 mm in different places. Temperature max. 40° C, min. <20° C. Valleys are shallowly to deeply flooded. 	<ul style="list-style-type: none"> Mainly aus, t.aman, HYV boro paddy & jackfruit. 	<ul style="list-style-type: none"> Soils have low moisture holding capacity & low fertility. Flash flood in valleys & deep flood in lower valleys. Groundwater contains large amount of iron. Poor road communication because of poor materials for road foundation, road surfacing, etc. due to plastic, properties of clay soils Small area & isolated occurrence, making it difficult to provide specific research and extension services. 	<ul style="list-style-type: none"> Dearth of drought tolerant crop varieties. Need for low water consuming cropping patterns/crop varieties. Lack of submergence tolerant modern rice varieties. Dearth of appropriate technique for tillage of heavy clay soils. Lack of appropriate technique for removal of iron in irrigation water. Dearth of drought tolerant crop varieties. 	<ul style="list-style-type: none"> Increase use of organic manures & fertilizers. Use mulching in terrace soils to reduce loss of nutrients by leaching, run-off & volatilization. Increase the thickness of brown terrace soils through deeper ploughing to break up the ploughpan. Improve maintenance of field bunds on soils used for transplanted paddy, together with use of protected drainage outlets between fields. Dibble aus paddy on terrace soils. Construct road cum embankment.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
		Northern and Eastern Hills	Khagrachhari, Chittagong hill tracts, Bandarban, Cox's Bazar, Moulvi Bazar, Habiganj, Mymensingh, Sunamganj, Comilla.	<ul style="list-style-type: none"> This region includes the country's hilly areas, which occupy about 12% area of total country. Yellow brown to strong brown hilly soils. Mean annual rainfall varies from 2000-5000 mm. Temperature max. exceed 40° C & min. fall below 20° C. Flash flooded but well drained area. 	<ul style="list-style-type: none"> Shifting jhum cultivation is widely practiced. Scrub thicket, grassland, bamboo, rubber are grown locally. 	<ul style="list-style-type: none"> Steep sloppy land. Roads are difficult/expensive to build because of long, linear, hill ranges with steep slopes. Very strongly acid soils. Fertilizer nitrogen is rapidly leached during heavy monsoon rainfall. Area also exposed to cyclones. Flash floods are prominent. Risk of landslip erosion. Remoteness of areas. Tribal land ownership or illicit land ownership by plains people. 	<ul style="list-style-type: none"> Fertilizer management for steep hill soils. Lack of improved jhum cultivation techniques. Lack of proper management techniques for steep slopes. 	<ul style="list-style-type: none"> Grow dry land kharif crops and early rabi crops on hills with gentle slope. Prevent run-off on sloping lands for conservation of soils. Make field drains to protect waterlogging. Practice Integrated Crop Management (ICM) techniques to increase crop production. Identify local schemes for improving flood protection. Develop a cadre of technical officials-preferably of hill origin trained in hill farming techniques, including techniques for soil conservation, tree crop management and afforestation. Construct terraces on steep slopes to reduce land slips.
		Northern and Eastern Piedmont	Sherpur, Netrokona, Sunamganj, Sylhet, Moulvi Bazar, Habiganj, Brahmanbaria,	<ul style="list-style-type: none"> A dominant soil characteristic is grey piedmont soils. Mean annual rainfall varies from 2000-5000 	<ul style="list-style-type: none"> Mainly t. aus, t. aman, HYV boro, deepwater aman. paddy 	<ul style="list-style-type: none"> Flash flood occurs on all land type. Early & deep floods hamper the harvesting, drying & storage of crops. Difficult to control flash 	<ul style="list-style-type: none"> Dearth of drought tolerant crop varieties. Lack of short duration HYV aus and aman varieties. 	<ul style="list-style-type: none"> Increase use of fertilizers & manures. Increase the thickness of brown terrace soils through deeper ploughing to break up the plough pan.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
			Comilla.	<ul style="list-style-type: none"> mm in different places. Temperature max. exceed 40° C & min. fall below 15° C. Regions are shallowly to moderately deeply flooded. 		<ul style="list-style-type: none"> flood because of the huge volumes of water & sediments. Compact, low moisture holding topsoil restricts the cultivation of dryland crops. Uncertain water resources for expansion of irrigation. Poor road facilities & remote area. 	<ul style="list-style-type: none"> Absence of improved deep water aman rice varieties. Lack of appropriate technique for protection against flash floods. 	<ul style="list-style-type: none"> management by land leveling and making drains to remove excess water quickly. Improve facilities for grain drying, storage & marketing.
9c	Lalmai Tiperah Hills	Lalmai Tiperah Hills	Feni, Comilla	<ul style="list-style-type: none"> Brown hill soil. Mean annual rainfall varies from 2030-2290 mm. Temperature max. 33° C & min. 10° C. 		No AEZ included.		
		Northern and Eastern Hills	Khagrachhari, Chittagong hill tracts, Bandarban, Cox's Bazar, MoulviMoulvi Bazar, Habiganj, Mymensingh, Sunamganj, Comilla.	<ul style="list-style-type: none"> This region includes the country's hilly areas, which occupy about 12% area of total country. Brown hill soils. Mean annual rainfall varies from 2000-5000 mm. Temperature max. exceed 40° 	<ul style="list-style-type: none"> Shifting jhum cultivation is widely practiced. Scrub thicket, grassland, bamboo, rubber are grown locally. 	<ul style="list-style-type: none"> Steep sloppy land. Roads are difficult/ expensive to build because of long, linear, hill ranges with steep slopes. Very strongly acid soils. Fertilizer nitrogen is rapidly leached during heavy monsoon rainfall. Area also exposed to cyclones. Flash floods are prominent. 	<ul style="list-style-type: none"> Fertilizer management for steep hill soils. Lack of improved jhum cultivation techniques. Lack of proper management techniques for steep slopes 	<ul style="list-style-type: none"> Grow dry land kharif crops and early rabi crops on some hills with gentle slope. Prevent run-off on sloping lands for conservation of soils. Introduce the field drains system to protect water logging. Practice Integrated Crop Management (ICM) techniques to increase crop production.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggeste d
				<p>C & min. fall below 20° C.</p> <ul style="list-style-type: none"> Flash flooded but well drained area. 		<ul style="list-style-type: none"> Risk of landslip erosion. Remoteness of areas. Tribal land ownership or illicit land ownership by plains people. 		<ul style="list-style-type: none"> Identify local schemes for improving flood protection. Develop a cadre of technical officials- preferably of hill origin trained in hill farming techniques, including techniques for soil conservation, tree crop management and afforestation. Construct terraces on steep slopes to reduce land slips.
10	Saline Tidal Floodplain	Ganges Tidal Floodplain	Bagerhat, Barguna, Khulna, Patuakhali, Pirojpur, Satkhira	<ul style="list-style-type: none"> Noncalcareous floodplain soils (saline), Noncalcareous & calcareous grey floodplain soils. Mean annual rainfall 1780-2030 mm. Temperature max. 37° C, min. 11° C. Medium to high tidally flooded area. 	<ul style="list-style-type: none"> T.aman, khesari, chilli and coconut, palms. 	<ul style="list-style-type: none"> Difficult communications, except by boat. Dry season salinity of soils. Extremely acid soil condition. Heavy clay basin soil which difficult to plough. River bank erosion & flooding by early and late heavy rainfall. Exposure of cyclones and storm surges. Remote area. Big land ownership. 	<ul style="list-style-type: none"> Dearth of salt tolerant crop varieties. Lack of appropriate technique for augmenting fresh water for dry season irrigation. Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. Lack of proper maintenance of coastal embankments & sluices. 	<ul style="list-style-type: none"> Improve tillage on basin clays, or use stronger draught animal/power tillers. Practice Integrated Crop Management (ICM) techniques to increase crop production. Expand command areas & number of pumps. Use traditional irrigation equipment. Make cross-dams in tidal creeks to retain water after high tide for irrigation. Construct more cyclone shelters and improve communication facilities.

SI	B F	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggest ed
11	Major Rivers	No AEZ included.						
	Coastal Marine Water	Ganges Tidal Floodplain	Bagerhat, Khulna, Satkhira, Pirojpur, Barguna	<ul style="list-style-type: none"> • Noncalcareous grey floodplain soils & acid sulphate soils. • Mean annual rainfall 2030-2790 mm. • Temperature max. 37° C, min. 11° C. • Tidally flooded area. 	<ul style="list-style-type: none"> • T.aman, khesari, chilli and coconut, palms. 	<ul style="list-style-type: none"> • Difficult communities except by boat. • Dry season salinity of soils. • Extremely acid soil condition. • Heavy clay basin soil which difficult to plough. • River bank erosion & flooding by early and late heavy rainfall. • Exposure of cyclones and storm surges. • Remote area. • Big land ownership. 	<ul style="list-style-type: none"> • Dearth of salt tolerant crop varieties. • Lack of appropriate technique for augmenting fresh water for dry season irrigation. • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. • Lack of proper maintenance of coastal embankments & sluices. 	<ul style="list-style-type: none"> • Improve tillage on basin clays, or use stronger draught animal/power tillers. • Practice Integrated Crop Management (ICM) techniques to increase crop production. • Expand command areas & number of pumps. • Use traditional irrigation equipment. • Make cross-dams in tidal creeks to retain water after high tide for irrigation. • Construct more cyclone shelters and improve communication facilities.
12		Young Meghna Estuarine Floodplain	Barisal, Bhola, Chandpur, Feni, Lakshmipur, Noakhali.	<ul style="list-style-type: none"> • Calcareous alluvium (saline). • Mean annual rainfall 2030-2790 mm. 	<ul style="list-style-type: none"> • Mainly t.aman, HYV aman. • Pulses, chilli. 	<ul style="list-style-type: none"> • Dry season soil salinity. • Lack of fresh surface/ground water for dry season irrigation. • Very silty soils low in organic matter, which provides little structural stability. 	<ul style="list-style-type: none"> • Dearth of salt tolerant crop varieties. • Lack of appropriate technique for augmenting fresh water for dry season irrigation 	<ul style="list-style-type: none"> • Improve soil & crop management by better cultural practices • Practice Integrated Crop Management (ICM) techniques to increase crop production.

SI	BEZ	AEZ	District Name	Key Characters	Major Crops	Key Constrains	Technology Gaps	Suggested Interventions/Policies
				<ul style="list-style-type: none"> • Temperature max. 34° C, min. 12° C. • Seasonally shallowly flooded by rain water. 2790 mm. • Temperature max. 34° C, min. 12° C. • Seasonally shallowly flooded by rain water. 		<ul style="list-style-type: none"> • Seasonal flooding in depressions which is mainly too deep for existing aman HYVs. • Constant bank erosion & new char formation, which make it difficult to provide and maintain coastal embankments & sluices. • Highly cyclone prone area & also most susceptible to high storm surges. • Remoteness from urban markets and service centres, aggravated by poor communications. 	<ul style="list-style-type: none"> • Lack of appropriate techniques and crops for agricultural rehabilitation following natural disasters. • Lack of proper maintenance of coastal embankments & sluices. 	<ul style="list-style-type: none"> • Promote dibble-sowing or transplanting of aus paddy to reduce damage by salinity. • Encourage early sowing or mulching of dry land to reduce damage by salinity. • Provide deeper ploughing to facilitate root penetration. • Expand cultivation of quick-maturing crops. • Build cross-dams in creeks to store fresh water for irrigation use where rivers become saline before the end of pre- monsoon. • Construct more cyclone shelters, costal embankment & polder inside embankment.

Note:

Besides these AEZ specific suggested interventions/policies, the following are general policies for all agro-ecological regions:

- Create awareness among the farmers on new/available technologies for coping with unfavorable conditions/disasters.
- Conduct socio-economic surveys to identify actual constraints on development and ways to remove them in different agroecological regions
- Undertake regular and timely maintenance programme for protection of river bank erosion along the channel.
- Develop post-harvest handling and marketing techniques/facilities for fruits, vegetables and other perishable crops.
- Make quality planting materials (seeds and saplings) of cereals, pulses, fruits and vegetables easily available.
- Activate ATC and NATCC for obtaining problems identified at field level and feedback on research.

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