



Building Smallholder Farmers' Resilience under Climate Change through Value Chain Management

Country Briefing: Bangladesh

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Country Context



Bangladesh with Regional Countries



Bangladesh is a South Asian country lies between $23^{\circ}34'$ and $26^{\circ}38'$ N latitude and between $88^{\circ}41'$ and $92^{\circ}41'$ E longitude.

The country is bounded by India on the west, north, and northeast; Myanmar on the southeast; and the Bay of Bengal on the south.

Country Context



Selected Statistics on Bangladesh

Area of Bangladesh	147570 sq.km
Total population	160.33 million
GDP*	US \$ 209 billion
GDP Growth rate*	6.4%
Per capita Income*	US \$ 1309
Agriculture contribute to GDP*	15.52%
Agricultural Growth rate	8.63%
No. of Farm Household	15.18 million
No. of Non-Farm Household	10.48 million
Cultivated Area	7.91 million ha
Cultivated Area per Household	0.51ha
Cropping Intensity	191%
% of irrigated area	62.96%

Source: Statistical Year Book of Bangladesh (BBS, 2014); *Global Finance, 2015, www.gfmag.com

Impact of Temperature on Crop Production

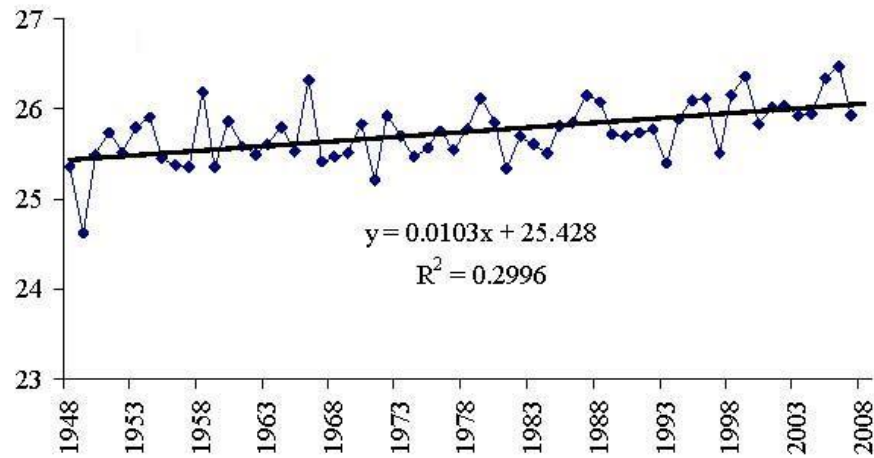


Figure: Trend of daily mean temperature during last 60 years (1948-2007)

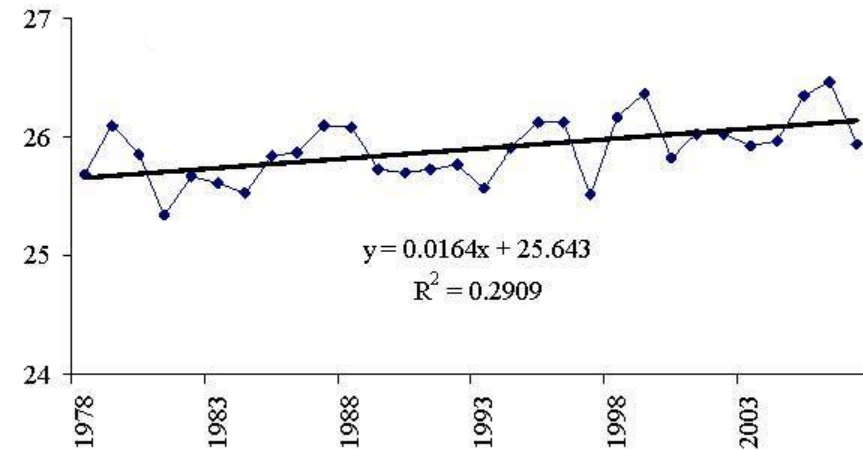
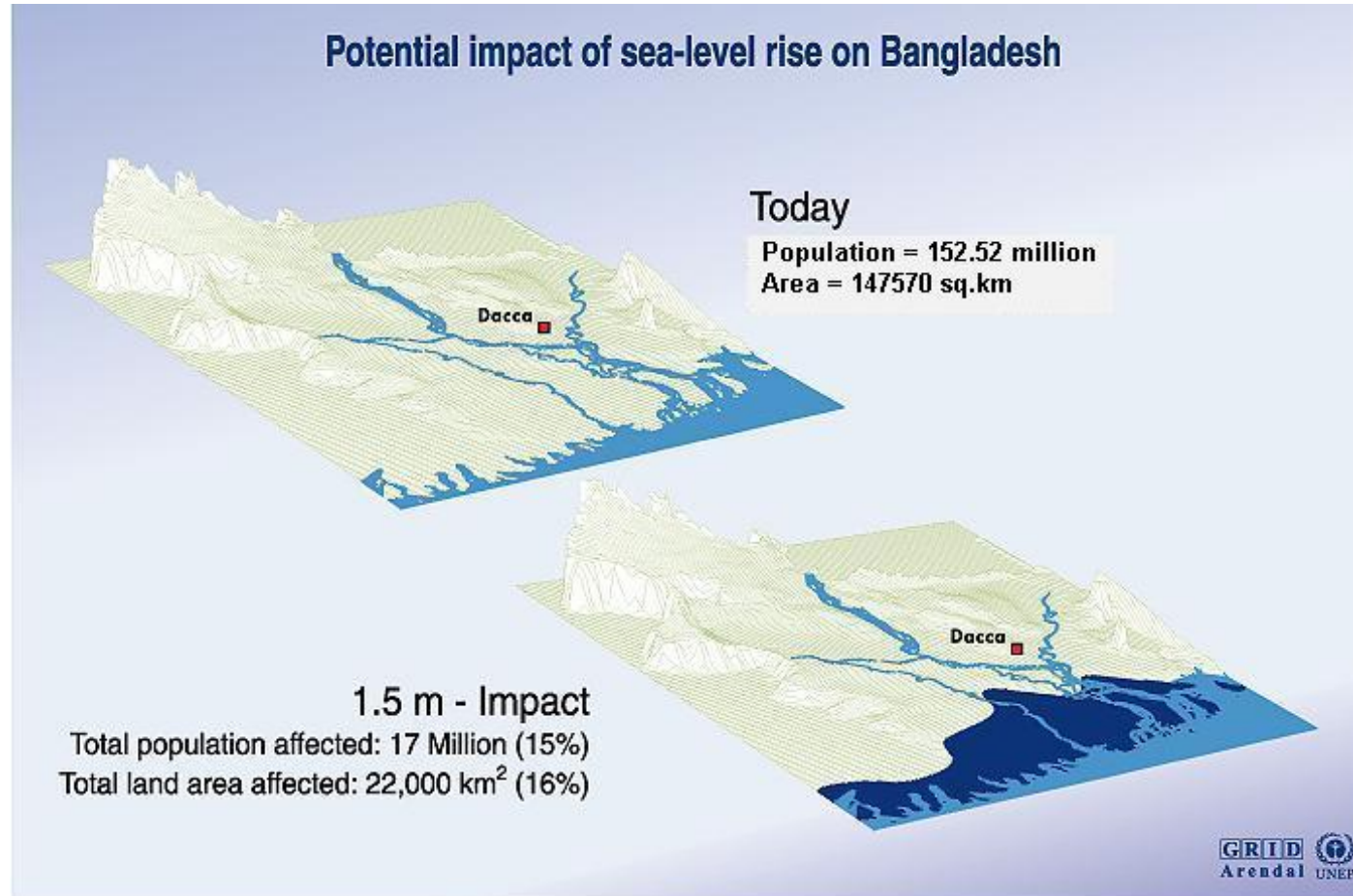


Figure: Trend of daily mean temperature during last 30 years (1978-2007)

- ❖ Mean daily temperature in Bangladesh increases to 0.9°C and 1.7°C during last 60 years and 30 years, respectively.
- ❖ In South Asia, average yields in 2050 for crops will decline from 2000 levels by about 50% for wheat, 17% for rice, and about 6% for maize because of climate change.

Impact of Sea Level Rise on Crop Production

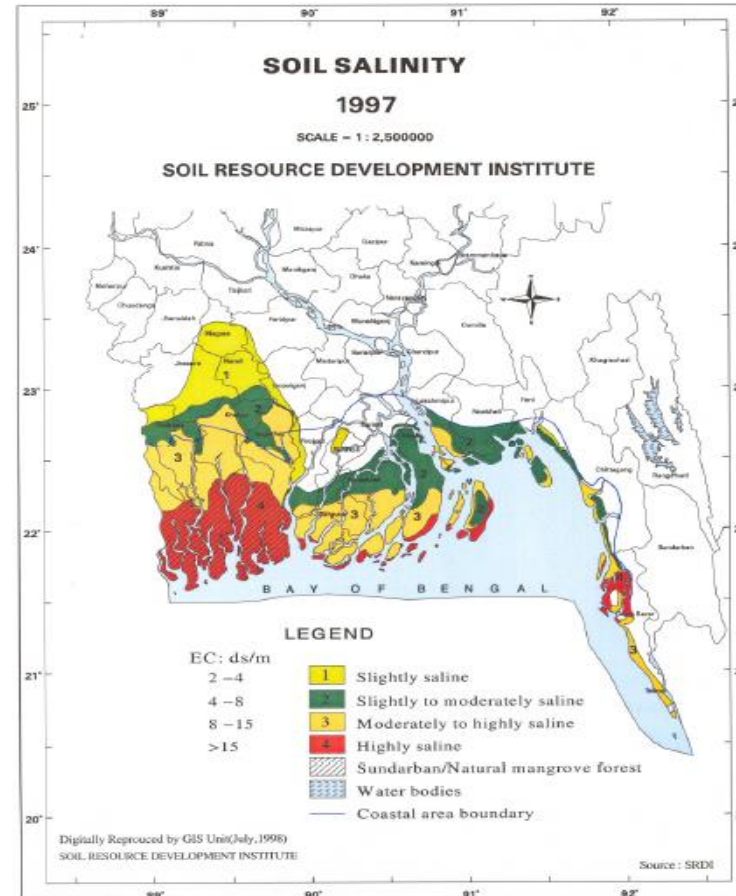
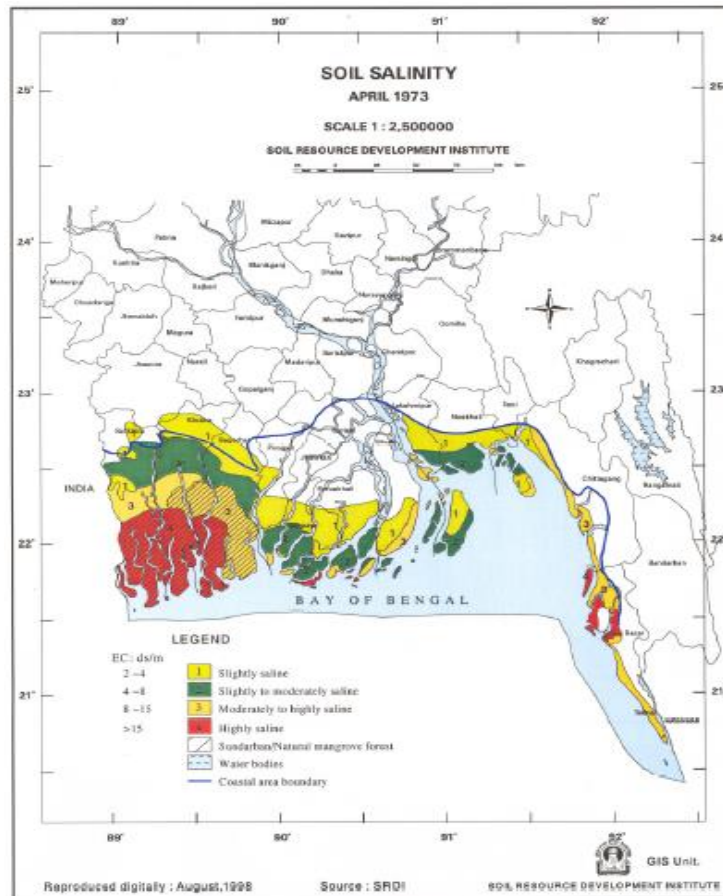


Source : UNEP/GRID Geneva; University of Dacca; JRO Munich; The World Bank; World Resources Institute, Washington D.C.

Country Context: Impact of Climate Change on Agriculture



Impact of Salinity on Crop Production



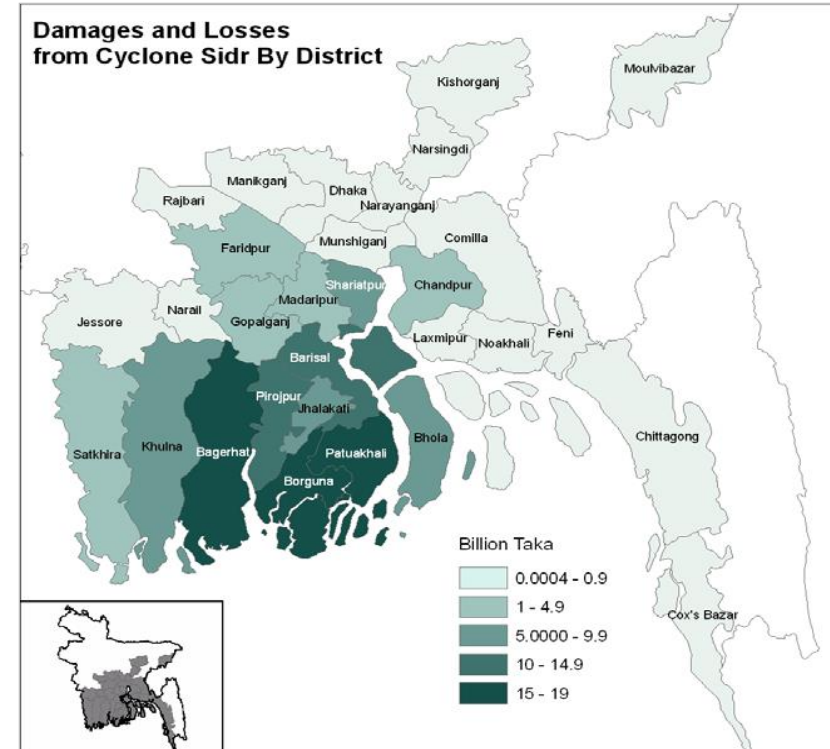
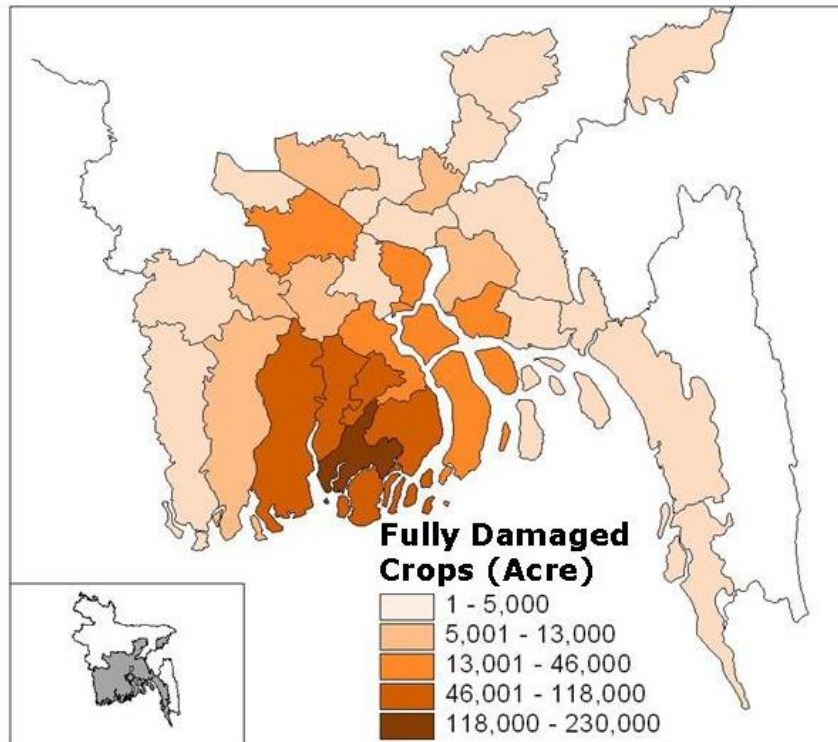
Salinity intrusion increased from 0.83 million hectares in 1990 to 3.05 million hectares in 2000. OECD estimated a GDP decrease in the range of 28 to 57% from 1 meter sea level rise (OECD, 2003).

Impact of Flood on Crop Production



- In 1988, 63% area affected, 2137 killed, US\$2137 million economic loss (Nazmul *et al.*, 2015).
- In 2007, 50% area affected, 1230 killed, US\$114 million economic loss (Nazmul *et al.*, 2015).
- In 2010, loss of about 150,000 metric tons of rice by unprecedented flash flood in the *haor* areas.

Impact of Cyclone on Crop Production



- ❖ The cyclone SIDR in 2007 killed 4275 people, damaged 1.23 million tons of rice in four severely, nine badly and seventeen moderately affected districts of Bangladesh (FAO/GIEWS Global Watch, 2007).
- ❖ About 175 peoples died and 10-12 million peoples were distressed by cyclone Ayla in 2009.

Country Context: Adoption of Agricultural Mechanization



Status of Agricultural Machinery and Installed Power in Bangladesh

	Number*	Number/'000 ha	Installed power, kW/ha
Tractor	35000	2.32	
Two-wheel Tractor	700000	46.42	
Pump(DTW)	35322	2.34	
Pump (STW)	1523609	101.04	
Pump (LLP)	170569	11.31	1.578
Rice Transplanter	400	0.03	
Reaper	500	0.03	
Combine Harvester	200	0.01	
Closed drum Thresher	220000	14.59	
Open drum Thresher	150000	9.95	

*Source: BAU, BARI, BRRI, BJRI, BSRI, BADC, BMDA and DAE

Country Context: Adoption of Agricultural Mechanization



Status of Mechanized Rice Production Activities in Bangladesh

Activities	% mechanized
Land preparation	90
Irrigation	63
Transplanting	0.1
Fertilizer application	1
Weeding	65
Spraying	80
Harvesting	0.8
Threshing	70

Country Context: Adoption of Agricultural Mechanization



Status of Agricultural Machinery Manufacturing Units and Market Trend

Manufacturing Units	Number
Foundries	70
Agri-Machinery Manufacturing Workshops and Industries	800
Spare Parts Manufacturing Workshops	1500
Repair and Maintenance Workshops	20,000
Mechanics	500,000
Village Artisans	100,000

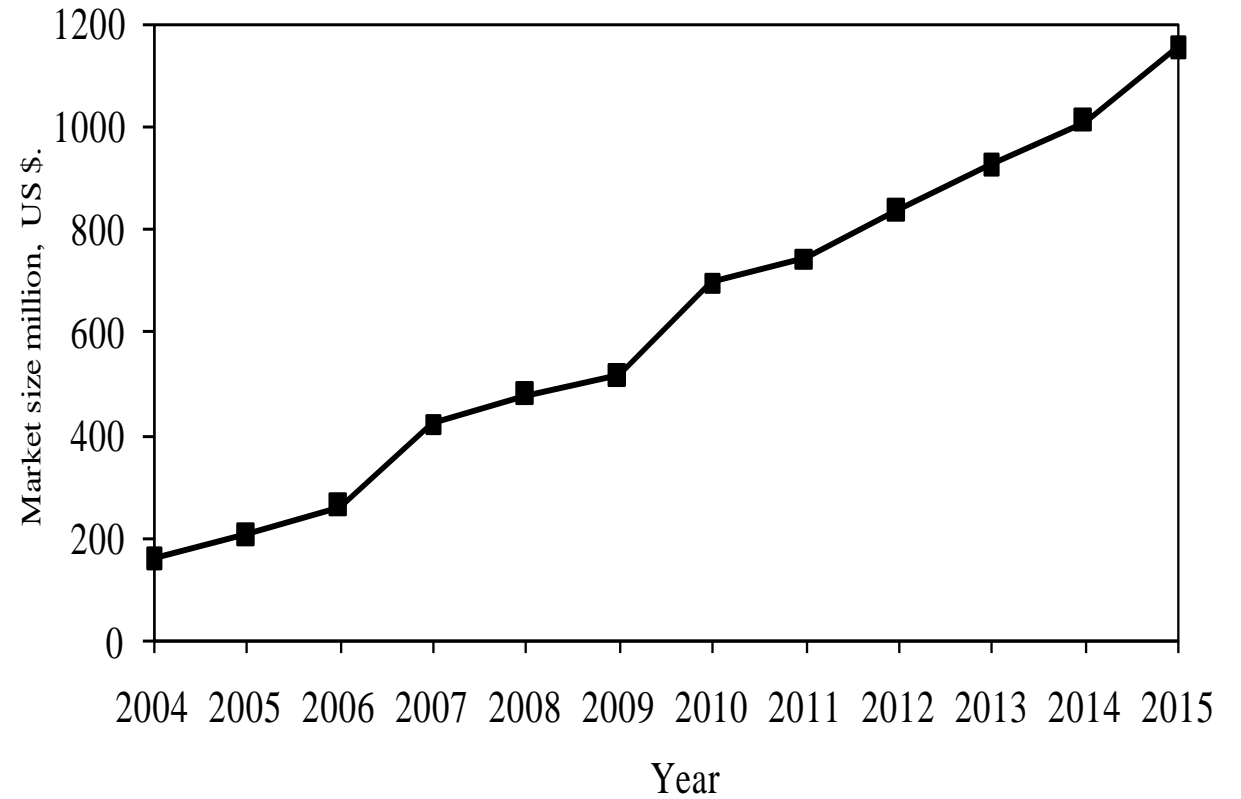


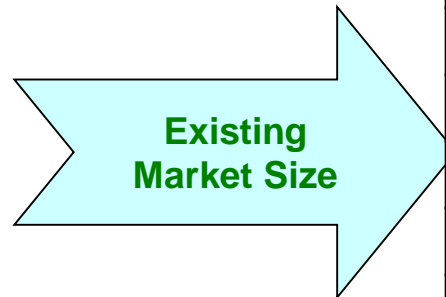
Fig. Agri-machinery manufacturing units

Fig. Agri-machinery market trend

Country Context: Adoption of Agricultural Mechanization



Annual Market Size of Selected Agri-Machinery



in million US \$

Agri-machineries	Market size/yr
Power Tiller (Imported)	57.10
Tractor (Imported)	94.21
Diesel Engine (Imported)	523.40
Centrifugal Pump (STW & LLP)	17.99
Spare parts (Local)	261.7
Spare parts (Imported)	95.16
Sprayer (local)	1.9
Sprayer (imported)	0.48
Thresher (Open & Closed drum)	87.22
Maize Sheller	2.83
Weeder	1.07
Harvesting equipment (Imported)	7.61
Sub-total	1151
Repair & Maintenance	137
Total market size	1288

Country Context: Mechanization Approaches for Mitigating Climate Change effect



Conservation Agricultural Machinery



Zero Till Planting (ASMIH-BD)



Strip Till Planting (ASMIH-BD)



Bed Planting (ASMIH-BD)



Country Context: Mechanization Approaches for Mitigating Climate Change effect

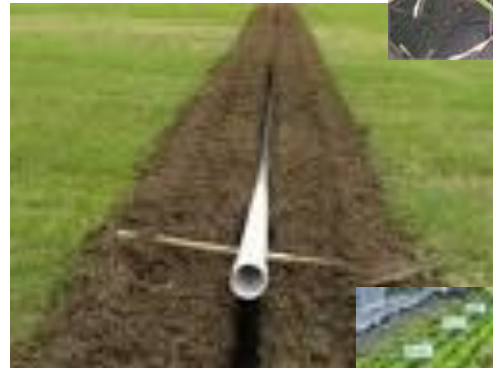


Improved Water Resources Management

Buried pipe



Alternate wetting and drying



Drip irrigation



Solar panels are used for powering motors for lifting irrigation water



Country Context: Mechanization Approaches for Mitigating Climate Change effect



Crop Planting and Harvesting



Seedling raising and Transplanting (ASMIH-BD)



Harvesting operation using Reaper & Combine (ASMIH-BD)

Country Context: Mechanization Approaches for Mitigating Climate Change effect



Threshing, Drying and Storage



Maize Sheller



BAU-STR dryer (PHLIL-BD)



Hermetic storage bags (PHLIL-BD)

Country Context: Developing Resilient Livelihoods



Conserving fresh water restores eco-system



Source: BCAS, Bangladesh



Saline tolerant rice

Cattle rearing

Duck rearing

Challenges and Opportunities



Challenges of Agricultural Mechanization in Bangladesh

- Inadequate knowledge and skill for efficient use, proper maintenance, repair and production of machinery at all levels of users, manufacturers and traders.
- Limited scale public sector agricultural extension activity involving farm machinery, mechanization and post harvest activities.
- Scarcity of quality spare parts, replaceable tools and accessories and adequate after-sales services.
- Poor quality of many imported as well as some locally fabricated machines.
- Inadequate skill related to iron, alloy and brass casting and heat treatment; fabrication and machining at producers' level.
- High tariff and multiple VAT on imported raw materials need for fabrication.
- Absence of product standards and quality certification.
- Absence of adequate design and fabrication guidelines.
- Inadequate accessibility of farm machinery to the crop field.
- Inadequate appropriate policies and regulations on mechanization.

Challenges and Opportunities



Opportunities of Agricultural Mechanization in Bangladesh

- Farmers are aware and ready to adopt appropriate technologies/machines for increased crop production.
- Use of traditional crop production technologies involving human muscle and animal power become unattractive.
- Custom-hire Service Providers are quite visible in rendering agricultural machinery services to farmers.
- Significant number of mechanics and repair & maintenance workshops are at the vicinity of the farming community.
- Agricultural machinery production sub-sector have gained quite maturity in production and marketing of agricultural machinery.
- Number of reputed private sector agricultural machinery importers are quite active in marketing and after-sales services at farmers level.
- Government is providing 50% subsidy in popularizing selected agricultural machinery.
- Credits are available at commercial banks and NGOs.
- Government initiated committee to formulate National Agricultural Mechanization Policy.

South-South Cooperation Needs



Urgent South-South technical and financial cooperation is needed for the following:

- Establishment of 'Agri-machinery Production Zone (APZ)' in potential agri-machinery production regions to accommodate existing and potential agri-machinery industries and workshops.
- Establishment of 'Common Facility Centre' at each APZ to facilitate quality services related to heat treatment, material testing, test and standardization, advisory services etc.
- Establishment of 'Central Institute of Agricultural Engineering (CIAE)' for continuation of innovation through R&D.
- Modernization of local Foundries through South-South collaboration and experience sharing.
- Strengthening capacity of Agri-machinery entrepreneurs through transfer of proto-type machines and technologies through South-South cooperation.
- Establishment of National Standardization Committee for agri-machinery and spare parts.
- Developing skills related to iron, alloy steel and brass casting, heat treatment; fabrication and machining; and R&M of agri-machinery to the technicians working at different production units and an advance level training to both embedded and transected service providers.
- Formulation of National Agricultural Mechanization Policy.

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