



Climate-Smart Agriculture (CSA) within the Feed the Future Project Portfolio of USAID-Bangladesh: A CCAFS Deep-Dive Review

Douglas White and Marie Quinney, Andy Jarvis

1. Objective

The Climate Change, Agriculture and Food Security (CCAFS) research program of the CGIAR is working with USAID to identify opportunities for advancing Climate Smart Agriculture (CSA) within its *Feed the Future* portfolio. CSA has three main objectives:

- 1) To sustainably increase agricultural productivity and incomes;
- 2) To adapt and build resilience to climate change; and
- 3) To reduce and/or remove greenhouse gas emissions, where *appropriate*.¹

A visit in August 2015 by personnel from CCAFS and USAID-BFS Washington to the Bangladesh Mission provided an opportunity to identify and discuss CSA-related activities within the country and the USAID zone of influence (ZOI). The five-day visit included a series of meetings with Mission staff, project implementing partners and the Bangladesh Department of Agricultural Extension. While the discussion scope emphasized the second of the above CSA objectives, adaptation, within *Feed the Future* (FTF) projects, the meetings included discussion of the other CSA objectives and USAID projects associated with Food for Peace and Global Climate Change. The visits were preceded by a document review of the Bangladesh Mission projects and relevant agriculture and climate change information available on the web.

This report outlines key findings of the visit and suggests ways in which CSA can be further integrated into upcoming *Feed the Future* programming in Bangladesh. These insights, combined with findings from similar deep-dive visits to other FTF countries (Zambia, Rwanda, Senegal, and Honduras) and the general electronic survey of Missions with FTF activities, will help inform how BFS can better support and track CSA efforts across the 19 focus countries, plus other aligned countries.

2. Bangladesh Context

Bangladesh is the most densely populated country in the world, with over 160 million people.² Although its population growth rate has decreased markedly to 1.2% annually, the total population is expected to increase by over 56%, to 250 million, within 25 years. Nearly 75% of the population lives in rural areas.³

Since 1996, the economy of Bangladesh has grown approximately 6% per year despite political instability, poor infrastructure, corruption, insufficient power supplies, slow economic reforms, and the global financial crisis of 2008-09. While the services sector generates more than half of

¹ versus the FAO definition, which uses *possible*)

² Non city-state countries.

³ Population Reference Bureau. [2014-world-population-data-sheet](#)

GDP (e.g., garment industry), the agriculture sector continues to employ nearly half of the population.⁴

The FtF zone of influence (ZOI) is sub-national and located in southwest part of country (Figure 1).⁵ The 20 districts are within the Barisal, Khulna, and Dhaka divisions and contain approximately 16% of the national population (27 million people)⁶ and approximately 25% of the land area.



Figure 1. Bangladesh ZOI

Agricultural lands cover approximately 60% of the country. Over 85% of agricultural land is arable; permanent crops and pastures comprise the remaining 15%. Forests stand on less than 10% of the country.⁷ Although Bangladesh has 30 agro-ecological zones,⁸ the ZOI is predominantly different types of floodplain (Figure 2).

Production of all crops follows two main seasons: *kharif* and *rabi*. Farmers plant and grow *kharif* crops during the wet season and start harvesting at the end of September and October. For *rabi* crops (pulses, wheat, potatoes and most vegetables) farmers cultivate them from January until the end of May or June. The tropical climate allows for rice production in three different seasons a dry mild winter *Boro* season (October to March) a hot, humid summer *Aus* season (March to June) and a humid, warm rainy monsoon *Aman* season (June to October). *Boro* rice falls under *Rabi* crops while *Aman* and *Aus* are considered *kharif* crops.

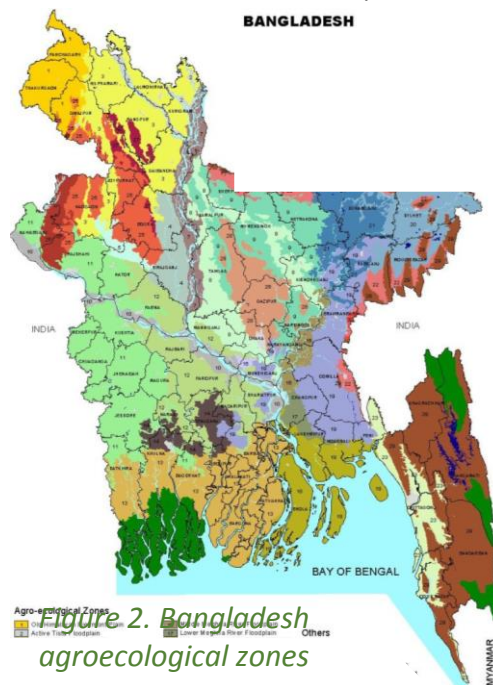


Figure 2. Bangladesh agroecological zones

Over a span of forty years (1971-2010), Bangladesh nearly tripled the production of cereal grains, despite a decline in arable land. The diffusion of modern rice technologies and improved farming practices generated most of the additional production. By 2010, the use of improved seed varieties increased to 3/4 of the rice-cropped area, supported by irrigation that expanded to 2/3 of the paddies. With irrigation, rice can be grown and harvested three times a year in most areas.⁹ Bangladesh is now the 4th largest rice producer in world.¹⁰ Despite these successes, however, annual yield increases have recently

⁴ CIA - The World Factbook 2015. Central Intelligence Agency. 29 June.

⁵ Map from USAID Bangladesh Nutrition Profile

⁶ Bangladesh Bureau of Statistics. 2011. *2011 Population & Housing Census: Preliminary Results*

⁷ FAOSTAT

⁸ http://agricultureandagricultureinformation.blogspot.com/2013/09/list-of-agro-ecological-zones-of.html#.Vcnr5_IHM60

⁹ Hossain 2010.

¹⁰ Average 1993-2013. <http://faostat3.fao.org/browse/Q/QC/E>

slowed, being only 1.1% or lower between 2010 and 2013.¹¹

A. Risk and Vulnerability

Bangladesh is the 6th most vulnerable country to climate change in the world.¹² Associated hazards include cyclones, droughts, and flash floods. A combination of poverty, population pressure and livelihoods dependent on the performance of agriculture and fisheries further increases the challenges and risks facing the country. The *Comprehensive Disaster Management Program* (CDMP) and other analyses of the Climate Change unit within the Department of Environment predict that a sea level rise of 45 cm by 2050 will inundate 10-15% of the national land area.

Over 1/3 or nearly 47 million rural people remain below the poverty line.¹³ Moreover, as the population continues to grow, the viability of smallholder farms is further threatened. Farm sizes have already decreased from 1.4 to 0.3 ha between 1960 and 2000,¹⁴ thus improvements to the agriculture sector are urgently needed both in terms of productivity and resilience. Other risks to rural livelihoods include pollution caused by hazardous practices of human sanitation and agricultural chemicals. Open-area defecation leads to a prevalence of waterborne diseases. The mis-use of commercial pesticides increasingly pollutes farms and fishing areas. National sales of insecticides used on rice, including carbofuran, pyrethroids, and malathion have increased more than 3X, from 13,000 tons in 2003 to 45,172 tons by 2009.¹⁵ Insecticides not only threaten ecological and human health, but also represent a significant expenditure by poor farmers. Unaware of integrated pest management strategies and treatment threshold levels, farmers typically over-spray high-value vegetables in order to reduce financial risks caused by infestations.

Additional hazards include naturally-occurring arsenic that contaminates groundwater, intermittent water shortages in the northern and central parts of the country, soil degradation, salinization of both soils and irrigation water, erosion, and deforestation.¹⁶ Regarding the latter, although the estimated per capita consumption of timber and fuelwood in Bangladesh is one of

¹¹ FAOSTAT [Comment: An anomaly or an already shrunken yield gap? Part of the problem may be that older modern varieties are still being used per an informed yet anecdotal comment during CSISA/IRRI meeting]

¹² Based on analysis of impacts caused by major climate events that occurred around the world during the twenty-year period since 1994. German Watch. 2015. Global Climate Risk Index (CRI) <https://germanwatch.org/en/cri> [Comment: Surprising that it is not worse. Acknowledgement of hazards and government investments could be responsible for the “better” ranking.]

¹³ Bangladesh FtF Multi-year Strategy; <http://www.ruralpovertyportal.org/country/statistics/tags/bangladesh>

¹⁴ Average size could be significantly smaller since only farms larger than 0.2 hectares were included (Lowder SK, Skoet J, Singh S. 2014. *What do we really know about the number and distribution of farms and family farms in the world?* Background paper for The State of Food and Agriculture. *ESA Working Paper No. 14-02*. Rome: FAO.

¹⁵ Sanwar S. 2011. *Green Buildings, Clean Transport and the Low Carbon Economy: Towards Bangladesh's Vision of a Greener Tomorrow*. Germany: Lambert Academic Publishers. 380p; <http://www.irinnews.org/report/96223/bangladesh-farmers-not-heeding-pesticide-warnings>

¹⁶ *CIA - The World Factbook* 2015. Central Intelligence Agency. 29 June.

the lowest in the world, biomass continues to be increasingly scarce and costly.¹⁷ The natural growth of forests as well as afforestation measures are too low to meet growing demands. Consequently, other biomass sources such as cow dung and agricultural residues are used as fuels. Not only do poor rural households, particularly women, have to spend a significant amount of time on collecting biomass, its use as fuel comes with an opportunity cost of not being applied as an organic input that could help prevent further degradation of soils. Furthermore, given that approximately 1/3 of farmers are tenant farmers/sharecroppers,¹⁸ investments to improve productivity and adaptation may not be considered worthwhile.

Assuring adequate family nutrition continues to be a major vulnerability of Bangladesh. To illustrate, children are undernourished in over one-quarter of even the richest households.¹⁹ Multiagency efforts, however, have achieved significant improvements. For children under the age of 5, stunting dropped from 59 to 40% between 1997 and 2011, a rate of improvement nearly 2X faster than that of India.²⁰ Multiple causes are likely, including improvements in household wealth, parental education, sanitation, health training and pre-natal care.

B. Government Agricultural Strategy and Policy

The government of Bangladesh (GOB) has set a target of becoming a middle-income country by 2021. Policies emphasize income generation, education, social justice and an equitable socio-economic environment. Improving resilience to climate change and natural disasters is recognized as being essential in ensuring development sustainability.²¹

Given the importance of agriculture, significant investments have been made to attain rice self-sufficiency, while expanding aquaculture and vegetable production. Nevertheless, agriculture support policies come with high costs. For example, despite reducing and eliminating many of the macro-economic policy distortions in the agricultural sector, fertilizer price subsidies of 40-50% have been consuming over 4% of the national budget in the past few years.²² Furthermore, such distortions hamper the adoption of sound integrated soil fertility management practices such as urea deep placement.²³ A “rebalancing” of the fertilizer subsidy away from a urea emphasis has yielded positive results with more prudent use of nitrogen fertilizer. Current discussions include efforts to target subsidies to the small and marginal farmers to ensure that they obtain greater share of the subsidy benefits.²⁴

¹⁷ https://energypedia.info/wiki/Bangladesh_Energy_Situation

¹⁸ IFPRI personal communication 2015.

¹⁹ World Bank. 2010. *Nutrition at a GLANCE. Bangladesh.*

²⁰ Headey D. 2014 *How Did Bangladesh Reduce Stunting So Rapidly?* IFPRI. [Global Nutrition Report. Panel 6.2.](#) or Headey, D, Hoddinott J, Ali D, Tesfaye R, Dereje M. 2014. The other Asian enigma: Explaining the rapid reduction of undernutrition in Bangladesh. [IFPRI Discussion Paper Series 1358.](#)

²¹ <http://www.ruralpovertyportal.org/country/approaches/tags/bangladesh>

²² Center for Policy Dialogue 2014. *An Analysis of the National Budget FY2015* http://cpd.org.bd/wp-content/uploads/2014/06/CPD-An-Analysis-of-the-National-Budget-for-FY2015_Final_June.pdf

²³ IFDC personal communication 2015.

²⁴ Miah H. 2015. [Agriculture Sector Development Strategy: background paper for preparation of 7th Five Year Plan.](#)

As Bangladesh develops, demands for foods will continue to change. Reports emanating from the Household Income Expenditure Surveys (HIES) show that considerable consumption diversification has occurred, with lower per capita intake of rice and higher consumption of high-value food items such as meat, fish, milk and edible oil (HIES 2005 and 2010). Nevertheless, much of the population has insufficient funds or lack access to diverse foods. Nationally, the overall crop diversity (area in non-rice crops) is 18%, with wide variation across regions. Although diversity ranges from a high of 40% in the hill tracts of eastern Bangladesh, it is very low in the FTF districts in Khulna (9%).²⁵

Private sector initiatives face a wide range of challenges. Bureaucratic procedures stifle entrepreneurship, market entry, small business development and productive private sector investment. Out of 183 countries in the *Doing Business Report* of the World Bank, Bangladesh's rank fell from 111 in 2009 to 173 in 2015.²⁶ Furthermore, Bangladesh has been ranked near the bottom of Transparency International's *Corruption Perception Index* for the past fourteen years.²⁷ In addition, a lack of access to electricity and to all-weather roads as well as a general scarcity of information and experience further impedes private sector competitiveness. Relatively few small farmers are organized into associations as advocacy groups,²⁸ despite the existence of other substantial development efforts such as Grameen Bank²⁹ and BRAC.³⁰

3. Climate Smart Agriculture and the *Feed the Future* Portfolio

This section provides a summary of the *Feed the Future* projects in Bangladesh with respect to CSA activities and discusses current perceptions. A variety of development efforts help agriculture adapt to a changing climate. These are categorized into three general approaches:

Approach 1: Technologies & practices including their development and dissemination that enable farm management activities to be more climate smart, with respect to adaptation, mitigation and productivity/income generation.

Approach 2: Incentive mechanisms through improved performance of value chains, financial mechanisms, performance compensation, capacity building, data collection and analysis, enhanced market and policy governance or other means that facilitate or promote adoption of climate smart technologies and practices.

²⁵ Sher-e-Bangla Agricultural University. Food Planning and Monitoring Unit. Ministry of Food. 2014. [Financial and Economic Profitability of Selected Agricultural Crops in Bangladesh](#).

²⁶ <http://www.doingbusiness.org/reports/global-reports/doing-business-2015>

²⁷ <http://www.transparency.org/cpi2014/results>

²⁸ Bangladesh FtF Multi-year Strategy Summary.

²⁹ As of October 2011, Grameen has 8.35 million borrowers, 97% of whom are women. With 2,565 branches, Grameen Bank provides services in 81,379 villages, covering more than 97% of the total villages in Bangladesh <http://www.grameen-info.org/about-us/>

³⁰ BRAC started as a limited relief operation in 1972 in a remote village of Bangladesh. Now it is the largest development organization in the world. A holistic development approach using tools like microfinance, education, healthcare, legal services, community empowerment, social enterprises and BRAC University.

Approach 3: Multi-institutional participation and planning that foster integration and coordination of efforts at multiple socio-political levels (community-based organizations (CBOs), producer organizations, businesses, and agencies – both national and international) and across economic sectors (agriculture, forestry, fisheries, transportation, and finance).³¹

While many CSA-related projects may consist of more than one approach, an emphasis of a project is often apparent. Categorizing the primary approach of the *Feed the Future* projects (and other CSA-related efforts) helps to assess: (i) the comprehensiveness of Mission CSA efforts, and (ii) how current activities may be achieving CSA goals, even though not currently framed as such because CSA terminology has not been required in FTF.

A. Farm Technologies and Practices

An initial identification of CSA-related projects, which emphasizes **farm technologies and practices** within the current *Feed the Future* portfolio, is summarized in Table 1. Included are brief descriptions of the projects and associated types of CSA benefits (productivity & income, adaptation, mitigation).

Table 1. CSA-relevant technologies and practices in projects and associated benefits

FTF/FFP/GCC Project	CSA-relevant activities	Productivity & income benefits	Adaptation benefits	Mitigation Benefits
Abiotic Stress Tolerant Wheat and Rice <i>Arcadia</i>	Breeding for salt tolerant rice varieties	Maintained or improved yields	Preparation for sea level rise	Indirect
Accelerating Agriculture Productivity Improvement (AAP/IFDC)	Cost-effective, resource-conserving, and environmentally friendly fertilizer and agriculture technologies: Alternate wet dry (AWD) Urea deep placement (UDP)	Increased rice production UDP can increase rice yield up to 20%. ³²	More efficient water use per ton of rice produced with UDP	AWD has CH ₄ mitigation potential of about 43%. ³³ UDP can reduce N use up to 35% (preliminary results)

³¹ Example components of an enabling environment that facilitate climate smart agricultural outcomes include climate information services, programmatic support for improved risk management, safety nets, or national policy frameworks such as national adaptation plans, NAMAs, etc.

³² Islam MR et al. *Effects of Fertilizer Deep Placement and Water Management Practices on Nitrogen Use*.

³³ R. Wassmann, B.O. Sander, J.A. Basconcillo 2014. Assessing the Suitability of Mitigation Options in Rice Production Derived from Bio-physical Considerations and Stakeholder Perceptions. In: *Integrating Greenhouse Gas (GHG) Emissions Mitigation into the Feed the Future Bangladesh Fertilizer Deep Placement Rice Intensification Project, Greenhouse Gas (GHG) Emissions from Rice Field: Finding Mitigation Options* from Proceedings of the National Workshop on Fertilizer Deep Placement and Alternate Wetting and Drying IFDC, USAID, Bangladesh Agricultural Research Council (BARC). August 26-27. Dhaka, Bangladesh

Agro-Inputs (AIP) CNFA	- Agro-Input Retailers Network (AIRN): 3,000 certified retailers in 20 districts supply improved ag inputs to over 1 million farmers. - Market Information Systems: Distribution of 200,000 Monthly Price Outlooks developed through a GIS-platform Input Market Information System. - Quality Control and Standards and Regulatory Constraints: to ensure conformity with industry-approved standards, AIRN will conduct “ <i>Business Ethics Audits</i> ” of certified members. - Build capacity of local organization, financial assistance to industry association partners and local organizations, including NGOs, microfinance institutions, research institutes, and government agencies.	Lower farmer expenditures of quality (unadulterated) agro-inputs	Increased farmer knowledge and skills	Prudent use of fertilizers can reduce NO ₂ emissions and NO ₃ losses to ground and surface water.
Aquaculture for Income and Nutrition WorldFish	Homestead pond management, vegetable gardens (raised beds, towers). [linked with a CCAFS project]	Increased productivity. Vertical intensification.	Diversification with fish and vertical gardens. Index based insurance with IFAD & Colombia U. Vertical gardens avoid saline soils. Fish micro-habitats to alleviate heat.	Indirect efficiency benefits. Living fences can increase farm carbon stocks.

FTF/FFP/GCC Project	CSA-relevant activities	Productivity & income benefits	Adaptation benefits	Mitigation Benefits
Cereal Systems Initiative for South Asia (CSISA-BD) CIMMYT/IRRI	Conservation agriculture practices with reduced tillage. Diversification with maize, sunflower and legumes. Maize/wheat: Proper crop residue management combined with different minimum tillage systems.	Increased productivity. Farmers attracted to maize due to its profitability. [Use within chicken feed industry]	Alternate wetting-drying (AWD) reduces water needs for irrigation. Requires collective action and mediation.	Reduced emissions from tillage and possible lower usage of chemical N because of legumes.
Mechanization and Irrigation (CSISA-MI) CIMMYT/IRRI	A two wheel tractor attachment can be used to seed and fertilize in lines while preparing land. When practiced in the long term, these methods can improve soil quality. Mechanization to alleviate seasonal labor shortages. Training is provided on how to operate machine and how to keep log book and maintenance Main objective is to intensify fallow system in southern Bangladesh.	Strip tillage can generate cost savings and better yields for farmers. When practiced in the long term, these methods can improve soil quality.	Strip tillage is a conservation system that reduces tillage, improves soil moisture. Tractor with minor modification can also be used for conservation agriculture, which conserves soil moisture and organic matter.	Via efficiency gains. Improved fertilizer and irrigation practices also help address CC issues. Claim the use of 30-40% less water and substantial energy savings. For example, a 30% fuel saving with seeder fertilizer drill.
Horticulture CIP/AVRDC	-Enhance the production and use of local and new potato and sweet potato varieties, tomato, peppers, amaranth, kangkong, jute mallow, gourds and beans. -Introduce organizational and technological innovations to small-holder farmers. Target 100k households via children showing parents	Intensified and diversified farm production. Sticky trap IPM. Enhanced post-harvest handling. Ventilated harvest storage. Cold room for seed potato.	Diversified production	None apparent.
Bangladesh Policy Research and Strategy	Policy research on issues impacting the agriculture sector and food security in general,	Improves government policy that enables	Via better use of resources and inputs.	None apparent.

Support Program for Food Security (PRSSP) /FPRI	including: production, technology, and natural resources; agricultural marketing and value chains; fisheries and livestock; international trade; social protection; public food distribution; nutrition security; gender issues; and governance. Works with Agriculture Policy Unit in the Ministry of Agriculture.	agricultural productivity growth. Technical support to GOB priority setting.		
Food for Peace (Save the Children CARE, ACDI/VOCA)	Saline tolerant rice varieties Tilapia with WorldFish Crop diversification, raised beds, organic pesticides, compost. Small animal production Microgrants, cookstoves.	Improved crop and livestock productivity	Diversification and farmer participation in upstream and downstream value chain activities.	Indirect, efficiency though productivity and resilience.
Climate-resilient Ecosystems and Livelihoods (CREL) Winrock [a GCC project]	Climate-resilient techniques: 1) Bed preparation (raised bed with better drainage) 2) Integrated Pest Management and organic methods 3) Early cultivation and short duration varieties 4) High yielding varieties (and Hybrid varieties in the case of selected vegetables) 5) Stress tolerant varieties (drought, salinity or flood tolerant) 6) Multi-cropping techniques including successional sowing 7) Protecting crops (plastic sheets and/or nets)	Improved crop and livestock productivity Sustainable harvesting of natural resources, such as fish and trees from mangroves, riverine areas and forests.	Diversification, improved practices and productivity. Expanded marketing and farmer participation.	Reduce deforestation and tree planting.

B. Incentive Mechanisms

Achieving widespread practice of CSA requires adequate incentives to make change. This subsection describes how *Feed the Future* activities provide four general types of incentives that foster transformative processes: (i) improved performance of value chains, (ii) financial mechanisms, business skills and governance, (iii) data collection and policy research, and (iv) enhanced reach of communications.

(i) Value chain performance

FTF and FFP activities, as well as the GCC activity CREL, often facilitate better functioning of both input and output markets. Inputs include physical such as fertilizers, seeds, animals, and machinery, along with knowledge inputs with respect to farm management skills. Outputs include post-harvest activities such as storage, packaging and market access.³⁴

Although CNFA focuses on better provision of inputs, it is a novel effort that improves the skills of agro-suppliers via training in optimal chemical handling and application. The activity addresses a major need and attempts to overcome a perverse incentive of over-selling chemicals. Agro-dealer certifications of expertise enables sellers to increase trust and perhaps earn more market share and higher incomes.

³⁴ For the FFP projects, the focus topic CSA may have overshadowed FTF-related activities on improving nutrition. Few discussions included mention of such efforts and associated impacts. This result was a consequence of meeting with three implementing partners simultaneously for only 1 hour. Although 20 minutes to summarize work and discuss CSA was time-efficient, the discussions unfortunately seem to have been insufficient to explore CSA in more depth.

(ii) Financial mechanisms, business skills and governance

Feed the Future and other complementary USAID projects foster a variety of support mechanisms that facilitate the adoption of CSA practices. Three examples are highlighted. One, the FFP projects provide technical and input support using micro-grants and asset transfers of small animals (ACDI/ VOCA, Save the Children). Empowerment of women and improved governance on the demand and supply sides of extension were also emphasized (CARE). Two, the FTF Aquaculture project appears to foster innovation to generate local solutions (e.g., micro habitats for fish). Three, the GCC CREL project supplies micro-finance support with SILCs. It also provides a 7 month financial literacy program and extensionist training. CREL participatory climate vulnerability assessments help to empower local decision-making in identifying viable solutions such as micro dams.

(iii) Performance compensation

Mechanisms for compensating superior agricultural products appear to be rare in Bangladesh. Current USAID-supported efforts include, the technical certification of agro-input dealers (CNFA), market niche access support both temporal (cucumbers for Ramadan) and spatial (strawberries for hotels), branding of high-value products (CREL), and also market segmentation is occurring with some high-value small-grain rice that earn a 100% price premium (CSISA).

(iv) Data collection, analysis and policy change

Besides the M&E efforts of all the projects, the Bangladesh portfolio includes efforts on data collection and policy support at a national scale. The PSSRP with IFPRI has conducted an extensive *national* baseline survey, which aided priority-setting for FTF. The group also supports the GOB in priority setting for investments in the agriculture sector, including fertilizer policy.

Despite significant benefits in terms of productivity and/or pesticide use, GMO releases can be contentious. For example, although Bt eggplant showed marked improvements in resisting pest pressures and thereby reducing the need for chemical spraying, environmental groups heavily criticized the release of the new variety. GMO salt-tolerant rice should take note of pro-active public relations efforts required to minimize negative public perceptions.

CIMMYT is in the process of attempting to change GOB policy on maize consumption.

(v) Communications

High population density facilitates communication in Bangladesh and is enhanced by good private and public telecommunications. Cellphones and radios are common. Nevertheless, communication efforts are not always effective. Public radio announcements, including early warning systems, are not always interpreted as being relevant by rural dwellers. Since district capitals are typically mentioned, inhabitants in nearby districts do not always heed warnings accordingly. The GOB Department of Agriculture Extension (DAE) has a wide network of personnel. However, given the size of the farming population, the ratio of extension agents to farmers is still very low and the agents face significant resource and transportation constraints. While some of the FTF activities collaborate with DAE, the constraints on extension service agents and the number of donor and government activities vying for attention limit the extent of that.

C. Multi-Institutional Participation and Planning

This sub-section describes how the USAID-Bangladesh Mission fosters coordinated donor and government participation in CSA-related activities. The government of Bangladesh (GOB), with USAID support, develops a Country Investment Plan (CIP) to guide GOB plans, mobilize funds and align finances. The CIP provides the justification for supporting increased public investment. The CIP fosters multi-institutional planning and participation by being anchored in the policy, programmatic and financial framework of Bangladesh and contains budgetary information from

COMPONENT	PROGRAMME
Food Availability	Sustainable and diversified agriculture through integrated research and extension
	Improved water resource management and infrastructure for irrigation purposes
	Improved quality of input and soil fertility
	Fisheries and aquaculture development
	Livestock development, with a focus on poultry and dairy production
Food Access	Improved access to markets, value-addition in agriculture and to non farm incomes
	Strengthened capacities for implementation and monitoring of NFP and CIP actions
	Enhanced public food management systems
	Institutional development and capacity development for more effective safety nets
Food Utilization	Community based nutrition programs and services
	Orient food and nutrition programs through data
	Food safety and quality improvement

the GOB and 16 international funding sources.³⁵ The CIP provides an integrated set of 12 priority investment programs (on left). The total cost of the CIP is estimated at US\$ 7.8 billion. Of this, US\$2.8 billion are already financed through allocated GOB budget resources and contributions by development partners. A financing gap of US\$ 5.1 billion

remains, of which US\$ 3.4 billion has been identified as being priority requirements.

Multi-institutional collaboration appears with all the Mission projects to some degree. Highpoint efforts are the three Food for Peace projects, which had a spirited joint meeting before our arrival, and CREL, which highlighted numerous agriculture and environment partners including with many FTF implementing partners – and even reporting on FTF indicator targets.³⁶ On the other hand, collaboration was not fully apparent amongst the international agencies. For example, USAID and World Bank have little collaboration or communication on CSA.

In addition, Bangladesh has hosted a CSA-related international conference: the *7th International Conference on Community Based Adaptation: Mainstreaming CBA into national and local planning*, which took place April 2013 in Dhaka <http://pubs.iied.org/G03616.html>.

4. Discussion

This section provides a commentary on current perceptions on CSA in Bangladesh, summarizes highlight remarks that arose during meeting discussions, and identifies potential future opportunities and challenges for *Feed the Future* programming.

³⁵ ADB, AusAid, DANIDA, DFID, EKN, EU, FAO, IDB, IFAD, JICA, SDC, UNDP, UNICEF, USAID, WB, WFP.

³⁶...four FtF indicator targets, two targets (indicators 18 and 19) were exceeded and the other two targets were substantially achieved (50% and 87%). CREL 2014. [Annual Progress Monitoring Report](#) Winrock International

A. Emerging Messages

Current perceptions of CSA

Bangladesh is considered by some to be the ‘climate adaptation capital of the world’³⁷ Hence, many CSA-related activities are already being advanced in Bangladesh, although such efforts are not necessarily considered as being so. This perception is based on reviews of USAID and GOB documents and discussions with (i) Mission staff, (ii) implementing partners of *Feed the Future* projects and (iii) administrators of GOB agricultural extension. Likely explaining a relatively advanced level of CSA effort is relatively long history of climate challenges and numerous foreseen needs.

The relatively new term of CSA is not always well-known. While CSA-related *technologies and practices* are typically perceived as “traditional agricultural development” or “conservation agriculture”, they typically address important climate challenges. CSA was not intentional but it just happened (according to CSISA). Productivity and adaptation are key priorities. During meetings, mentions of tolerance to salinity and waterlogging, intensification of cereal crops, efficient use of fertilizers, diversification of agriculture and nutritious diets were common.

Other aspects of CSA such as *multi-institutional partnerships and planning* (MIPP) and *incentive mechanisms* are also being advanced. The above-mentioned CIP is a comprehensive national plan and living document based on a wide consultation process with over 900 stakeholders in Dhaka and the regions (including Government agencies, the private sector, farmers, academics, civil society, NGOs and Development Partners). Nevertheless, not all funding partners seem to be buying-in to the concept of it being a means to facilitate coordination and collaboration. This is likely not the fault of the effort itself but could be the result of prevailing mind-sets within some of the donor agencies.

Numerous Mission projects highlight good marketing governance. While CNFA focuses on inputs and CREL on management and outputs, the FFP projects address all aspects.

In addition to training for capacity building along entire value chains, many project *incentive mechanisms* employ micro-grants and asset transfers. Rotating credit schemes, a strength of Bangladesh development efforts, did not get much mention.

Highlight comments by Mission

CSA is key in Bangladesh, especially adaptation. Below are additional comments regarding both the current status and future plans for CSA-related activities.

Technologies and practices

- Basic agriculture technology development and dissemination emphasizes rice, though new salinity-tolerant varieties have challenges with farmer acceptance. Vegetable production represent an important diversification strategy for household diets and income. Such crops often grown on dikes.
- Urea deep placement (UDP) is perceived as CSA practice, having been promoted for years.
- Smaller-scale solar irrigation pumps are to open up irrigation to previously un-irrigated land.
- Next large project will address cropping systems and diversification.

³⁷ <http://www.rtcc.org/2013/04/23/bangladesh-focuses-on-adaptation-as-climate-fears-grow/>

- Mixing shrimp and rice is a possibility.
- More post-harvest support, including solar drying and improved cookstoves.

Incentive mechanisms

- Continuing investments in feeder roads and harvest storage / aggregation centers (with solar panels).
- Attempt to improve subsidy programs to promote balanced nutrient use and improved environmental stewardship as a result.

Multi-institutional partnerships and planning

- Environmental perspective not coordinated as an issue – ad hoc across different projects
- Although an agriculture-themed meeting occurs with World Bank and other donors, the topic of CSA is not addressed.
- For communications, GOB focuses on defense measures such as warnings rather than CSA. 10-day forecast for planning, especially with regards to cyclones and floods.
- Climate services use government meteorological department which is linked with agriculture. Nevertheless, the usefulness is questioned. Radio and TV announcements exist, but mainly for disaster warnings. In addition, reports are supposedly interpreted by farmers as being relevant to only the district center/capital so warnings are not always heeded.
- Timing of visit perfect, CCAFS findings can feed into 2016 USAID-Bangladesh strategy being advanced in September.
- Warnings of flood surges from upstream locations and better coordination w/ India.

Highlight comments by implementing partners

Technologies and practices

- CSISA
 - A key climate-smart activity is adapting germplasm to increased soil salinity. Three salinization causes identified: (i) less fresh water coming down the rivers, (ii) excessive groundwater pumping for irrigation allowing subsurface salt water intrusion to occur, and (iii) cyclonic events make sea water rise up into the floodplains.
 - In many cases, saline water is used for raising shrimp, which is much more profitable than rice – but riskier. Viable diversification responses are seen to be (i) adjusting the timing of planting and introducing saline-tolerant rice varieties for dry season, and (ii) providing sunflower, wheat and barley.
 - Alternate wetting-drying (AWD) does not always reduce water use. Fewer applications but requiring larger amounts of water. Moreover, since farmers pay for water seasonally, no incentive exists to change practice. Collective action would be required to change institutional rules. [Benefits of GHG mitigation not discussed].
 - Population stable in 2050. Would require 7t average yield up from 4.5 t today.
 - Need for faster turnover/release of new crop varieties.
 - Salinity-tolerant forage crops may also be introduced. Large-scale cultivation and use of forage needs more organization of animal industry. *Massena* legume is an option – found in salt marshes in Spain.
 - Need to improve record-taking by farmers that would improve management decisions.

- For the submersion tolerant rice variety, increasing education is needed so that farmers do not uproot the plant. It stays alive during the flood and recovers afterwards.
- Cold tolerance needed in northern (non ZOI) region of the country.
- CSISA – MI
 - New varieties of maize dominated by private sector, farmers get very good yields: 7 ton per ha (wheat 3 ton/ha).
 - Using of herbicides and agro-chemicals, USAID guidelines taken into account.
 - Farmers increasingly attracted to maize due to its profitability.
 - A problem exists with excessive N use on maize. As it is not a notified crop, no fertilizer guidelines are in place from the GOB.

Incentive mechanisms

- CSISA
 - Dissemination mechanisms: demonstrations and training. Working with Department of Agriculture Extension, local NGOs and some private sector partners too.
 - Post-harvest support: Producer marketing groups for maize; linking sunflower farmers to local oil press mills.
 - Bangladesh becoming health conscious. Given high levels of heart disease, sunflower oil could be part of a cultural solution. Diabetes also a problem in Bangladesh due to rice.
 - Maize is not registered as crop for consumption by humans in Bangladesh, although currently “hidden” within flours. To promote maize CYMMT brings experts from Mexico and India; also organizing events particularly with women. Policy change needed for widespread human consumption.
- CSISA – MI
 - Bangladesh is already largely mechanized for tillage, but few mechanized options exist for other types of farm tasks. The prevalent rice-rice system does not require a seeding mechanism or leveling/terracing, but labor availability is becoming a major challenge, especially with upland (non-rice) crops.
 - Working with IDE on value chain and market development. For machine dissemination, IDE is working with local dealers and manufacturers.
 - Farmers can recover their investment costs in 2 years, especially when provide service to neighbors. Many of the farmers can access bank loans.
- CNFA
 - A system of fertilizer favoritism exists. Regional quotas cause some areas to have insufficient supplies.
 - Few women apply to be agro-input dealers. To help overcome inherent challenges, women receive grant support for required training.
 - Overuse of pesticides: Farmers often apply every other day, especially high-value vegetables, and rarely believe extension people or scientists. They tend to believe those controlling supply, who try to sell him more products.

Multi-institutional partnerships and planning

- CSISA
 - Private sector involvement in breeding.

- Climate information obtained from CGIAR system.
- CSISA – MI
 - Working closely with BARI (Bangladeshi Agricultural Research Institute) for breeding
 - Working with government staff when speaking with communities.
 - Seed growers continue to face difficulties in obtaining seeds from government research institutes. Increased coordination and involvement of private sector would improve farmer access.
- CSISA – MI
 - Water table depleting by 0.8m every year in some areas. A government policy is moving winter season rice from north to south despite groundwater being affected by salinity.
 - Rice: Adding conservation agriculture practices and mechanical transplanting did not bring substantial benefits.
 - No documentation generated from climate change discussions with farmers, who aware of rainfall and temperature change. Also, frequency of hail and regular storms increasing.
- PRSSP
 - Mixed messages on the adoption, for example:
 - UDP early high rates of adoption but have recently slowed.
 - CSISA adoption very low but they continue.

Other comments

- CSISA
 - A CSISA perception is that FTF pushes them to get the *number of farmers* outcome which is consistent with Mission focus on improving production; yet basic research is needed to achieve long term impacts.
 - CC mitigation via intensification with rice means that GHG emissions per unit decreases
 - A small grain rice variety requires less fertilizer. Given price premium, the same income is possible while producing less GHG.
 - Upland rice can be poverty trap, especially if farm is near a city where higher-value flowers or vegetables could be grown.
 - Early maturing varieties enable an intensification of entire agricultural system.
 - Recommended nitrogen fertilizer level for maize appears to be much too high: 250-300 kg/ha of N.
- GCC projects, such as CREL, are seen as a beneficial complement to *Feed the Future* efforts, especially with regards to NRM aspects of agriculture and climate change mitigation. Nevertheless, systematic coordination amongst the GCC and FTF projects was not apparent.
-

B. Future Opportunities & Challenges

The Bangladesh Mission has an extensive portfolio of FTF and other USAID activities. For upcoming programming, a series of questions face the team.

Soil fertility improvement instead of fuel? Households in rural areas obtain more than 90% of their household supply of energy from biomass fuels.³⁸ These traditional fuels consist of

³⁸ Bangladesh Bureau of Statistics. 2010, *Statistical yearbook of Bangladesh 2009*, Statistics Division, Ministry of Planning, Govt. the People's Republic of Bangladesh, DHAKA.

agricultural residues including rice husk and bran, straw, bagasse, jute sticks, animal wastes, firewood (i.e. stem and main branches). In many forest poor areas, households burn other tree products such twigs leaves, bark, roots, woody debris. Although 83% of households would prefer improved cooking stoves over traditional cooking stoves, few have them.³⁹ The viability and attractiveness of agroforestry systems, ranging from live fences and disperse planting to alley cropping to woodlots, can be explored. Benefits would also include the slowing of storm surges. Given the land tenure context, with 1/3 being sharecropped, collective action and policy measures may be needed.

Focus or expand? FTF-supported investments have generated a wide variety of impacts in the ZOI. Continuing such efforts in ZOI will help improve the reach of projects that benefit more farm families [aka, saturation level]. To meet the nutritional needs of another 90 million citizens who face some of the most severe impacts from climate change, improvements to agriculture with diverse nutritional foods needs to be achieved. CSA within FTF and other Mission programs could be enhanced by coordinating efforts with other multi-lateral, bi-lateral and national agencies. Although such a strategy runs a risk of diluting efforts and jeopardizing the achievement of impacts within the ZOI, improved links and partnerships with other organizations can increase knowledge exchange and impact in other parts of the country. Bangladesh has achieved a series of significant transformational changes with MIPPs – from increasing rice production during the dry season⁴⁰ and popularizing home gardens and diet diversification⁴¹ – to reducing its population growth rate and improving access credit to many rural and urban poor. How can CSA can build from these successes of behavior change communication?

Unbalanced success? Does a tradeoff arise between specialization and diversification? A lack of an adaptation/resilience target favors investments in specialization, yet could generate mal-adaptation in the short- and long- term. For example, at a technology & practice level, an effort may be considered CSA, but at development level it is not (e.g. rice over-specialization). Targeted international investments in staple crops and associated yield gains have helped crowd out

³⁹ Miah MD, Rashi HA, Shin MY (2009) Wood fuel use in the traditional cooking stoves in the rural floodplain areas of Bangladesh: A socio-environmental perspective. *Biomass and Bioenergy*. 33(1): 70-78.

<http://www.sciencedirect.com/science/article/pii/S0961953408001025>

⁴⁰ Winter season (*Boro*) rice accounted for less than 10% of the rice production at the beginning of the Green Revolution (1966–67). By 2008, however, investments in irrigation, fertilizer and germplasm enabled farmers to modify their production systems so that winter rice rose to 56% of total rice production. The rapid growth of irrigated dry-season rice farming grew to account for 90% of the increase in rice production in Bangladesh between 1988 and 2007. (Hossain M. 2010. Shallow Tubewells, *Boro* Rice, and Their Impact on Food Security in Bangladesh Chapter 9 in: *Proven Successes in Agricultural Development. A Technical Compendium to Millions Fed*. Spielman DJ, Pandya-Lorch R. Eds.) <http://www.ifpri.org/publication/proven-successes-agricultural-development>

⁴¹ Islam MR. 2012. *Crop Diversification in Cyclone Sidr Affected Southern Bangladesh*. FAO.

<http://www.researchgate.net/publication/272504975> ; Iannotti L, Cunningham K, Ruel MT. 2010. Improving Diet Quality and Micronutrient Nutrition: Homestead Food Production in Bangladesh. Chapter 20 in: *Proven Successes in Agricultural Development. A Technical Compendium to Millions Fed*. Spielman DJ, Pandya-Lorch R. (Eds.)

<http://www.ifpri.org/publication/proven-successes-agricultural-development> ; Shanmugasundaram S, Keatinge JDH, d'Arros Hughes J. The Mungbean Transformation: Diversifying Crops, Defeating Malnutrition. Chapter 14 in: *Proven Successes in Agricultural Development. A Technical Compendium to Millions Fed*. Spielman DJ, Pandya-Lorch R. (Eds.) <http://www.ifpri.org/publication/proven-successes-agricultural-development>

legumes and other crops to the detriment of CSA. Figure 3 shows the domination of rice from over 10M ha in 1964 to nearly 12M ha in 2013. Meanwhile, the area for any other crop is 1 to 2 orders of magnitude lower. Despite multiple benefits of cultivating maize and reported correlation with increased household food security in the Chittagong hill tracts,⁴² promotion of maize production and consumption will require a continuation of coordinated efforts ranging from policy change within agricultural extension and nutrition agencies of the GOB to recipe sharing, cooking classes and marketing.

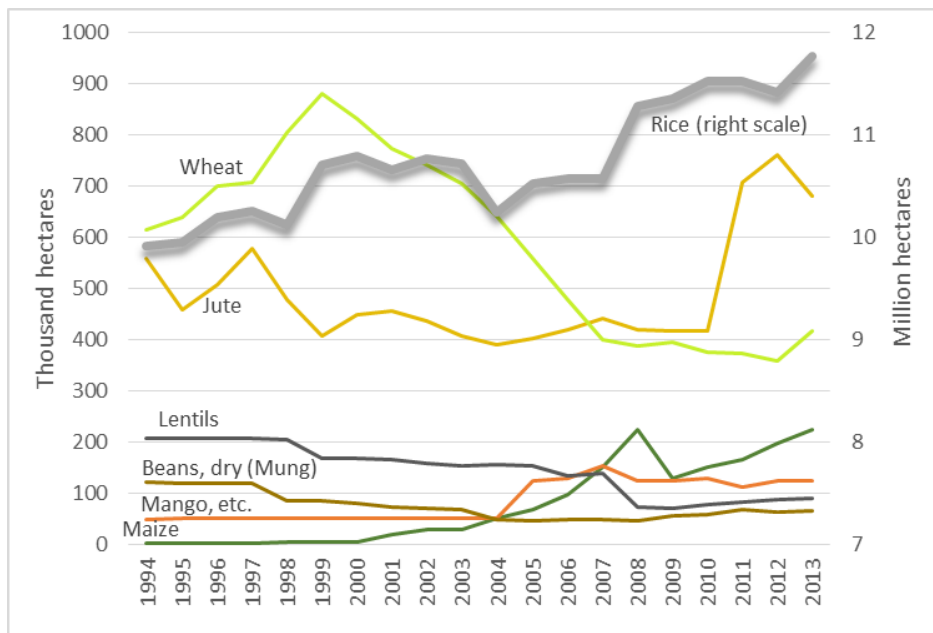


Figure 3. Trends in Bangladesh cropping (hectares planted 1994-2013)

Data: FAOSTAT.

An unintended perpetuation of rice dominance? Although aspects of CSA are somewhat explored within the broad baseline study conducted for FTF,⁴³ the PRSSP of IFPRI inquiry heavily emphasized rice, thus supporting its dominant role in Bangladesh agriculture. Such a focus is crowding out analysis of other important aspects of CSA, such as crop diversification, tree crops, animal feed and fuelwood sources. Moreover, the survey identifies the use of improved varieties in a broad category. According to some implementing partners, many improved varieties are years, even decades, old.

Missing partners? Although the current roster of CGIAR & international centers working in Bangladesh is substantial (AVRDC, CIP, CIMMYT, IFDC, IFPRI, IRRI, WorldFish), others could also provide important CSA-related technologies and practices. Each of the following centers can play a valuable role in diversifying and increasing the resilience of agriculture in Bangladesh:

⁴² Harat Ali M, Uddin Ahmed K, Hasanuzzaman M. 2010. *Consumption of Maize - An Alternative Food Habit to Improve Food Security in the Hilly Areas of Bangladesh*. Final Report CF # 10/08. Sher-e-Bangla Agricultural University. 129p.

⁴³ IFPRI 2013. *The Status of Food Security in the Feed the Future Zone and Other Regions of Bangladesh: Results from the 2011–2012 Bangladesh Integrated Household Survey*.

- CIAT (tropical forages for animal production and soil health and conservation),
- ICRAF (agroforestry for fuelwood, soil health and conservation),
- ICRISAT (legumes & pulses for soil health)
- ILRI (smallholder animal production).

Engagements could include diagnostics of existing agricultural systems with screening of biophysical limitations/opportunities, technology feasibility and participatory selection. Results from the electrosurvey reveal a variety of opportunities to increase the use of different CSA technologies and practices (Annex).

Time for a CSA tune-ups on M&E and IA? The PSSRP work has an agriculture productivity emphasis, with less attention being paid to adaptation and mitigation. The upcoming national survey could include more CSA-related inquiry supported by CCAFS. For wider-scale uptake of CSA, review and adjustments of the Bangladesh Climate Change Strategy and Adaptation Plan (BCCSAP) of 2009 may also be worthwhile. In addition, FTF impact surveys should distinguish difference between the use of new and old improved high-yield varieties.

Self-sufficiency or comparative advantage? A potential tradeoff arises from supporting specific agricultural products. Not only will comparative disadvantages persist in Bangladesh, many non-staple and luxury products are available on the global market. With ample global supplies of meat, milk and sugar, Bangladesh could re-think its agriculture and food strategy to emphasize productive, resilient and climate-friendly products.

Other questions: Does basic research on rice salinity tolerance exist off-the-shelf? Is Bangladesh using its “allotment of external funding” for developing a global public good?

5. Conclusion

In addition to the questions raised above and findings described within other section of the report, the Deep-dive assessment team highlights the following list of recommendations.

- Policy
 - Engage CCAFS, or another third party, to review the PSSRP population-based survey questionnaire in order to include CSA-related inquiry where appropriate.
 - Link outcomes of project M&E results and the upcoming population-based survey of IFPRI order to revise and substantiate the CIP. Progress on *food access, food availability and food utilization* can be used to identify “successful” interventions and gaps to be addressed. Such an effort will enable agricultural programming and investments to shift from an input-based to a results-based evaluation approach.
 - Continue to work with the government in reviewing current policy support mechanisms, especially fertilizer, mechanization, seed production, extension and capacity building and foods (especially maize) in order to explicitly include CSA concepts of productivity/profitability, adaptation, mitigation.
- Programming
 - Link activities of FTF with GCC for better management of water and forest/mangrove resources. GCC can work with FTF to

- overcome challenges in managing open-access resources (fresh vs. saline water) that affect the performance of the agricultural and food sectors.
 - Clarify land tenure and resource ownership, especially in tenant farmer situations, in order to improve incentives to make longer term land improvements with trees, bushes, legumes and grasses.
- Explore links/commonalities between efforts that foster the adaptive management of natural resources (GCC) with agriculture and market entrepreneurship (FTF).
- Systematically review the scope of current FTF and GCC projects and work with implementing partners in identifying topics for periodic information exchange and opportunities for joint-efforts both with current efforts and future programming. CCAFS as a “neutral” organization could assist in advancing this effort with Mission staff.
- Partnerships
 - Work with other donors to highlight CSA activities while increasing their funding and participation in the national policy process.
 - Work with more innovation labs and international centers in order to obtain greater diversity of agricultural activity.
 - Coordinate with effective national development organizations (BRAC and Grameen Bank) to increase the self-sufficiency of USAID interventions. Replace asset transfers with community-led rotating credit and repayment mechanisms.
 - Work with the national government on CSA messaging and leverage their ability to reach the entire country with their radio and extensionist network.

In sum, Bangladesh has an impressive array of climate-smart agriculture activities. To meet future needs, USAID can work with Bangladesh to enhance productivity, resilience and climate mitigation of the rural landscape. By fostering technical, institutional and policy advances, new transformational changes can continue to diversify the farm landscape away from rice, intensify production practices on smallholder farms, increase the planting and management of trees, and improve the diet of both rural and urban Bangladesh.

6. Annex

Reported results from electro-survey

CSA tech & practice	Scoring	Comments:																	
Fertilizer & residue inputs	4	<p>High adoption of CSA practices of improved <i>fertilizer and residue inputs</i> (brown cell) were reported. One practice <i>soil and fertilizer management</i> and improved <i>water management</i> (blue cell) were reported as being adopted by more than 33% of FTF farmers in the ZOI. Many practices of <i>crop, water and other CSA management</i> were being adopted by <33% of farmers. In addition, effort to reduce conversion of natural lands was also reported at that level of adoption</p> <p>Pilot activities were reported for many other practices of <i>crop, water, soil and fertilizer management</i> along with the reduction of post harvest losses (perhaps mistakenly). Although few improved <i>Livestock management</i> practices were known, many other CSA practices were already being practiced by FTF farmers.</p> <p>Legend</p> <table border="0"> <tr> <td>4</td> <td>= > 66%</td> <td rowspan="7"><i>With respect to participating FtF farmers</i></td> </tr> <tr> <td>3</td> <td>= 33-66%</td> </tr> <tr> <td>2</td> <td>= <33%</td> </tr> <tr> <td>1</td> <td>= pilot</td> </tr> <tr> <td>0</td> <td>= none</td> </tr> <tr> <td>U</td> <td>= unknown</td> </tr> <tr> <td>N</td> <td>= not applicable</td> </tr> <tr> <td>A</td> <td>= already common</td> </tr> </table>	4	= > 66%	<i>With respect to participating FtF farmers</i>	3	= 33-66%	2	= <33%	1	= pilot	0	= none	U	= unknown	N	= not applicable	A	= already common
4	= > 66%		<i>With respect to participating FtF farmers</i>																
3	= 33-66%																		
2	= <33%																		
1	= pilot																		
0	= none																		
U	= unknown																		
N	= not applicable																		
A	= already common																		
Nitrogen fertilizer efficiency	3																		
New irrigation mechanics	3																		
Irrigation efficiency	2																		
Stress-tolerant varieties	2																		
Other CSA activities	2																		
Avoided conversion	2																		
Reduced tillage	1																		
Other conservation ag	1																		
Organic matter management	1																		
Water saving in rice	1																		
New/different crops	1																		
Reduce post-harvest loss	1																		
Reduced energy use	0																		
Ruminant management	U																		
Reduced biomass burning	U																		
Grassland management	U																		
Biogas from manure	U																		
Wood lot establishment	N																		
Diversification w/ trees	A																		
Farmplot crop diversification	A																		
Weather/climate information	A																		
Other bioenergy	A																		
Crop harvest risk insurance	A																		