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Report No: PAD1146

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR125.2 MILLION
(US\$ 176.06 MILLION EQUIVALENT)

TO THE

PEOPLE'S REPUBLIC OF BANGLADESH

FOR A

NATIONAL AGRICULTURAL TECHNOLOGY PROGRAM - PHASE II PROJECT
(NATP-II)

May 14, 2015

Agriculture Global Practice
SOUTH ASIA

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CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2015)

Currency Unit = SDR
SDR 0.71103 = US\$1
US\$ 1.40642 = SDR 1

FISCAL YEAR
July 1 – June 30

ABBREVIATIONS AND ACRONYMS

AIF	Agricultural Innovation Fund	DPD	Deputy Project Director
APL	Adaptable Program Loan	DPP	Development Project Proposal
BARC	Bangladesh Agricultural Research Council	DP	Direct Procurement
BARI	Bangladesh Agricultural Research Institute	EMF	Environmental Management Framework
BBS	Bangladesh Bureau of Statistics	EOP	End of Project
BFRI	Bangladesh Fisheries Research Institute	ERR	Economic Rate of Return
BINA	Bangladesh Institute for Nuclear Agriculture	FAO	Food and Agriculture Organization
BLRI	Bangladesh Livestock Research Institute	FAPAD	Foreign Aided Project Audit Directorate
BMD	Bangladesh Meteorological Department	FEDEC	Finance for Enterprise Development and Employment Creation Project
BRI	Bangladesh Rice Research Institute	FG	Farmer Group
CAS	Country Assistance Strategy	FIAC	Farmers' Information and Advice Center
CCMC	Commodity Collection and Marketing Center	FM	Financial Management
CEAL	Community Extension Agents for Livestock	GAP	Good Agricultural Practices
CIG	Common Interest Group	GDP	Gross Domestic Product
CIP	Country Investment Plan	GMO	Genetically Modified Organism
CONTASA	Convertible Taka Special Account	GOB	Government Of Bangladesh
CRGP	Competitive Research Grant Program	HEQEP	Higher Education Quality Enhancement Project
DA	Designated Account	HOPE	Head of Procurement Entity
DAE	Department of Agricultural Extension (MOA)	Hortex	Horticulture Export Development Foundation
DLS	Department of Livestock Services	ICB	International Competitive Bidding
		ICT	Information and Communication Technology
		IDA	International Development Association

	(MOFL)		(WB Group)
DOF	Department of Fisheries (MOFL)	IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation	PCU	Project Coordination Unit
IRR	Internal Rate of Return	PCMU	Project Coordination and Management Unit
IUFR	Interim Unaudited Financial Reports		
JPSC	Joint Project Steering Committee	PDO	Project Development Objective
LEAF	Local Extension Agent for Fisheries	PIU	Project Implementation Unit
MOA	Ministry of Agriculture	PMP	Pest Management Plan
MOFL	Ministry of Fisheries & Livestock	PMU	Project Management Unit
MIDPCR	Market and Infrastructure Development Project in Chaorland Regions	PO	Producer Organization
		SCA	Seed Certification Agency
		SEPA	Procurement Plan Execution System
NAEP	National Agricultural Extension Policy	SMF	Social Management Framework
NARI	National Agricultural Research Institute	SORT	Systematic Operations Risk-Rating Tool
NARS	National Agricultural Research System	UNDB	United Nations Development Business
NCB	National Competitive Bidding		
OA	Operating Account	USAID	US Agency for International Development
OTM	Open Tendering Method		
PACE	Promoting Agricultural Commercialization and Enterprises		
PACT	Project for Agricultural Commercialization and Trade		

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Senior Global Practice Director:	Juergen Voegele
Practice Manager:	Martien van Nieuwkoop
Task Team Leader:	Patrick Verissimo

BANGLADESH
National Agricultural Technology Program – Phase II Project
(NATP-II)

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PAD DATA SHEET

Bangladesh

*Bangladesh: National Agricultural Technology Program - Phase II project
NATP-II (P149553)*

PROJECT APPRAISAL DOCUMENT

SOUTH ASIA

0000009056

Report No.: PAD1146

Basic Information			
Project ID P149553	EA Category B - Partial Assessment	Team Leader Patrick Verissimo	
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints []		
	Financial Intermediaries []		
	Series of Projects []		
Project Implementation Start Date 01-Sep-2015	Project Implementation End Date 31-Mar-2021		
Expected Effectiveness Date 01-Jul-2015	Expected Closing Date 30-Sep-2021		
Joint IFC Yes	Joint Level Complementary or Interdependent project requiring active coordination		
Practice Manager/Manager Martien van Nieuwkoop	Senior Global Practice Director Juergen Voegele	Country Director Johannes Zutt	Regional Vice President Annette Dixon
Borrower: Government of Bangladesh (MoFin/ERD)			
Responsible Agency: Ministry of Agriculture (MOA)			
Contact: Telephone No.:	Mr. Shyamal Kanti Ghosh 880-2-9540100	Title: Email:	Secretary secretary@moa.gov.bd

Project Financing Data(in USD Million)												
<input type="checkbox"/>	Loan	<input type="checkbox"/>	IDA Grant	<input type="checkbox"/>	Guarantee							
<input checked="" type="checkbox"/>	Credit	<input type="checkbox"/>	Grant	<input type="checkbox"/>	Other							
Total Project Cost:			214.00			Total Bank Financing:			176.06			
Financing Gap:			0.00									
Financing Source							Amount					
BORROWER/RECIPIENT							6.65					
International Development Association (IDA)							176.06					
US Agency for International Development (USAID)							7.43					
International Fund for Agriculture Development (IFAD)							23.86					
Total							214.00					
Expected Disbursements (in USD Million)												
FY	2016	2017	2018	2019	2020	2021	0000	0000	0000	0000		
Annual	10.00	20.00	40.00	52.00	52.00	40.00	0.00	0.00	0.00	0.00		
Cumul.	10.00	30.00	70.00	122.00	174.00	214.00	0.00	0.00	0.00	0.00		
Institutional Data												
Practice Area / Cross Cutting Solution Area												
Agriculture												
Cross Cutting Areas												
<input checked="" type="checkbox"/> Climate Change												
<input type="checkbox"/> Fragile, Conflict & Violence												
<input checked="" type="checkbox"/> Gender												
<input type="checkbox"/> Jobs												
<input type="checkbox"/> Public Private Partnership												
Sectors / Climate Change												
Sector (Maximum 5 and total % must equal 100)												
Major Sector				Sector		%	Adaptation Co-benefits %		Mitigation Co-benefits %			
Agriculture, fisheries, and forestry				Ag. extension & research		50						
Agriculture, fisheries, and forestry				Animal production		20						
Agriculture, fisheries, and forestry				Crops		20						
Information and communications				Information technology		10						
Total						100						

I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Rural development	Rural services and infrastructure	50
Trade and integration	Technology diffusion	25
Rural development	Rural markets	25
Total		100

Proposed Development Objective(s)

To increase the agricultural productivity of smallholder farms and improve smallholder farmers' access to markets in selected districts.

Components

Component Name	Cost (USD Millions)
Enhancing Agricultural Technology Generation	52.00
Supporting Crops Development	66.00
Supporting Fisheries Development	37.00
Supporting Livestock Development	47.00
Project Management	12.00

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes []	No [X]
Does the project require any waivers of Bank policies?	Yes []	No [X]
Have these been approved by Bank management?	Yes []	No []
Is approval for any policy waiver sought from the Board?	Yes []	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No []

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04		X
Forests OP/BP 4.36		X
Pest Management OP 4.09	X	
Physical Cultural Resources OP/BP 4.11		X

Indigenous Peoples OP/BP 4.10		X	
Involuntary Resettlement OP/BP 4.12			X
Safety of Dams OP/BP 4.37			X
Projects on International Waterways OP/BP 7.50			X
Projects in Disputed Areas OP/BP 7.60			X
Legal Covenants			
Name	Recurrent	Due Date	Frequency
1. Governance Accountability Action Plan (GAAP)	Yes	various	n.a.
Description of Covenant Carry out, in a manner satisfactory to IDA, all activities listed in the GAAP, as per the respective deadlines (see PAD, Annex 7)			
2. Joint Project Steering Committee (JPSC) and Project Management Unit (PMU)	Yes	Not later than one month after Effective Date	n.a.
Description of Covenant Establish and thereafter maintain, JPSC and PMU with mandate, terms of reference and resources satisfactory to IDA			
3. Project Implementation Units (PIUs)	Yes	Not later than two months after Effective Date	n.a.
Description of Covenant Establish and thereafter maintain, PIUs in each of the Implementing Agencies with mandate, terms of reference and resources satisfactory to IDA			
4. Project Implementation Manual (PIM)	Yes	Throughout implementation	n.a.
Description of Covenant Carry out the Project in accordance with the PIM			
5. Grants under Agricultural Innovation Fund (AIF)	Yes	Throughout implementation	n.a.
Description of Covenant Provide grants following the requirements of the AIF Operational Guidelines and Procedures applicable for each AIF window and enter into agreements with Eligible Beneficiaries under terms and conditions acceptable to IDA			
6. Independent AIF performance assessment	No	Sept. 30, 2017	Once
Description of Covenant Employ an third party entity to carry out an independent performance assessment of the AIF for consideration in the Mid-term Review			

Name	Recurrent	Due Date	Frequency
7. Safeguards compliance	Yes	Throughout implementation	n.a.
Description of Covenant Carry out the project following the requirements of the EMF, SMF, PMP and any required Assessments and Plans prepared in accordance with the EMF and SMF			
8. Monitoring and Impact Evaluation (M&IE)	No	Not later than 4 months after Effective Date	n.a.
Description of Covenant Employ an independent third-party M&IE entity to carry out: stakeholder analysis; impact evaluation baseline, midline and endline; ICT-based project M&E and reporting system			
9. Computerized Financial Management System	Yes	Not later than 12 months after Effective Date	n.a.
Description of Covenant Enhance project's system of accounting by operating a computerized financial management system to facilitate financial information and consolidation			
Conditions			
Source Of Fund	Name	Type	
USAID	USAID parallel co-financing	Effectiveness	
Description of Condition The USAID Co-financing Grant Agreement has been executed and delivered on behalf of the Recipient and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals under it (other than the effectiveness of this Agreement) have been fulfilled.			
IFAD	IFAD joint co-financing	Effectiveness	
Description of Condition The IFAD Co-financing Loan Agreement has been executed and delivered on behalf of the Recipient and IFAD and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals under it (other than the effectiveness of this Agreement) have been fulfilled			
IDA	Project Implementation Manual	Effectiveness	
Description of Condition The PIM has been adopted by all the Implementing Agencies in a manner satisfactory to the Association			
IDA	AIF Operational Guidelines and Procedures	Disbursement	
Description of Condition No withdrawal shall be made under any of the funding windows for the Agricultural Innovation Fund (AIF) unless the Operational Guidelines and Procedures for AIF-1/CRG, AIF-1/PBRG, AIF-2 and AIF-3, have been submitted by the Recipient to the Association, in a manner satisfactory to the Association.			

Team Composition			
Bank Staff			
Name	Title	Specialization	Unit
Jock R. Anderson	Consultant	Agricultural Innovation Systems	GFADR
Mohammed Atikuzzaman	Financial Management Specialist	FM and Disbursement	GGODR
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Rohan G. Selvaratnam	Operations Analyst	Project Costing	GPSOS
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Patrick Verissimo	Lead Rural Development Specialist	Team Leader	GFADR
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Claire Bilski	Gender & Poverty Consultant, IFAD	
Robert Delve	IFAD	Rome
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Anton Glaeser	Agriculture and Extension Specialist, FAO/IC	Rome
Karl Morteo	ICT Specialist, FAO/CIO	Rome
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Marimuthu Swaminathan	Livestock Consultant, FAO-CP	

I. STRATEGIC CONTEXT

A. Country Context

1. **Building on its remarkable social and economic performance over the past 20 years, Bangladesh aims to become a middle income country by 2021; to achieve this will require among others that the Government of Bangladesh (GoB) overcomes considerable challenges in agricultural development and rural economic growth.** The country's annual GDP growth averaged about 6 percent between 2000 and 2013, accompanied by a decline in the national poverty headcount rate from 48.9 percent to 31.5 percent over the first decade of the century, effectively lifting some 16 million people out of poverty. Bangladesh, a country of over 160 million inhabitants, has also made noteworthy gains in education and health, and is well set to achieve most of the MDGs. Despite these gains, Bangladesh remains a poor country, with a 2013 GDP per capita of some US\$1,000, and is regularly hit by natural disasters that severely impact the economy, disproportionately affecting the infrastructure and agriculture sectors, as well as vulnerable groups. Further, nutrition outcomes have not kept pace with the progress achieved with most social and economic indicators.

2. **Bangladesh remains a predominantly agricultural country and growth and development achievements in rural areas must be brought on par with those in urban areas.** Agriculture occupies some three-quarters of the scarce land space of the country and supports the livelihoods of the majority of the population. While overall poverty has significantly declined over the last decade, the poverty headcount in rural areas (still around 35 percent) has not declined as fast as in urban settings; moreover, the proportion of people living in extreme poverty in rural areas is still three times higher than in urban areas. The contribution of agriculture to the country's economic output has declined over the past decade, but crops, livestock, forestry, fisheries still combine for 17 percent of GDP. Moreover, with some 67 percent of the population living in rural areas and over 43 percent of the country's total labor force engaged in agriculture, achieving further economically, socially and environmentally sustainable economic growth and poverty reduction will require policies and investments conducive to lasting transformational changes in rural areas – including through technological innovation in agriculture.

B. Sectoral and Institutional Context

3. **To eliminate the country's extreme poverty by the year 2030 and to promote shared prosperity for the poorest 40 percent, agriculture¹ must continue to grow (in ways that are sustainable and adapted to climate change) and rely on a more diversified production base.** Poverty reduction in rural areas depends crucially on growth in agricultural productivity, which is driven by investment in infrastructure, generation of new or improved technologies adapted to changing climate, and their adoption by farmers and other supply chain actors (e.g., processors). Sustainable intensification and diversification of agriculture through technological change requires an efficient and productive national agricultural technology system, comprising agricultural research (technology development and refinement) and agricultural extension (technology dissemination and adoption). This needs to be supported by appropriate value addition and market linkages through smallholder participation in emerging/established commodity supply chains for

¹ Unless otherwise indicated, the term “agriculture” used in this document refers to the crop (including horticulture), livestock, and fisheries sectors.

higher value agriculture. To achieve these strategic goals, the GoB has been seeking the support of development partners such as the Bank, IFAD and USAID to develop and finance activities aimed at boosting agricultural production through productivity enhancement and at increasing smallholders' income.

4. **In Bangladesh, while the performance of the NARS has been impressive in contributing to food security (particularly with rice), research in some key sub-sectors (e.g., livestock, fisheries) has yet to reach its potential in terms of releasing a sufficient stream of useful innovations** (including a range of new climate-smart technologies for production and post-harvest). The extension system has still extremely limited reach into the myriad communities of the nation (particularly for the fisheries and livestock subsectors where local-level public extension workers are absent), and worse, hardly communicates with the public NARS, or the relevant private and non-government entities also engaged in technological advance. The national agricultural technology system is far from exploiting the systemic interactions that should drive it to success; moreover, insufficiencies pervade the system both within the subsystems, the all-too disconnected and in some instances less than strong elements of the NARS. Also, public-private links are largely absent, and links between research entities public and private with the higher education sector are sparse and severely underexploited. The proposed project will seek to overcome some of the key constraints to increasing the efficiency and performance of the national agricultural technology system

5. **The World Bank, IFAD and USAID have long supported the promotion of agricultural technology and the delivery of extension services to farmers in Bangladesh.** NATP, which closed in December 2014, is a key milestone in this long history of development partners' engagement. NATP, co-funded by IFAD, had been designed as a first operation in support of a national program whose medium-term objective is to *increase income and reduce extreme poverty and hunger by improving agricultural productivity and the performance of the national agricultural technology system*. NATP has indeed achieved some such gains by increasing efficiency and effectiveness of the agricultural research and extension systems (see Annex 12 for more on achievements and lessons learned from NATP), but there is yet much to be done to broaden and deepen such needed gains, as well as to add greater value to the output of the agricultural sector by strengthening its commercialization.

6. **A key lesson learned from the implementation of NATP is the need to look beyond productivity increases and focus as well on facilitating market linkages to ensure sustainability of farmer groups and in particular of producer organizations.** Smallholders in Bangladesh are generally poorly integrated into post-harvest agricultural value chains, resulting in a large gap between the commodity value received by farmers and the ultimate retail value of these products (raw or transformed). Principal contributory factors to the limited price pass-through include, among other things: inordinately lengthy supply chains with multiple links/intermediaries, logistical challenges; poor linkages among chain participants and high information asymmetry; postharvest deterioration. The sector also suffers from food safety concerns that limit markets. GoB is committed to addressing these challenges and is gradually augmenting its food-security/yield-gap focus with a value-gap focus through facilitating improvements in smallholder farmers' access to markets.

7. **Agricultural technology is prominently featured in the GoB's donor supported 2011 Bangladesh Country Investment Plan, CIP Program 1: *Sustainable and Diversified Agriculture through Integrated Research and Extension*.** The National Agricultural Extension

Policy (NAEP, 2012) and the Bangladesh Agricultural Research Council Act (BARC, 2012) provide the sector policy framework for the proposed NATP-II. NAEP advocates *inter alia* the development of decentralized, integrated, demand-driven agricultural research and extension services. Support is now required for the Department of Agricultural Extension (MOA) and the Department of Fisheries (MOFL) towards achieving the strategic objectives of the NAEP and the National Fisheries Strategy, respectively, and for the Department of Livestock Services (MOFL) for the completion of its respective strategy/policy. The 2012 BARC Act aims at fostering the coherence of research activities conducted by the twelve NARS institutes, making BARC responsible for the allocation of resources among the NARS institutes and for the approval of the institutes' research programs. Implementation of the BARC Act remains a challenging process and requires additional financial and technical assistance. Further, there are some significant differences in the institutional capacity and performance among the various NARS institutes (with livestock and fisheries lagging behind), and the project is expected to strengthen the research agenda and outcomes for livestock and fisheries given the increasing importance of these sub-sectors for rural economic growth, livelihoods and human nutrition.

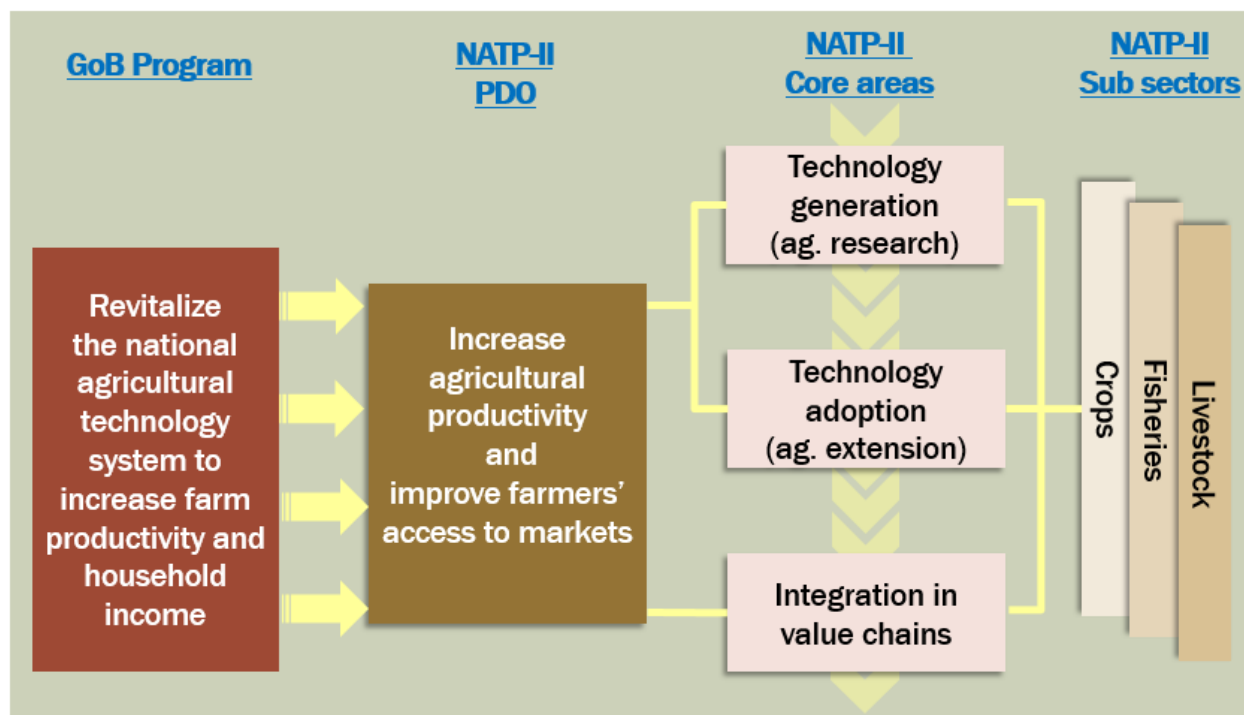
C. Higher Level Objectives to which the Project Contributes

8. **NATP-II will support GoB's strategic priorities in agriculture, i.e., increasing production, achieving food security, supporting adaptation to climate change, and enhancing nutrition through safer and more diversified food.** It will also contribute towards the World Bank's corporate strategic goals of eradicating extreme poverty while promoting shared prosperity. As depicted in the figure below, the project supports a broader GoB program aimed at increasing food security and agricultural production through a revitalization of the national agricultural technology system; to that effect, NATP-II will support the decentralization processes already underway for agricultural research and extension services. The overarching principle of the proposed project is to promote a more demand-driven approach to improvement of agricultural technology and modernization of on-farm practices that takes into account the growing demand from end-consumers for safer food, as well as the needs of farmers for more diversified production. NATP-II will also directly contribute to the objective of the GoB Master Plan for the Development of Agriculture in the Southern Delta region.

9. **Agriculture has long occupied a central place in the Bangladesh development agenda and in the CPSs of the WBG.** In the CPS for FY11-14 (subsequently extended to FY15), agriculture is highlighted in Pillar 3, *Vulnerability, Adaptation and Inclusion*, although the sector also contributes to growth (Pillar 2), and benefits from initiatives designed to improve governance (Pillar 4). As the CASPR (Report No. 73983-BD) of November 20, 2013 notes concerning Pillar 3 Outcome 3.1 on Agriculture and Food Security, program implementation has been ramping-up and is showing significant improvements in agricultural productivity as measured in crop and livestock performance. Recurrent natural disasters and deficiencies in technology remain the basic threats to improvements in agricultural production, and are therefore the focus of Bank interventions in the sector. IFC, with financing from the Pilot Program for Climate Resilience, is also assisting by supporting the climate resilience of agribusiness companies and their supply chains, and is exploring availability of low-cost housing and livestock protection structures in flood-prone coastal areas. A proposed follow-up to NATP was retained in the revised CPS for FY15 implementation.

10. NATP-II is fully aligned with the three strategic objectives of IFAD’s results-based Country Strategic Opportunities Program: (i) the livelihoods of poor people in vulnerable areas are better adapted to climate change; (ii) small producers and entrepreneurs benefit from improved value chains; and (iii) marginalized groups, including poor rural women, are economically and socially empowered.

Figure 1: Project overview, objective and overall context



II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

11. The development objective of this project is to *increase agricultural productivity of smallholder farms and improve smallholder farmers' access to markets in selected districts.*

12. NATP-II will contribute directly to the Ministry of Agriculture’s (MOA) and the Ministry of Fisheries and Livestock’s (MOFL) priority of increasing farm yields and diversifying agricultural production by improving agricultural research and extension. Given the sector’s high vulnerability to climate shocks and the diversity of agro-climatic zones, improving the agricultural technology system of Bangladesh will need to: (i) be embedded in the country’s **adaptation to climate change** agenda with a focus on generating and diffusing climate-smart agricultural technologies and good agricultural practices adapted to the different agro ecological systems across the country, and (ii) take into account the social fabric and **gender** dimension in rural areas.

13. NATP-II will achieve the PDO: (i) by **strengthening the capacity of the NARS and the extension services to generate and diffuse agricultural technologies aimed at increasing farm productivity and reducing post-harvest losses**; and (ii) by **promoting the sustainability of existing and newly created farmer groups and producer organizations by facilitating their**

linkages with markets. Sustainable intensification and diversification of agriculture through technological change requires an efficient and productive national agricultural technology system, comprising agricultural research (technology development and refinement) and agricultural extension (technology dissemination and adoption). This needs to be supported by appropriate value addition and market linkages through the strengthening of supply chains to generate higher incomes from agriculture. To that effect, NATP-II will continue supporting agricultural research and extension, and have a stronger focus than the previous project on market-oriented production, and on the participation of smallholders in markets.

B. Project Beneficiaries

14. **Primary project beneficiaries will be smallholder farmers (i.e., small, marginal and landless farmers).**² In compliance with Government policies and strategies, the primary target group for NATP-II will be smallholder farmers, with special emphasis on women. Smallholder farmers account for over 90 percent of the country's rural population and make up for the vast majority of the country's poor. It is estimated that over 1 million farming households will directly benefit from project activities, including from improved extension services, stronger linkages with research, on-farm demonstrations of new technologies, capacity enhancement through training and skills development, as well as from co-funding productive assets. Based on previous experience, significant spill-over effects and knowledge transfer to farmers not members of groups supported by NATP (the Common Interest Groups, CIGs) can be anticipated, and therefore all members of the supported farming communities will potentially benefit from the technologies generated, the improved extension services provided, as well as from the market linkages developed.³ Overall, up to 3.0 million farmers in the project area are expected to benefit from NATP-II.

15. **The project will promote gender mainstreaming and women's empowerment to ensure that a significant proportion of direct beneficiaries are female.** Building on the Bank's and IFAD's experience under NATP, at least 35 percent women participation in CIGs will be targeted. A gender assessment carried out by IFAD, the main measures to facilitate women empowerment and their participation in project activities have been identified as follows: (i) tailored extension services to address women's mobility issues and specific needs; (ii) activities specifically targeting women, including home gardening, goat rearing, and poultry farming; (iii) mobilization of women CIGs; (iv) promoting women's leadership through female lead farmers, and (v) targeted efforts to promote women's participation, including in farmer field days, exposure visits, training events, CIG and PO membership. Furthermore, a gender-sensitive allocation of resources from NATP-II's Agricultural Innovation Fund (AIF) for matching grants supporting the implementation of micro-projects for women and women CIGs will be a key instrument in empowerment of women (and more generally, social inclusion).

16. **Other direct project beneficiaries include extension workers, agricultural researchers, and to a lesser extent, rural entrepreneurs.** Since the project will facilitate access to market, project beneficiaries will also include traders, processors, local entrepreneurs, value-adding SMEs and agribusiness companies, to the extent that they provide clear opportunities to **promoting shared prosperity** for the farmers targeted by NATP-II (e.g., purchase of farmers'

² Smallholder farmers are classified by land ownership as follows: Small (1.5-2.5 acres); Marginal (0.5-1.5 acres); Landless (0.5 acres and less).

³ The NATP Impact Assessment (2014) confirms that for every CIG adopter, 2.7 non-CIG farmers on average adopted technologies promoted by NATP.

commodities, delivery of extension and financial services, contract farming arrangements, and others). Public extension staff as well as local extension agents will also directly benefit from the project through training, equipment, and where applicable, from the delivery of fee-based services to local farmers. Finally, agricultural research providers will benefit from this project through the financial support to be provided to research programs, the improvement of research infrastructure and the development of human resources in research.

C. PDO-level Results Indicators

17. Progress regarding PDO achievement will be measured through the following indicators:
- (a) **Farm Productivity: Increase in the yield of selected agricultural commodities.** This indicator will monitor the annual yields of key commodities (selected from crops, fisheries and livestock) in the new NATP-II areas; this indicator will show how the yield-gap has narrowed over the lifetime of the project with farmers' adoption of new technologies and good agricultural practices. Average yield increase expected ranges from 14 to 100 percent.
 - (b) **Market Access: Volume of agricultural commodities sold annually through new structures/arrangements promoted by the project.** This indicator will inform about the improvement in the participation of smallholder farmers in markets. It will measure the throughput marketed via commodity collection points, rural markets, contract farming and other new arrangements facilitated by the project. This indicator can also help determine project impact on farm income. An end-of-project aggregate volume of over 21,000 tons is targeted.
 - (c) **Project beneficiaries: Direct project beneficiaries.** This indicator will measure the cumulative number of farmers who are members in Common Interest Groups (CIGs), and report on the share of female members. It is expected that at the end of the project, NATP-II will have directly supported over 1 million farmers (of which at least 35 percent are female).

III. PROJECT DESCRIPTION

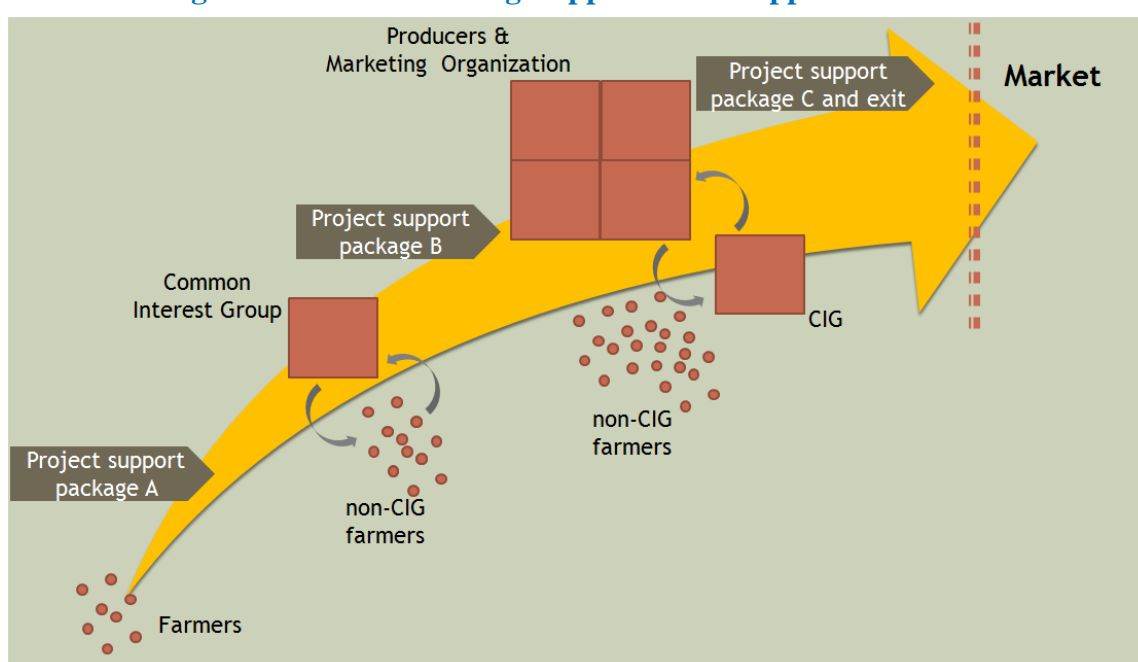
18. NATP-II will cover 57 of the country's 64 districts and span a broad range of agro ecological zones across Bangladesh. The project will be implemented over a six-year period in up to 270 of the country's 493 sub-districts (or *Upazilas*);⁴ this includes 107 *Upazilas* already covered under NATP, plus up to 163 new *Upazilas*. New *Upazilas* have been selected following the multi-criteria approach successfully applied under NATP (including poverty incidence, high prevalence of marginal farmers, agro ecologically stressed areas); Annex 13 includes a listing of NATP-II *Upazilas* and applied selection criteria.

19. NATP-II's dual field-level strategy will deepen the interventions initiated by the previous project in existing *Upazilas* (vertical scaling up) and expand the geographic coverage to include new districts and *Upazilas* (horizontal scaling up). At field level, the project will develop and implement comprehensive support packages for CIGs, public and private extension workers, and rural entrepreneurs. At community level, CIGs are the main interlocutors for all

⁴ Some NATP-2 research activities will also be implemented in other *Upazilas* as well.

NATP-II field activities. A differentiated approach in NATP-II support to farmer groups (CIGs) will be required to address the differences in needs, maturity and performance levels that exist between over 20,000 1st generation CIGs established under NATP, and over 21,000 2nd generation CIGs to be formed under NATP-II.⁵ It is expected that most 1st generation CIGs will be further up in the “NATP-II development path” depicted in Fig. 2, than the 2nd generation CIGs. NATP-II will also promote spillovers between members of NATP CIGs and non-CIG farmers (e.g., for technology dissemination), support the development of sustainable and inclusive market-oriented producer organizations (POs), and adopt a **gradual phasing-out** of project support for mature and sustainable CIGs. In working at the CIG level, NATP-II will give particular attention to homestead gardening, poultry farming and goat-rearing CIGs to address this aspect of the **gender** dimension in agriculture and contribute to improving **nutrition** at household level.

Figure 2: NATP-II strategic approach for support to farmers



20. **To contribute to the project objectives and help in scaling up previous achievements, NATP-II implementation will rely on a comprehensive program of training activities; this will be implemented at various levels and cover skills development, knowledge sharing and learning.** Training is one of two core pillars of the NATP-II implementation strategy to promote technology transfer and knowledge sharing, in particular for field-level stakeholders (e.g., CIGs and POs, extension workers, lead farmers, and others). The project will rely on a needs-based, customized **Training-of-Trainers** approach and introduce the use of ICT for an efficient and ‘as needed’ access to knowledge. Training packages will be differentiated between stakeholders in NATP and in new *Upazilas*. While 2nd generation CIGs will receive ‘basic’ farm and group training on group formation, group management and governance, innovative production and post-harvest technologies and good agricultural practices, 1st generation CIGs will be introduced to newly

⁵ The rating system developed under NATP to assess CIG performance will be reviewed in light of the introduction of AIF-2. There is a need to streamline the CIG performance criteria and ensure that the readiness of CIGs to manage grants is taken into account when rating CIG performance.

emerging farming technologies as well as non-farm specialized training (e.g., savings management, financial literacy, simplified procurement, collective marketing, nutrition, food safety, and more), as well as receive, where needed, refreshers on elements of the basic package.

21. To provide the financial resources that will be needed to scale up NATP achievements, the project design includes – embedded in the different project components – an Agricultural Innovation Fund (AIF). The AIF is the other core pillar in NATP-II’s scale-up strategy; it aims at providing grant funding for eligible research and sub-project proposals to be implemented by potential project beneficiaries. The AIF includes three funding windows: (i) AIF-1 (USD24 million) will promote agricultural technology generation through grants for research providers; (ii) AIF-2 (USD15 million) will promote the adoption of innovative technologies generated by the research community, through matching grants for the CIGs; and (iii) AIF-3 (USD4 million) will support private operators with the development of business alliances with POs and market opportunities for farmers, as well as with the provision of relevant services to farmers, through matching grants for rural entrepreneurs. The share of the grant recipient to AIF-2 and AIF-3 grants will be regularly reviewed and might be subsequently adjusted. NATP-II will use calls for proposals, scientific and technical peer reviewing and transparent selection mechanisms for the allocation of all grants under the AIF. Disbursement of AIF grants will be subject to the development of **AIF Manuals of Operational Guidelines and Procedures** acceptable to the Bank.⁶ Additional information on the AIF is provided in Annex 8.

A. Project Components

22. The project design for NATP-II takes into account some of the shortcomings identified under NATP and reflects the integrated approach required to achieve the PDO. NATP-II includes a foundational component that contributes towards decentralized, demand-driven agricultural research, as the foundation of an enhanced agricultural technology system. The project further includes three sub-sector components (crops, livestock and fisheries) which address a range of constraints to technology generation, to technology transfer and adoption at farm level, and to farmers’ access to markets. This approach is expected to lead to a better integration between agricultural research, extension, and production, an area regularly reported under NATP as requiring further improvement. The project also includes a component that covers cross-cutting activities as well as regular project management tasks.

23. Agricultural extension and advisory services will be supported across all three sub-sector components for crops, livestock and fisheries farmers. For crops, extension services will be primarily delivered by **public extension staff** from DAE. For fisheries and livestock, extension services will be delivered mainly by **private local extension agents** hired, trained and equipped by the project. The project will also support **farmer-to-farmer extension**, and to that effect, will identify and train a cohort of lead farmers (including for on-farm research and technology demonstrations). The project will strengthen extension services by investing in overcoming two major constraints to the performance of extension services: mobility and connectivity. NATP-II will focus on the sustainability of the extension system implemented in the project and support public and private extension workers by enhancing their skills and knowledge, by facilitating their access to and the diffusion of updated knowledge through the use of mobile tablets, by supporting their mobility with a bicycle (where required), by and providing them with office space (where

⁶ The GoB has submitted a request to the Bank for a Project Preparation Advance to be used among others for the preparation of the AIF Manual.

available) in the local Farmers Information and Advisory Centers (FIACs).⁷ NATP-II will also introduce an IT-based mechanism that tracks farmers' level of satisfaction with the extension services supported by the project (civic engagement).

24. Activities geared towards facilitating market access for smallholder farmers will be supported by NATP-II under the three sub-sector components. The line departments have identified a number of commodities around which a series of market access activities will be implemented (e.g., capacity enhancement of actors involved in the value chain, selected investments to support specific value-adding activities, promotion of CIG/PO alliances with private sector, and more). The final selection of commodities will be based on the outcomes of a value chain mapping/analysis to be carried out at the onset of project implementation, taking into account as well other criteria such as relevance for small and marginal farmers, in particular women. Infrastructure investments to promote smallholders' linkages with markets could range from setting up CIG or Producer Organization-run collection points for the washing, sorting, grading of specific commodities, to improving the physical infrastructure in a selected number of rural markets. Subject to the outcomes of an independent performance assessment of the 25 existing Commodity Collection and Marketing Centers (CCMCs) supported under NATP, the new project could consider limited investments for their improvement or replication to other location across the project area. Finally, matching grants from the AIF (3rd window) will contribute to linking smallholders to markets; AIF-3 will provide capital to rural entrepreneurs (including CIGs and POs) interested in developing value-adding activities relevant to the farming community (including the project's CIGs) and in establishing productive alliances with private sector.

25. Producer Organizations (POs) are key elements in facilitating sustainable access to markets for smallholders; POs will be established under all three subsector components. Based on lessons learned under the previous project, NATP-II will take a fresh look at supporting the establishment of crops, fisheries or livestock Producer Organizations (POs). POs will facilitate aggregate marketing of input and outputs, invest in increasing the bargaining power of producers, and promote increased access to information, technical service delivery and access to finances. POs will have a strong business orientation. Although POs are a key to the sustainability of the CIGs formed by NATP, their membership will be open to non-CIG farmers as well.

Component 1: Enhancing Agricultural Technology Generation (USD52 million)⁸

26. Component 1 will contribute to achieving the PDO by helping improve the performance of the national agricultural research system (NARS) through the support to agricultural technologies development and the strengthening of agricultural research institutions. Improving the performance of the agricultural research system is an essential ingredient for achieving higher farm yields and thus directly contributes to the PDO. NATP-II will support a demand-driven and market-oriented approach to agricultural research that takes into account: (i) the multiplicity of actors involved in agricultural technology generation; (ii) the need for increasing agricultural output per unit of shrinking arable land while adapting to climate variability and

⁷ Under NATP, 732 FIACs have been set up in facilities provided by the local *union* administration. An additional 967 FIACs are expected to be established under NATP-2, subject to availability of *union* facilities, for a total of 1,699 FIACs under operation by the end of NATP-2. Each FIAC hosts 3 DAE extension officers, 1 private Local Extension Agent for Fisheries (LEAF), and 1 private Community Extension Agent for Livestock (CEAL).

⁸ Annex 2 provides further details on the activities to be implemented under this component

longer-term climate change; (iii) the evolving domestic demand for diversified, safer and more nutritious food; and (iv) opportunities for supplying international markets with selected agricultural and food products. Component 1 will support this research agenda by enhancing the institutional capacity of BARC and the National Agricultural Research Institutes (NARIs), by funding research through competitive grants, and by helping to build human capital for agricultural research. The component will also finance a number of activities (including specific studies, policy notes, training, research-extension linkages, and others) in support of the implementation of the 2012 BARC Act approved under NATP.

27. To strengthen the institutional capacity of the NARS, NATP-II will invest in building the institutional and human capacity of the NARIs; to that effect, the component will fund technical assistance to BARC, BFRI and BLRI, as well as support human capital development through a limited number of funded doctoral studies for eligible candidates from the NARIs, BARC, DAE, DOF and DLS. The component will further support the enhancement of research infrastructure at NARI facilities (e.g., renovations, laboratories, equipment). Finally, the component will help in developing a comprehensive agricultural research and development web-based platform that will also serve as a research database and knowledge center for the country's agricultural technology system.

28. To support the development of innovative agricultural technologies, mobilize available research capacity, stimulate scientific creativity and promote efficiencies in the research system, AIF-1 will be coordinated by BARC and provide support through: (i) a **Program-based Research** initiative (AIF-1 PBRG) for comprehensive core research programs run by a NARI or led by another research provider; and (ii) a **Competitive Research Grant** (AIF-1 CRG) program for smaller research activities with recognized in-country public and private research providers. AIF-1 CRG will be designed taking into account potential synergies with similar research grant programs, e.g., under the Bank-funded Higher Education Quality Enhancement Project (HEQEP) or the Krishi Gobeshona Foundation (KGF).⁹

Component 2: Supporting Crop Development (USD66 million)¹⁰

29. Component 2 will contribute to achieving the PDO by increasing farm yields, diversifying agricultural production, and improving market linkages for smallholder farmers. To that effect, a comprehensive program of activities will be implemented under this component that will be geared at:

- (a) improving the outreach and quality of crop extension and advisory services by strengthening the skills of public extension workers from DAE, promoting ICT in agricultural extension services and supporting farmer-to-farmer extension;
- (b) developing farmers' skills to scale-up the dissemination of Good Agricultural Practices (GAPs) including those developed under NATP, as well as identifying technologies for a sustainable production of safer food;

⁹ Under NATP, KGF has been implementing the project's Competitive Grants Program and intends to pursue its applied research program outside NATP-2 with its own resources.

¹⁰ Annex 2 provides further details on the activities to be implemented under this component.

- (c) promoting farm and off-farm mechanization to increase crop productivity, farm output and diversification, as well as to increase efficiency in crop handling, reduce post-harvest losses and support processing;
- (d) facilitating stronger collaboration with the private sector for agro-business development on agro-processing, market access for smallholders, as well as for the establishment of machinery hire-services; and
- (e) strengthening institutions involved in the crop sector, through capacity development and selected investments in infrastructure (e.g., improving DAE's horticultural centers, developing a national seed testing laboratory with MOA's Seed Wing).

Component 3: Supporting Fisheries Development (USD37 million)¹¹

30. Component 3 will contribute to the PDO by promoting an integrated approach to achieve productivity, quality and output increases through technology transfer, as well as a better access to market opportunities for fish farmers. To achieve the PDO, NATP-II will provide support for the sustainable development of **inland culture fisheries** (small scale aquaculture ponds) and **inland capture fisheries** (open water fisheries in *beel* and *haor*). Under this component, the project will scale-up NATP Good Aquaculture Practices for the production systems prevailing in the project area, promote community-based fisheries management, support the participation of fisheries CIGs and POs in value chains, reinforce research-extension-farmers linkages and strengthen the capacity of fisheries institutions. NATP-II will further explore linkages with fishery activities under the on-going IFAD and USAID supported operations.¹² The high degree of economic opportunities and benefits offered by the currently available and underutilised aquatic areas for aquaculture development, as well as the **gender** and **nutrition** dimension of fisheries, will be a major consideration for NATP-II.

31. In addition to capacity enhancement and institutional strengthening, this component will support a number of investments supporting fish farming in the project area. These include investments for: (i) the promotion of specific fish production models involving improved fish varieties, (ii) the production of better quality fish seed, (iii) the introduction of appropriate fish feed, (iv) the application of relevant fisheries management tools, (v) the restoration of aquatic habitat, and (vi) the creation of more suitable market linkages for better access to markets and improved realization of value for the product. Through this component, NATP-II will also invest in promoting climate-resilient and innovative aquaculture technologies. This component will pilot a support scheme to two fisheries POs who will be helped with accessing district markets through productive marketing infrastructure (fish landing centers), comprehensive skills development through training-of-trainers, and support with further market linkages. In these landing centers, the project will fund the infrastructure; the POs, with support from AIF-3, will finance the equipment for processing the fish, and in particular for preserving it.

Component 4: Supporting Livestock Development (USD47 million)¹³

32. Component 4 will contribute to the PDO by promoting an integrated approach to achieve

¹¹ Annex 2 provides further details on the activities to be implemented under this component

¹² See also: *Haor Infrastructure and Livelihoods Improvement Project (HILIP)* for IFAD, and *Aquaculture for Income and Nutrition Increase*, for USAID.

¹³ Annex 2 provides further details on the activities to be implemented under this component.

productivity, quality and output increases through enhanced technology transfer, service delivery, as well as a better access for livestock farmers to markets. To that effect, NATP-II will focus on: (i) strengthening livestock institutions (including food and feed safety and quality, animal health), improving livestock extension services, and reinforcing the linkages between research, extension and livestock farmers; (ii) scaling up outreach programs to reach out to a larger number of farmers; and (iii) facilitating the participation of smallholder farmers in selected livestock markets. To achieve significant and lasting productivity development in the dairy and beef sector, NATP-II will focus on improving **farm management** (including animal nutrition, fodder production, animal health, improved animal husbandry practices, as well as marketing) and work towards strengthening the artificial insemination system in accordance with the national breeding programs. This component will also support better interaction between the Bangladesh Livestock Research Institute and the Central Cattle Breeding Station and Dairy Farm; particular attention will be given to the need for synergies between BLRI's dairy program and the herd improvement program of the Breeding Station.

33. Under this component, NATP-II will cover dairy farming, goat rearing, beef fattening, and poultry farming. Project activities will be implemented to help smallholders take advantage of emerging market opportunities. The component will also promote food and feed safety issues at various levels of the commodity value chain, particularly for meat and dairy products. Goat rearing and poultry farming are livestock activities that involve a large number of near landless farmers, in particular women. Opportunities are emerging for dairy farmers to take advantage of the increased demand from the dairy industry: IFC is facilitating the dialogue with dairy companies seeking to expand their operations and procure milk from NATP-II dairy CIGs. For goat and beef meat, the project will support community-level product aggregation, fund simple slaughter facilities, and promote market linkages through close collaboration with the private sector for further processing and marketing.

Component 5: Project Management (USD12 million)

34. Component 5 will: (i) ensure that the project is carried out in line with the provisions in the official project documents, in particular all fiduciary and governance aspects; (ii) establish liaison mechanisms between the Bank and the project, as well as between the project and the GoB, and (iii) coordinate the implementation of selected overarching project activities with the support of external technical assistance.

B. Project Financing

35. Total project costs are estimated to amount to USD214 million. Table 1 below provides an overview of the costs by component, sources of funding, and expenditure category. NATP-II is co-funded by an IDA credit (82.4 percent of the total costs of all components), an IFAD loan (11.1 percent), a USAID trust fund managed by the Bank (3.5 percent) and a GoB contribution (3.0 percent). **GoB contribution¹⁴ will be parallel co-financing** and fund 100 percent of all vehicles

¹⁴ As per Table 1, GoB contribution reported amounts to USD6.65 million (or 3 per cent of project costs). This is likely to be underestimated, as it does not include the hiring by DOF and DLS of *Upazila*-level extension staff, to be dedicated to NATP-2 and recruited for the duration of NATP-2 only – but fully funded through GoB resources. However, since this process is underway and has not yet been submitted to the Manpower Committee (Finance Division/MoF), the final number of staff that actually will be recruited is not yet known. Hence, the exact amount to be added to the reported GoB contribution is not yet available.

purchased for NATP-II, as well as civil servants assigned to work full time on the project, and other expenses. The legal documents governing the use of donor funds under NATP-II will include¹⁵:

(a) a Financing Agreement for IDA funds (signed between GoB and IDA); closing date September 30, 2021;

(b) a Loan Agreement for the **IFAD joint co-financing** (signed between GoB and IFAD); closing date September 30, 2021;

(c) a Grant Agreement for the **USAID parallel co-financing** (signed between GoB and IDA, acting as Administrator of the corresponding USAID Trust Fund); the USAID Grant will finance 100 percent of AIF-1 CRG and may not be used to pay taxes (if any, tax liability arising from project transaction with USAID TF shall be paid by GOB); closing date September 30, 2018.

36. NATP-II grant recipients will be required to provide cash contributions towards the matching grants (AIF-2: at least 30 percent of the sub project costs; AIF-3: at least 50 percent). Pending M&E reports on the AIF implementation, the cash contribution from grant recipients might be adjusted over the lifetime of the project, subject to the Bank's approval. Component 2 on Crops Development covers more than double the number of CIGs than Livestock and Fisheries combined and includes a number of cross sector activities (e.g., investments related to the establishment of new and upgrading of existing FIACs, institutional support to strengthen research-extension linkages), resulting in a relatively larger allocation of funds to this component.

37. A **Project Preparation Advance (PPA)** request for USD470,000 has been approved by the Bank in February 2015. The main objective of the PPA is to provide funding to GoB in order to carry out the following activities: (a) the development of the AIF Operational Guidelines and Procedures; (b) the development of the PIM; (c) the development of a matrix of districts to be implemented under the Project including the selection criteria of such districts; (d) the development of a procurement plan for the Project; (e) the preparation of updated rating of CIGs based on simplified criteria including the development of criteria to manage matching grants; (f) the updating of training modules for basic training to be provided to CIGs; (g) the carrying out of value chain scoping and mapping of selected commodities; (h) the carrying out of an assessment of the performance and sustainability of community collection and marketing centers; (i) the carrying out of Project awareness workshops; (j) the preparation of terms of reference and expressions of interest of selected consultants required for the Project; (k) the acquisition of financial management and accounting software including the provision of associated training; (l) the setting of a grievance redress mechanism at central, district and *Upazila* levels; (m) the preparation of bidding documents of selected goods and works required for the Project; and (n) the preparation of a matrix of specialized training to be provided to the common interest groups.

38. **Leveraging IFC support.** IFC contributed to project preparation by establishing linkages with ongoing and future IFC interventions, as well as leveraging IFC experience in fee-based advisory services to the private sector. In its project - Climate Resilient Agriculture and Food Security under Pilot Program for Climate Resilience, IFC will work with input suppliers and off-takers as well.

¹⁵ The IDA legal documents for NATP-II have been negotiated on May 11, 2015. Negotiations for the USAID TF Grant Agreement and the IFAD Loan Agreement are expected to be held jointly and completed before the end of FY15. Consequently, all legal agreements pertaining to NATP-2 are expected to be signed at the same time and before August 31, 2015.

IFC will explore opportunities to leverage NATP-II interventions by involving IFC's private sector clients in specific sites, crop supply chains and technologies. IFC also intends to provide advisory support to AIF-3's matching grants program for private operators in developing business and market opportunities for farmers, as well as in providing relevant private service to farmers. IFC can also lend support in the screening process for companies interested in AIF grants to ensure they comply with WBG due diligence standards. On seed policy and regulation, investment funding for infrastructure development through NATP-II will complement IFC's work with MOA and the South Asian Association for Regional Cooperation (SAARC) on improving the policy/regulatory environment and investment climate (e.g., new Seed Act and Plant Protection regulations, cold storage regulations). IFC's work may complement NATP-II interventions on seed testing laboratory, upgrading lab and testing facilities for plant quarantine, matching grant for cold storage infrastructure development and agro processing SMEs, and more. Moreover, IFC's advisory projects/activities targeted to farmers can include NATP CIGs as entry points.

39. Leveraging USAID support. In the Southwestern region of Bangladesh, USAID is currently funding the implementation of Aquaculture for Income and Nutrition (AIN), Agriculture Value Chain (AVC) and Agricultural Extension Support Activity (AESAs) projects. The solicitation bid for the Livestock Production for Improved Nutrition project in the same region is already out for implementation in 2015. In addition, USAID has been leading the coordination and collaboration between six other livestock projects in the Southwestern, North and Northwestern regions of the country that are funded by other donor agencies. With lessons learned from the implementation of these projects, USAID intends to work with the Bank and NATP-II in leveraging resources as well as in ensuring the coordination and collaboration of these ongoing USAID projects with the NATP-II PIUs of DAE, DOF and DLS so that the implementation of the sub-sector components is done in a synergistic manner that would guarantee the optimal outcome.

40. Leveraging IFAD support. IFAD has positioned itself in Bangladesh as a strong partner in terms of targeting and women empowerment. With projects such as the Market and Infrastructure Development Project in Charland Regions (MIDPCR), Finance for Enterprise Development and Employment Creation Project (FEDEC) and the upcoming Promoting Agricultural Commercialization and Enterprises Project (PACE), IFAD has also built strong capacity in promoting more commercial and remunerative livelihoods for small rural producers. The NATP-II design has benefitted from this expertise and the lessons learned. IFAD will continue to provide its strategic inputs throughout the project implementation.

Table 1: Overview of total project costs (top) and IDA withdrawal schedule (bottom)

Sources of funding		million US\$			
IDA credit	IFAD loan	USAID grant	GoB contribution*	Beneficiaries (matching grant)	Total**
176.06	23.86	7.43	6.65	6.50	214.00

* estimate based on 3% of project costs

** net of Beneficiaries contribution

Cost estimate		million US\$			
Comp.1: Research	Comp.2: Crops	Comp.3: Fisheries	Comp.4: Livestock	Comp.5: Project Mgt.	Total
52.0	66.0	37.0	47.0	12.0	214.00

Expenditure category		million US\$					Total
Goods, works, non-consulting services, consultant services, training, operating costs	GoB items (incl. vehicles, dedicated man-power, and others)	Agriculture Innovation Fund AIF-1 PBR	Agriculture Innovation Fund AIF-1 CRG	Agriculture Innovation Fund AIF-2	Agriculture Innovation Fund AIF-3	Project Preparation Advance	
163.88	6.65	16.57	7.43	15.00	4.00	0.47	214.00

Category	Amount of the Credit Allocated (expressed in SDR)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods (except vehicles), works, non-consulting services, consultants' services, training and incremental operating costs	99,550,000	88%
(2) Grants under AIF-1/PBRG	11,750,000	88% of the amount disbursed for a Grant
(3) Matching Grants under AIF-2	10,650,000	88% of the amount disbursed for a Matching Grant
(4) Matching Grants under AIF-3	2,850,000	88% of the amount disbursed for a Matching Grant
(5) Refund of Project Preparation Advance	400,000	Amount payable pursuant to Section 2.07 of the General Conditions
Total IDA amount	125,200,000	

C. Lessons Learned and Reflected in the Project Design

41. **NATP-II builds on a wealth of experience gained under the previous project; lessons learned from NATP implementation and its comprehensive impact assessment have helped shape the design of the new project.**¹⁶ The previous project design featured thematic components (i.e., research, extension, supply chain), which often resulted in a fragmented, less well coordinated approach to improving the agricultural technology system. NATP implementation support missions have regularly reported the need to further strengthen the linkages between technology generation, transfer and adoption. Several technologies developed at research level and tested in the field have never been scaled up and diffused through extension services (in particular farm equipment). This highlights the need for a much more integrated approach to technology planning, involving the CIGs (needs assessment), extension services and research institutes. To better respond to a demand-driven, decentralized, agricultural technology system, NATP-II adopts a more holistic approach with a design that includes three sub-sector components (crops, fisheries and livestock) anchored in a cross-sector research component. This design seems better aligned with the institutional landscape in which NATP-II is embedded, with sub-sector components coordinated by the respective line departments from both ministries involved.

42. **Implementation arrangements for NATP-II reflect the need for a less fragmented approach to project implementation and for achieving greater efficiency in fiduciary management.** Under the previous project, implementation arrangements were fragmented with 7 implementing agencies (6 PIUs and 1 PMU), often giving a sense of multiple projects being implemented under one umbrella. NATP-II is designed to consolidate these arrangements, with a view to strengthening the sectoral focus (crop, livestock, fisheries), buttressed upon strong cross-cutting thematic support from research, extension, and market access services.

43. **The design of NATP-II takes into account the feedback from the NATP beneficiaries for better access to market opportunities and to costlier agricultural technologies promoted.** NATP's impact assessment provides strong evidence of a widespread adoption of many of the low-cost technologies and GAP developed by the research providers and disseminated through public and private extension channels, in turn resulting in an increased production at household level and in on-farm diversification (e.g., adoption of higher-value market commodities). While marketing and supply chain development activities were piloted under a small separate component under the previous project, in NATP-II the market-orientation required for the sustainability of CIGs and POs is explicitly stated in the PDO and is designed as a cross sectoral dimension of NATP-II. Moreover, under the new project, the AIF has been introduced and includes a funding window (AIF-2) for matching grants dedicated to facilitating smallholders' adoption of technologies requiring more capital. Risk mitigation measures will accompany the matching grant programs, in particular CIG/PO training on financial literacy, simplified procurement, savings management, and more, making some of those groups potential bankable clients for financial institutions, in particular those engaged in a rural finance program/project (e.g., IFAD's PACE project).

44. **NATP-II is designed to address the significant gaps that have emerged at the end of the implementation of the previous project.** Gaps to be tackled by NATP-II are mapped to the following core areas :

¹⁶ See details in: *Impact Assessment Study of NATP*, NATP PMU, December 2013

- (a) in Research, the new institutional reforms enacted for improving effectiveness and efficiency in the management of agricultural research (as per the 2012 BARC Act) have not yet been operationalized, a process for which BARC still needs significant support. NATP-II will promote **strategic partnerships** and twinning arrangements with international research organizations to fill the gaps on research management at BARC and to develop technical and strategic skills at BFRI and BLRI.
- (b) in Extension, the CIGs have proved to be an effective framework for meeting some farmer extension needs and propagating extension messages – but the demand from the farming community for access to knowledge, innovative agricultural technologies, and market opportunities, remains largely unmet and a clear strategy for establishing **sustainable and inclusive POs** has been missing. This will now be taken up under NATP-II through appropriate technical assistance to DAE, DOF and DLS for developing and implementing a strategy for inclusive production and marketing POs.
- (c) in Food Safety: NATP supported some initiatives on **food safety**, such as Integrated Pest Management in horticulture (to reduce the use of harmful pesticides). In view of the rising public awareness and recent media reports on food safety in Bangladesh, NATP-II will build on the commodities selected to forcefully address major food safety issues, including through communication campaigns to producers, traders and processors. At field level, IPM technologies will be scaled up; at processing level, a close coordination with FAO's Food Safety Program and IFC's advisory services on phytosanitary certification will be sought to maximize the impact of specific investments.
- (d) in the use of ICT: ICT has been underutilized in NATP. NATP-II will mainstream ICT across the project, building on the enormous in-country ICT human resources and on existing local experience of the application of ICT to agricultural development (e.g. in the GAFSP-funded IAPP project or the multi-donor KATALYST project¹⁷). NATP-II will take an integrated approach to scale-up ICT in line with GoB's commitment to e-Agriculture under the *Digital Bangladesh – Access to Information* initiative led by the Prime Minister's Office. To that effect, NATP-II will mainstream ICT in agricultural research, extension and market access by utilizing the National Data Centre, connectivity through BanglaGovNet, provide an integrated ICT-based knowledge platform, support the development of agricultural mobile apps, and support the extensive use of mobile tablets at the touch points of beneficiary interaction (see Annex 9 for more details).

45. While strongly building on the lessons learned from the previous operation, NATP-II is taking into account the experience from similar projects in the country and across the region.

While NATP had little interaction during its implementation with other projects, NATP-II is designed to reach out to relevant operations and capitalize on their experience. The Bank's experience on matching grants for farmers and rural entrepreneurs with the Project for Agricultural Commercialization and Trade (PACT) in Nepal, visited by a GoB delegation during NATP-II preparation in December 2014, has helped shape the AIF. IFC's work with agribusiness and farmers, including under the Bangladesh Pilot Program for Climate Resilience (PPCR), as well as its advisory programs with MOA on the Seed Act revision and on upgrading the SPS certification process, have also been taken into account in developing NATP-II Component 2. Fisheries and livestock technologies successfully promoted under the Integrated Agricultural Productivity Project (IAPP) have been included in the NATP-II technology diffusion agenda, and further

¹⁷ See also: KATALYST (2012): *Making ICT work for Bangladesh Farmers*. Case Study #6 – The Katalyst Cases.

collaboration will be sought during implementation; the same applies for the USAID funded livestock and fisheries project under implementation in Bangladesh. In addition, a number of other operations will be approached prior to implementation start, e.g., the Higher Education Quality Enhancement Project (HEQEP) to explore potential to disseminate agricultural technologies generated under HEQEP Innovation Fund; the FAO program on national food safety to ensure complementary investments in lab facilities and explore joint training activities; and the Bank-funded agricultural competitiveness project in India for further experience on smallholder farmers' integration in agricultural value chains.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

46. **NATP-II will be implemented under the responsibility of the Ministry of Agriculture (lead implementing agency) and the Ministry of Fisheries and Livestock.** NATP-II is a project fully **integrated in the GoB administration** and project implementation is designed to promote the use of existing GoB structures at central level, and when available, at decentralized levels. Where institutional capacity is limited and special skills are required, the project will reach out to outside expertise, including international technical assistance and consulting services. A **Joint Project Steering Committee (JPSC)**, composed of senior representatives from the agencies under MOA and MOFL involved in project implementation, as well as representatives from other relevant ministries, the Planning Commission, the farmers and private sector, will provide overall strategic guidance, approve annual budget and activity plans, monitor overall implementation progress, facilitate interagency coordination required for smooth project implementation, and resolve any outstanding issues requiring higher level decision. Overseeing project implementation and coordinating among agencies will be delegated to a Project Management Unit (PMU).

47. **A PMU will be set up to oversee implementation of project activities, carry out day-to-day project management functions, facilitate coordination among components, and liaise with the World Bank on all project implementation related aspects.** The PMU will be headed by a full-time Project Director (PD) appointed and on deputation for the duration of the assignment; the PD will report to the JPSC. A Deputy Project Director (DPD) will also be appointed on deputation and on a full-time basis for the duration of the project. The PD and the DPD will come from two different ministries. The appointment of PD and DPD will be done by the relevant ministries and in consultation with the Bank, on the basis of ToRs acceptable to the Bank. The technical positions at PMU will be filled with individual consultants competitively recruited and subject to the Bank's prior review. The PMU will need to acquire the services of a limited number of high level technical specialists for cross-sectional work (preferably through a **technical assistance provider** with a national/international pool of experts for M&E coordination, gender promotion, project communication and public awareness, producer and marketing cooperatives, ICT solutions for agriculture, and research-extension linkages). Finally, in line with common practice adopted in other Bank-funded operations in Bangladesh, the PMU will hire the services of a **Monitoring and Impact Evaluation** consulting firm with international expertise, to design and coordinate the stakeholders' analysis and impact surveys, develop a comprehensive project M&E framework, process project data, and compile all implementation progress reports including an updated Results Framework. Before project effectiveness, the PMU will produce a **Project Implementation Manual (PIM)** acceptable to the Bank that details the operational, financial and administrative procedures of NATP-II. The PMU will also be responsible for the implementation

of Component 5.

48. **All other project components will be integrated in the corresponding line department (or agency); each department/agency will set up a component-specific Project Implementation Unit (PIU).** Under MOA, BARC and DAE will each set up a PIU for the implementation of Component 1 (Agricultural Technology Generation) and Component 2 (Crops), respectively. Under MOFL, DOF and DLS will each set up a PIU for the implementation of Component 3 (Fisheries) and Component 4 (Livestock), respectively. All PIUs will be headed by a full-time Director on deputation from the respective department/agency;¹⁸ the core PIU positions will be staffed with in-house personnel on deputation, complemented with openly recruited consultants (e.g., environment/social specialists, M&E). To coordinate the implementation of component-specific project activities, the PIUs will use – in a manner consistent with GoB and World Bank fiduciary requirements – project funds allocated to the respective components (including for covering operating costs). Project activities in the field will involve district and *Upazilas* administration staff and be coordinated (or carried out) at union level by extension staff from DAE as well as LEAFs and CEALs recruited by the project.

49. Using project funds, DOF, DLS and BARC will recruit **service providers** (e.g., international institutions, agro consulting firms, academia, or others) to deliver the technical assistance needed for strengthening their institutional capacity and supporting their PIUs with the implementation of component-specific activities. It has been agreed that the HORTEX Foundation, a public company under MOA, that implemented the pilot Supply Chain Management Component under NATP, will be reinforced accordingly with international consultants in order to further build its capacity and provide technical assistance in Component 2 under a Bank-approved **strategic partnership** arrangement with DAE (single source consultant firm contract).

50. Guiding principles for the AIF implementation arrangements are outlined in Annex 8.

B. Results Monitoring and Evaluation

51. **The multi-tier Results Monitoring and Impact Evaluation system developed for NATP-II takes into account the complex nature of the project that features various sectors and two distinct cohorts of beneficiaries (1st and 2nd generation CIGs).** The NATP-II Results Framework (see Annex I) includes a number of World Bank Core Sector Indicators as well as civic engagement indicators (beneficiaries' feedback). It will inform about the progress made toward achieving the PDO (i.e., agricultural productivity and market access) through a limited set of clearly defined PDO indicators: (i) *Increase in the yield of selected agricultural commodities*; (ii) *Volume of agricultural commodities sold annually through new structures/arrangements promoted by the project*; and (iii) *Direct project beneficiaries* (and share of actively engaged females). The Results Framework will further inform about progress made against a limited set of Intermediary Indicators. Whenever applicable, indicators are disaggregated to report on women, to capture the **gender** dimension of NATP-II. In addition to describing the Results Framework, the Project Implementation Manual will include a broader Monitoring and Impact Evaluation (M&IE) Framework, with additional intermediary outcome and output indicators. The RF indicators are thus a subset of the indicators that will populate the M&IE Framework.

¹⁸ In the event that a suitable consultant cannot be recruited for the position of PD and a staff from MOA is then recommended instead, the JPSC shall also recommend the PIU Director from either DLS or DOF to be the nominal NATP-2 Deputy Director.

52. NATP-II's Results Monitoring and Impact Evaluation system includes the following core elements: (i) a comprehensive beneficiary/stakeholders analysis covering a randomized selection of previous and new *Upazilas*, to be completed within the first year of project implementation (ii) a rigorous impact evaluation with baseline, midline and endline household and community surveys allowing for adjustments during implementation; (iii) an ICT-based project information management system (PIMS) based on an integrated platform for monitoring project implementation; and (iv) a reporting system with quarterly and annual project progress reports with data generated from the PIMS. In addition, the project will introduce ICT-based tools (e.g., e-scorecard) to, among other, capture beneficiaries' feedback (e.g., farmers' rating of extension services received) and assess changes in the performance of CIGs over time. The stakeholder analysis as well as the project impact evaluation will include a comprehensive focus on gender dimensions and poverty targeting.

53. Adequate human and financial resources will need to be allocated under NATP-II to properly implement the Results Monitoring and Impact Evaluation approach, assess the overall project performance, project impact, and fully carry out monitoring and reporting functions. In view of the limited M&E capacity prevailing with the implementing agencies, and to follow the common practice adopted in many other IDA-funded projects in Bangladesh, the bulk of the implementation of the Results Monitoring and Impact Evaluation system for NATP-II will be outsourced to a third-party M&IE specialized firm with international expertise. The firm will be hired by and report to the PMU; it will work in close collaboration with the PIUs for each component. The M&IE specialized firm will also be tasked with **developing M&IE capacity** in DAE, DOF, DLS and BARC. While the M&IE will be responsible for the Results Framework and the core elements of the system, the PMU and the PIUs will be responsible for day-to-day monitoring of project activities and implementation progress, and for data collection, processing and reporting on the indicators in their respective section of the M&IE Framework. Annex 3 provides further details on implementation arrangements for NATP-II project monitoring and impact evaluation.

54. A mid-term review of the project shall be completed before July 31, 2018.

C. Sustainability

55. To ensure the durability of the model for technology transfer and delivery of advisory services to farmers, NATP-II will promote pluralistic extension system that support various complementary elements (e.g., public extension staff, local private extension agents, lead farmers, FIACs, ICT connectivity, gender focus). In the absence of union-level extension staff from DOF and DLS, NATP-II will recruit, train, and equip additional private LEAFs and CEALs to provide advisory services to the farmers, and help implement farmer-to-farmer extension. The sustainability of CEALs, derived from the income generated from advisory and technical services provided to the livestock farming community, has already been demonstrated under NATP, and is further scaled up under this project. The potential for fee-based extension and technical services in fisheries (particularly open capture) appears more limited; NATP-II will give special attention in recruiting LEAFs who are successful fish farmers in the community and/or who are carrying out fisheries-related income generating activities (e.g., agro-input dealer or fish feed producers). The improvement of existing and the establishment of new FIACs – where administration

buildings are available at union level – will be coordinated by DAE¹⁹. FIACs, who host extension workers for crops, fisheries and livestock, will continue to operate after project closing. The performance-based approach to be introduced by NATP-II for agricultural extension will seek to ensure a high degree of satisfaction by farmers with technical and advisory services received by SAAOs, LEAFs and CEALs.

56. Improved access to knowledge, markets, market and price information, and financial services will help contribute to the sustainability of CIG and POs supported by the project.

A significant difference with the previous project is that NATP-II fully embraces a demand-driven, market-orientated approach which is required for the agricultural technology system to achieve higher performance levels. As smallholders adopt productivity-enhancing, post-harvest loss-reducing good agricultural practices and innovative technologies, access to markets for CIGs with commodities that meet market requirements on quality and quantity will become essential for the increase in farmers' income. To further increase smallholders' voice and economic strength in the selected value chains, NATP-II will establish Producer Organizations for CIGs *and* non-CIG farmers. In addition to the grant funding provided through the AIF to help build the farmers group's asset base, bankable CIGs and POs will be linked up with financing institutions involved in other programs/projects supporting access to finances (e.g., IFAD's new PACE project).

57. The sustainability of NATP-II outcomes will further be supported by the institutional capacity and skills development agenda of the project.

To support project implementation, the PMU will be hiring technical expertise in cross-cutting areas while the PIUs will hire service providers. The hiring is also intended to contribute to skills development and knowledge transfer to the line agencies in order to develop and strengthen their capacity, including in fiduciary aspects. NATP-II will thus contribute to empowering the line departments and building in-house capacity in technical areas covered by the project, as well as on more generic topics. However, while it is beyond NATP-II to address the staffing policy of the line agencies involved in the project, it is clear that long term benefits (to line agencies) of the knowledge transferred by NATP-II consultants will require more favorable staff hiring and retention policy, as well as other incentives, than is currently the case.

58. The sustainability of NATP-II achievements will require the political ownership of sector reforms underway and GoB willingness to further support the modernization of the agricultural technology system.

This will require: (i) GoB to deepen the reform process underway towards decentralized, demand-driven research and extension services, (ii) an adequate allocation of public funds on a sustained basis to enhance the agricultural technology system, and (iii) the preparedness of public institutions to fully embrace private sector participation in order to increase market opportunities for smallholders. The strategic and policy framework to sustain the reform process underway has been developed: MOA now needs to support the implementation of BARC Act approved under NATP. Similarly, DAE and DLS have developed advanced drafts of national extension policies that take into account lessons learned from NATP; these now need to be formally validated and endorsed – and then implemented. Both documents are directly aligned with the principles promoted under NATP-II and their implementation would directly contribute to the sustainability of the project achievements and provide the political clout for further scaling

¹⁹ Under the USAID-funded Agricultural Extension Services project, an MoU has been signed with DAE for the set up of 120 "Agricultural Extension Centers" in 4 *Upazilas* of the Feed the Future program area. Under DAE's leadership, close coordination between the two projects will be required to avoid duplication of FIACs and AECs in the same location.

up to other districts. Further, MOFL will need to implement their staffing plans and recruit technical specialists and extension workers at the *Upazila* and union level.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Systematic Operations Risk - Rating Tool (SORT)	
Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Low
OVERALL	Substantial

B. Overall Risk Rating Explanation

59. **The risk assessment for the proposed project uses the Bank’s new Systematic Operations Risk-rating Tool (SORT).** The risks considered are the risks to development results associated with the operation (as per the PDO and Results Framework): both the risks to not achieving the intended (positive) results pursued by NATP-II; and the risks of NATP-II causing unintended (negative) results. In addition, the assessment takes into account both the likelihood of the risk materializing, as well as the severity of its impact on the achievement of the intended results. The risk assessment in the SORT matrix above is based on *current residual* risk, i.e., after taking into account the impact of mitigation measures that have already been implemented; but not presuming any future additional mitigation measures, beyond those already in place.

60. **The overall risk for NATP-II not to achieve the PDO and targets is considered substantial.** Overall risk assessment and management is strongly derived from the lessons learned from NATP. For maximum ownership, the project is fully integrated in the existing administration and the project design aligned with the institutional landscape across MOA and MOFL. To accelerate the generation of agricultural technology (including climate-smart technologies) by public and private sector as well as to facilitate their adoption by farmers, a grant-based Agricultural Innovation Fund has been introduced and the public/private agricultural extension system developed under NATP has been further enhanced (including through the application of ICT). Similarly, with a focus on gender in agriculture, no major social and environmental risks unrelated to safeguards compliance are expected. The bulk of the risks associated to NATP-II are linked to fiduciary and governance aspects, to the differences prevailing in the institutional strength and capacity between the implementing agencies BARC, DAE, DOF and DLS, and to a low degree of interaction among the line agencies, potentially enhanced by a project design that

follows the prevailing institutional mapping.

61. Several risk mitigation measures have been taken into account in the project design and implementation arrangements. The substantial risks identified with regard to policies and sector strategies refer to the potential for lack of operationalization of the BARC Act, the delays in the hiring of public extension workers for MOFL, and the lengthy approval process for the validation of the NAEP. Under NATP-II, these are addressed through: (i) strengthening the institutional capacity of BARC in the area of research management through the hiring of an international service provider; (ii) expanding the use of private community-based extension agents for livestock and fisheries with the aim of developing sustainable models for private extension (e.g. scaling up fee-based services for livestock, promoting additional sources of revenues for LEAFs); and (iii) adopting in NATP-II some of the core pillars of the NAEP (e.g. promoting group approach, complementary farmer-to-farmer extension; promoting private extension services, and more).

62. The substantial risk identified with respect to institutional capacity for implementation refers to the challenges in **coordinating four line agencies from two different ministries** and their capacity to implement the respective components. As shown in the previous project, the coordination challenge can be adequately addressed through a PMU with strong leadership. The appointment by the relevant ministries of a Project Director and a Deputy Project Director with ToRs acceptable to the Bank, and the recruitment of technical experts (as consultants) at the PMU level, are key factors for the successful coordination across line agencies - and ultimately for successful project implementation. An important mitigation measure in the implementation arrangements for NATP-II (different from the previous project) is the support with external technical assistance from service providers recruited internationally for each line agency (TA under Component 2 will be provided by HORTEX).

63. Risk mitigation measures for procurement and financial management are proposed in the Appraisal section; the GAAP (Annex 7) also provides an overview of some of the governance-related risk mitigation measures proposed. Risk mitigation measures related to sustainability are covered in the above section on Sustainability.

C. Governance and Accountability

64. Lessons learned over the last five years to improve the project implementation and safeguard against potential governance issues have been incorporated in the project design, implementation arrangements and monitoring procedures. The project design, with the full alignment of the four operational components with the prevailing institutional setting, allows for full and distinct accountability with a single line agency (BARC, DLS, DOF and DLS) for each component. Project monitoring and impact evaluation will be carried out in collaboration with the PMU and the PIUs by an independent entity recruited competitively and operating with national and international consultants. Two independent assessments (technical and financial audit) of the AIF will be carried out: (i) within 3 months of the project mid-term review to improve the grant system's performance accordingly, and (ii) within 6 months of project closing, to support project completion report. Beneficiaries' feedback will be obtained through IT apps tailored to the project's needs and channeled directly to the NATP-II Management Information System's area coordinated by the third-party monitoring firm. Within 6 months of Effectiveness, NATP-II PMU will set up a project-level grievance redress mechanism and local communities will be consulted early in the process. In addition, in line with the Bank's Disclosure Policy and the country's Right to Information Act, all information in the project shall be made public. Annex 7 provides details

about the NATP-II Governance and Accountability Action Plan (GAAP).

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

65. **Project benefits are expected to derive from: (i) increased productivity; (ii) increased price pass-through; and (iii) reduction in production costs in some cases.** The parameters used in making these projections were based on the NATP experience. On this basis, the NATP-II internal rate of return (IRR) is calculated at 28 percent, the project’s economic rate of return (ERR) at 31 percent, and the corresponding net present value at USD 49.9 million. This economic rate of return remains robust under hypothetical scenarios of a 10 percent decrease in expected net revenues and/or a 10 percent increase in project costs (see Table 2 below).

Table 2: Economic and Financial Analysis and Sensitivity Analysis: key outcomes

	As Assessed	Assuming a 10% decrease in net benefits	Assuming a 10% increase in investment costs	Assuming both a 10% decrease in net benefits and an increase in investment costs
ERR (%)	31	25	25	20
NPV (USD Mill.)	49.9	33.5	38.5	22.0

66. The financial and economic analysis has contributed to refining project design in several ways. For instance, it has highlighted the significant contribution to the project’s net benefits of farmers who are not members in an NATP CIG. As a result, the project envisages expanding training and information opportunities for these non-CIG farmers, including availing them the opportunity to participate in the POs envisaged under the project.

67. Apart from monitoring changes in the three key parameters (productivity, price pass-through, and production costs), it will be important that the degree and quality of outreach to these non-CIG farmers be also closely monitored during the NATP-II implementation. This will make it possible to revisit the economic analysis as necessary at mid-term, and it will also facilitate the ex-post economic analysis to be done for the Implementation Completion Review (ICR).

68. NATP-II’s direct fiscal impact is expected to be minimal. For crops, NATP-II will use existing GoB agricultural extension staff. For livestock and fisheries, it will use private individuals. GoB’s direct monetary contribution to NATP-II of USD 6.4 million is limited compared with its overall budget of USD 32 billion in 2014/2015. Future costs beyond those associated with the project, such as periodic replacement of vehicles (USD 6.0 million) as well as their operation and maintenance, while always a challenge in government, generally, do not seem to impose an undue fiscal burden relative to the overall national budget.

B. Technical

69. **Based on lessons learned from NATP and good practices from Bank-supported agricultural technology projects elsewhere, the proposed operation will support the country’s agricultural technology agenda by focusing on stronger linkages between**

Research-Extension-Farmers and Markets. At field level, in line with GoB strategy, NATP-II embraces the group-based approach to technology dissemination, with extension and advisory services delivered through public and private extension workers, lead farmers, and the use of ICT. A wide range of technologies developed and validated under the previous project will be diffused by NATP-II and research efforts for additional innovations will be pursued. Table 3 in Annex 2 provides a partial list of technologies ready for scale up under NATP-II.

70. A differentiated approach will be pursued to account for the different maturity levels between 1st and 2nd generation CIGs. A matching grant for farmers and rural entrepreneurs will provide an incentive for a faster technology adoption by farmers (primarily those in 1st generation CIGs); this will be coupled with specialized training for these farmers, while the project strategy for 2nd generation CIGs will involve more (basic) training, including through training of trainers approach. At field level, the project will focus on skills development of all actors involved, giving special attention to gender-sensitive advisory services (including through farmer-to-farmer videos to be produced with the farmers in the community). Field level skills development and knowledge sharing activities will be complemented by investments to strengthen the agricultural technology system, e.g., to adequately address food safety issues in horticulture and animal products. Finally, to help improving the performance of the agricultural technology system, NATP-II will support institutional capacity strengthening for BARC, DAE, DLS and DOF and their structures at the district and *Upazila* level.

C. Financial Management

71. **The fiduciary assessment for NATP-II rated the risk in FM (FM) as “substantial”.** The main drivers of the FM risks identified are: (i) the involvement of multiple PIUs and accounting centers; (ii) the timeliness of consolidation of FM reports; and (iii) the compliance with requirements of multiple donors. While several risk-mitigating measures have been incorporated into the design of the FM implementation arrangements, a number of additional measures will also be taken to improve overall FM capacity and performance.

72. **NATP-II will hire an experienced consultant at PMU (Senior FM Specialist), with qualifications acceptable to the Bank, to lead and coordinate FM activities.** The consultant will support the project in strengthening budgeting practices, internal controls, fund reconciliations, and other relevant financial functions, including coordination with the FM staffs at PIUs. The current manual system of accounting will be enhanced within 12 months of project effectiveness by a **computerized FM information system** to facilitate easy and timely access to financial information and its consolidation. In order to ensure clear practices harmonized across the project, the PIM will include all the relevant parts of FM operations, donors’ compliance and financial disclosure. Prior to Effectiveness, the Project will also adopt an online off-the-shelf, web-enabled accounting software. Annual **external audits** of all project components will be conducted by the Foreign Aided Project Audit Directorate (FAPAD) and will be supplemented by additional internal audits from an independent audit firm (twice in the project lifetime).

Disbursements

73. **Financing from IDA, IFAD and USAID TF will be disbursed through three separate Designated Accounts (DA).** These will be opened and operated by the PMU. All PIUs will maintain a designated operating account (OA) to receive funds from the PMU. Disbursement will initially be made on an advance and replenishment based on regular statements of expenditure (SOEs). The same method would be applied between PMU and PIUs. After one year of

implementation, the Bank will review the FM performance and may recommend converting the disbursement modality to one based on interim unaudited financial reports (IUFs) including a six-monthly forecast of fund requirements.

74. All project related transactions i.e. all sources (IDA, USAID, IFAD and GoB) will be accounted for separately in the PMU following double-entry book keeping principles and on a cash basis. The key project accounting functions for which PMU would be responsible are as follows: (i) budget preparation and monitoring; (ii) payments for eligible project expenditure to third parties; (iii) disbursement of project funds to various agencies, as per approved work plan; (iv) maintenance of books and bank accounts; (v) cash flow management; (vi) financial reporting to GoB, the World Bank, IFAD and other stakeholders; (vii) preparation of withdrawal applications to claim funds from the World Bank and IFAD; and (viii) assistance to external auditor and ensuring appropriate follow up of audit. Details on the proposed financial management and disbursement arrangements can be found in Annex 3.

D. Procurement

75. Procurement under NATP-II will be guided by the Bank-approved Procurement Plan and processed through pooled procurement by the PMU for selected goods and services (e.g., ICT equipment and peripherals, furniture and office equipment, consultant services to be provided across various components, and others) items under Component 5, and by the four PIUs and the PNU for all other component-specific goods, works and services. BARC, DAE, DOF and DLS all have experience in managing Bank-financed procurement; however, their human resources capacity is not sustainable. To mitigate procurement risks from low in-house capacity, the project will contract six Procurement Specialists (consultants): two for the PMU and one each for the PIUs. An acceptable procurement plan covering the first 18 months of project implementation is available. Institutional procurement approval will be provided by the respective Head of Procurement Entities (HOPE) or his/her delegate as per delegation of financial powers of the four agencies (departments' Director General and BARC Chairman); the HOPE for the PMU is the Secretary, Ministry of Agriculture (lead implementing agency). The procurement chapter in the PIM will provide a detailed list of common items to be procured through a process initiated by the PMU; all other items will be procured by the respective PIUs (and the PMU for component 5).

76. Procurement financed under the NATP-II will be carried out in accordance with the Bank's "*Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers*" dated July 2014 (the Procurement Guidelines) and "*Guidelines: Selection and Employment of Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers*" dated July 2014 (the Consultant Guidelines), and the provisions stipulated in the NATP-II Financing Agreement. As per the Guidelines, all **ToRs for consultant services**, along with the detailed cost estimates for the assignment, are subject to the Bank's prior no objection.

77. Except as otherwise agreed in the procurement plan, works and goods may be procured on the basis of International Competitive Bidding (ICB). For consultant services, the Bank's Standard Request for Proposals (SRFPs) is applicable for all types of selection processes. Procurement of goods and works having an estimated value less than the ceiling stipulated in the Procurement Plan may follow National Competitive Bidding (NCB), Framework Agreement, and/or Shopping. All NCB procurement under NATP-II will be allowed to be done through

electronic government procurement (e-GP). Post reviews on contracts/procurement will be carried out by the Bank. An **integrated fiduciary review** that includes procurement post review and forensic audit will be carried out by the Bank on a regular basis.

E. Social (including Safeguards)

78. NATP-II is not expected to have any significant adverse social impacts; it will build on the achievements of the previous project to adequately address Gender and Social Inclusion. Since the locations where AIF-funded sub projects will be implemented have not been determined at design stage, a Social Assessment has been undertaken and an SMF acceptable to the Bank has been developed and publicly disclosed in-country and through the Bank's InfoShop prior to Appraisal. NATP-II activities may have special impacts on women or can enhance benefits to them and other vulnerable groups. The SMF will include a **Gender and Inclusion Framework (GIF)** focused on participatory processes, social inclusion and accountability. All sub-projects will follow the guidelines provided in the GIF and maintain the requisite consultation processes and documentation. Gender targets regarding women participation in NATP as well as inclusion of small and marginal farmers in CIGs have been met. NATP-II will build on the positive experience of the previous project and will design strategies under the GIF to further enhance voice, participation and inclusion of women and vulnerable groups through information dissemination, and an on-going strategy for consultation and communication. The mobilization, consultation and communication strategy will be focused on the above. The project will actively seek the participation of marginal, small-scale, women (including female-only households), and near-landless farmers, and specifically address their agricultural technology needs for raising productivity and incomes.

79. Following the preparation and review of the SMF, it was determined that the Involuntary Resettlement (OP 4.12) social safeguards policy would not need to be triggered. The Indigenous People (OP 4.10) social safeguards policy has been triggered. Since the geographic coverage of the current project NATP 2 has been extended, it is expected that the project will operate in areas where small ethnic and vulnerable communities live. However, no adverse impacts on those communities are expected. The NATP-II SMF includes a Tribal Peoples Development Framework (TPDF) and a screening template to determine if NATP-II project activities (in particular areas where AIF sub projects will be implemented) include small ethnic and vulnerable communities – in which case the sub-project will be required to prepare and implement a **Small Ethnic and Vulnerable Communities Management Framework** in compliance with the SEVC Development Framework included in the SMF. The project will ensure consultation and communication with small ethnic and vulnerable communities in an inclusive and culturally appropriate manner and seek to enhance their participation and voice in the design and implementation of AIF sub-projects that impact them.

80. Mitigation measures, monitoring and evaluation, and implementation arrangements: In addition to the SEVC Development Framework and the Gender and Inclusion Framework, the SMF will include a Monitoring and Evaluation Strategy for NATP-II at the sub-project and the overall project level along with roles and responsibilities stated clearly. Third party monitoring and social accountability elements will be highlighted, and specific M&E indicators and criteria for social assessment performance will be identified. An accessible and usable grievance redress mechanism will be devised in close consultation with communities. The SMF will contain implementation arrangements, reporting and budget indication.

F. Environment (including Safeguards)

81. **NATP-II is classified as a “Category B” under OP/BP 4.01 with a partial assessment as the environmental impacts are likely to be small-scale, site specific and with no irreversible impacts.** Mitigation measures can be designed readily. The environmental safeguard policies triggered in NATP-II are Environmental Assessment (OP4.01) and Pest Management (OP 4.09). NATP-II is designed to support sustainable production practices of crops, fisheries and livestock with environmentally-friendly and climate smart innovative technologies, and thus, it is not expected to have any major adverse impacts on the environment. Key environmental issues that will need to be addressed under NATP-II include: (i) potential soil degradation; (ii) potential pollution of the eco-system with agro-chemicals, particularly in ponds and water bodies; (iii) potential pesticide-related health and safety issues; (iv) food safety issues; (v) possible depletion of groundwater due to irrigation; (vi) saline water intrusion in groundwater and surface water in select sites. Many of these are linked to a potential excessive use by farmers of chemical fertilizers and pesticides beyond recommended levels. However, the above issues are not considered to be critical in NATP-II; minor to moderate impacts that may occur can be avoided or minimized through an appropriate environmental management plan.

82. **Since the exact locations of NATP-II activities (in particular AIF sub projects) and their potential environmental impacts have not been identified, a framework approach has been adopted.** To that effect, an Environmental Management Framework (EMF), building on the experience from the previous project, has been developed and publicly disclosed in-country and through the Bank’s InfoShop prior to Appraisal. The EMF provides details on potential environmental risks in AIF sub-projects and other project activities, and outlines procedures to mitigate any potentially adverse environmental impacts; the EMF further provides guidance for setting up a mechanism for environmental monitoring as well as for capacity enhancement. The EMF includes relevant environmental codes of practices to avert negative impacts and strengthen positive outcomes expected to be generated from project interventions. A **Pest Management Plan (PMP)** to address pest infestation and pesticides related issues in NATP-II has also been developed and disclosed prior to Appraisal. The PMP focuses on the promotion of IPM technologies, judicious use of nationally approved pesticides, environmental code of practices for nutrient and pest management, and creation of awareness about soil and nutrient management.

G. World Bank Grievance Redress

83. **Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB’s Grievance Redress Service (GRS).** The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB’s independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank’s attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank’s corporate Grievance Redress Service (GRS), please visit www.worldbank.org/grs. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

Annex 1: Results Framework and Monitoring

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

Project Development Objective: To increase agricultural productivity of smallholder farms and improve smallholder farmers' access to markets in selected districts										
Baseline value (2014)		Cumulative or Annual values (targets and actuals)						Frequency of data collection	Data source	Comments
		Year 1	Year 2	Year 3 mid term	Year 4	Year 5	Year 6 project end			
PDO Level Indicators										
1. Farm Productivity: Increase in the yield of selected agricultural commodities										
Crops: Rice (paddy): 4.7 t/ha Tomato: 30.0 t/ha Livestock: Dairy: 3.0 ltr milk/day/cow Beef: 160 kg live weight Fish: Culture (ponds): 3.0 t/ha Capture (<i>beel</i>): 0.7 t/ha	Target	Rice: 4.7 Tomato: 30.0 Dairy: 3.0 Beef: 160 Culture: 3.0 Capture: 0.7	Rice: 4.8 Tomato: 31.2 Dairy: 3.2 Beef: 175 Culture: 3.4 Capture: 0.8	Rice: 5.0 Tomato: 32.4 Dairy: 3.4 Beef: 185 Culture: 3.7 Capture: 1.0	Rice: 5.1 Tomato: 33.6 Dairy: 3.5 Beef: 200 Culture: 4.1 Capture: 1.1	Rice: 5.2 Tomato: 34.8 Dairy: 3.7 Beef: 215 Culture: 4.4 Capture: 1.3	Rice: 5.4 Tomato: 36.0 Dairy: 3.9 Beef: 225 Culture: 4.8 Capture: 1.4	Annually	DAE, DLS and DOF district & Upazila statistics	Crops Rice: +14% overall increase Tomato: +20% Livestock Dairy: +30% Beef: +40% Fisheries Culture (ponds): +60% Capture (<i>beel</i>): +100%
	Actual	Rice: Tomato: Dairy: Beef: Culture: Capture:	Rice: Tomato: Dairy: Beef: Culture: Capture:	Rice: Tomato: Dairy: Beef: Culture: Capture:	Rice: Tomato: Dairy: Beef: Culture: Capture:	Rice: Tomato: Dairy: Beef: Culture: Capture:	Rice: Tomato: Dairy: Beef: Culture: Capture:			
2. Market Access: Volume (in tons) of agricultural commodities sold annually through new marketing structures/arrangements promoted by the project										
Total volume: 0 t	Target	0	200	2,000	4,000	6,800	8,400	Semi-annually	PIUs at DAE, DOF and DLS	
	Actual									

Project Development Objective: To increase agricultural productivity of smallholder farms and improve smallholder farmers' access to markets in selected districts										
Baseline value (2014)		Cumulative or Annual values (targets and actuals)						Frequency of data collection	Data source	Comments
		Year 1	Year 2	Year 3 mid term	Year 4	Year 5	Year 6 project end			
3. Project beneficiaries: Direct project beneficiaries, of which female [CORE INDICATOR]										
Cumulative number of members in farmers groups (CIG) supported by the project (percentage of female members)										
CIG members: 397,600 (of which female: 29%)	Target	600,000 (35%)	800,000 (35%)	1,000,000 (35%)	1,000,000 (35%)	1,000,000 (35%)	1,000,000 (35%)	Semi-annual	PIUs at DAE, DOF and DLS	Most new CIG will be formed in YR1 (others are 1 st gen. CIG already formed)
	Actual									
Intermediary Indicators										
4. Research: Technologies demonstrated in the project area [CORE INDICATOR]										
Technologies demonstrated: 0	Target	5	10	15	30	40	0	Semi-annual	PIU BARC	Only on-farm, i.e., informing also about research-extension-farmer linkages
	Actual									
5. Research: Research sub-projects under implementation or completed [CORE INDICATOR]										
AIF-1 grants: 0	Target	15	70	100	130	130	130	Semi-annual	PIU BARC	Total of at least: 30 PBRG 100 CRG
	Actual									
6. Extension: Targeted clients satisfied with agricultural and rural advisory services [CORE INDICATOR]										
Percentage (percentage female satisfied)										
Farmers satisfied: % (tbd %)	Target	66% (64%)	74% (68%)	79% (77%)	85% (84%)	89% (89%)	93% (93%)	Annual	PIU DAE, DOF, and DLS	
	Actual									

Project Development Objective: To increase agricultural productivity of smallholder farms and improve smallholder farmers' access to markets in selected districts										
Baseline value (2014)		Cumulative or Annual values (targets and actuals)						Frequency of data collection	Data source	Comments
		Year 1	Year 2	Year 3 mid term	Year 4	Year 5	Year 6 project end			
7. Extension: Clients who have adopted an improved agricultural technology promoted by the project [CORE INDICATOR]										
Cumulative number of CIG members adopting at least 1 technology (percentage female)										
Adopters: 0 (female: 0)	Target	0 (0%)	226,000 (35%)	396,000 (35%)	529,000 (35%)	602,000 (35%)	640,000 (35%)	Semi-annual	PIU DAE, DOF, and DLS	
	Actual									
8. Market access: Marketing solutions implemented by the project (cumulative)										
Marketing solutions: 0	Target	15	30	65	95	120	140	Annual	PIU DAE, DOF, and DLS	
	Actual									
9. Agricultural Innovation Fund: Technology adoption and marketing sub-projects under implementation or completed										
Cumulative number										
AIF-2&3 grants: 0	Target	0	500	1,000	2,000	2,800	3,500	Semi-annual	PMU	Total of at least: 3,000 AIF-2 grants and 500 AIF-3 grants
	Actual									
10. Client-days of training provided [CORE INDICATOR]										
(percentage female)										
0 (0%)	Target	500,000 (35%)	1,000,000 (35%)	1,000,000 (35%)	700,000 (35%)	600,000 (35%)	500,000 (35%)	Semi-annual	PMU and PIUs at DAE, DOF and DLS	
	Actual									

GLOSSARY

PDO level indicators

PDO Ind.#1. This indicator will measure increase in the yield of selected agricultural commodities in new *Upazilas*. The commodities selected under DAE are paddy Rice (Aus, Amon and Boro) and Tomato; under DLS Milk and Beef meat; and under DOF Fish/Shrimp in ponds (aquaculture) and *beel* (capture fishing). The data will be collected annually and respective line agencies will be responsible for reporting data.

PDO Ind.#2. The indicator will measure the total amount of agricultural commodities sold through structures/arrangements promoted by the project. These could be commodity collection and marketing centers, milk collection centers, rehabilitated markets, etc. It is expected that the baseline value for this indicator will be zero and this data will be reported semi-annually.

PDO Ind.#3. This indicator will measure the cumulative number of farmers in CIGs supported by NATP-II (which includes groups formed under the previous project). This indicator will also measure percentage of female members in all common interest groups. All line agencies (DAE, DLS, and DOF) are responsible for collecting data and this will be reported semi-annually.

Intermediary Indicators

Ind. #4. The indicator measures the number of innovative on-farm agricultural/agro processing technologies demonstrated in selected project areas. The term ‘technology’ includes a change in practices compared to currently used practices or technologies (seed preparation, planting time, feeding schedule, feeding ingredients, post-harvest, storage, processing etc.). If one specific technology is demonstrated in more than one location in the project area, it will count as one technology. If the project introduced or promotes a technology package in which the benefit depends on the application of the entire package (e.g., a combination of inputs such a new variety and advice on agronomic practices such as soil preparation, changes in seeding time, fertilizer schedule, plan protection etc.) – this will count as one technology. ‘Guidance on demonstrated’ includes advice given or demonstrated by farmer organization, producer organization, cooperatives, extension service, innovative farmers, research organization etc. Technologies can be demonstrated during field days, farmer to farmer learning events, at formal or informal training courses, as part of vocational or academic training etc. The demonstration can be targeted at farmers or at extension agents, community representatives, researchers, etc.

Ind. #5. This indicator measures the number of agricultural research sub-projects (under implementation or completed) that are funded through the Agricultural Innovation Fund 1 (AIF-1). This data aggregated over time will show the growth in formal collaboration between the public sector/government driven research and/or extension systems with the private sector and/or other non-governmental providers of extension services and/or of agricultural research. This does not include informal partnership agreements between the project and partner organizations.

Ind. #6. This indicator measures the percentage of clients who expressed satisfaction with the agricultural and rural advisory services (including agribusiness services) provided in the

project areas based on an IT-based reporting mechanism. The sample size should be representative of the total number of clients. In this context, client means farmers or members of a business (disaggregated by men and women) targeted by the project. Agricultural and rural advisory service includes services provided under the project by extension staff, CEALs, LEAFs, common interest groups, cooperatives, producer groups, agro-input dealers, etc.

Ind. #7. The indicator measures the number of clients of the project who have adopted an improved agricultural technology promoted by the project. In this context, adoption means a change of practice or change in use of a technology that was introduced and/or promoted by the project. The term ‘technology’ includes a change in practices compared to currently used practices or technologies (seed preparation, planting time, feeding schedule, feeding ingredients, post-harvest, storage, processing etc.). If one specific technology is demonstrated in more than one location in the project area, it will count as one technology. If the project introduced or promotes a technology package in which the benefit depends on the application of the entire package (e.g., a combination of inputs such a new variety and advice on agronomic practices such as soil preparation, changes in seeding time, fertilizer schedule, plan protection etc.) – this will count as one technology.

Ind. #8. This indicator measures the cumulative number of operating commodity collection and marketing centers (CCMC), rural business centers, rural markets, collection points, milk centers, etc. established or improved by the project. The marketing solutions are facilities where producers (members NATP CIGs and non-CIG farmers), processors and traders come together and are doing business.

Ind. #9. The indicator measures the cumulative number of agriculture sub-projects funded by Agricultural Innovation Fund window 2 and 3. AIF 2 is allocated for eligible recipients (CIG or CIG member) to accelerate the adoption of proven agricultural technologies. This fund will contribute towards investment financing i.e., matching grants will co-finance the acquisition of assets (e.g., equipment, machinery, facilities and other goods etc.) but not the costs of operation and maintenance of the technology. AIF-3 will be utilized in fostering productive partnership and business linkages between farmers and off-takers (traders, processors) as well as promoting SMEs. Under this fund, grant recipients will be registered local entrepreneurs, processing and value adding SMEs, and agribusiness companies who are willing to invest in local economic activities.

Ind. #10. This indicator measures the number of client days of training provided i.e., the number of clients who completed training multiplied by the duration of training expressed in days. It is expected that the baseline value for this indicator will be zero. The term clients include scientists, extension agents, farmers, community members, businessmen, traders, processors etc. The term ‘trained’ means any training organized or provided by the project (formal or informal training, degree and non-degree courses, vocational, on the job training, field demonstrations, study tour etc.) completed by a client. The term ‘day’ may include aggregating partial day or hours to full client day.

Annex 2: Detailed Project Description

BANGLADESH: National Agricultural Technology Program - Phase II Project

84. **The development objective of this project is to increase agricultural productivity of smallholder farms and improve smallholder farmers' access to market in selected districts.** NATP-II will achieve the PDO: (i) by strengthening the capacity of the NARS and the extension services to generate and diffuse agricultural technologies aimed at increasing farm productivity and reducing post-harvest losses; and (ii) by promoting the sustainability of existing and newly created farmer groups (CIGs)²⁰ and producer organizations by strengthening their linkages with markets. NATP-II will support a holistic approach to revitalizing the country's agricultural technology system that supports decentralized, demand-driven research and extension services, and promotes market-oriented, diversified smallholder production. NATP-II will contribute directly to the Ministry of Agriculture's (MOA) and the Ministry of Fisheries and Livestock's (MOFL) priority of increasing farm yields and diversifying crop and animal production by improving agricultural research and agricultural extension – thus achieving higher agricultural output and contributing to household food security.

85. Given the sector's high vulnerability to climate shocks and the diversity of agro-climatic zones, improving the agricultural technology system of Bangladesh will need to: (i) be embedded in the country's **adaptation to climate change** agenda with a focus on generating and diffusing climate-smart agricultural technologies and good agricultural practices adapted to the different agro-ecologic zones across the country, and (ii) take into account the social fabric and **gender** dimension in rural areas.

86. The project description below provides details on cross-cutting themes covered in NATP-II (e.g., agricultural extension, Agricultural Innovation Fund, and others) that are common to crops, livestock and fisheries, followed by a detailed description of component-specific activities.

Farmer Common Interest Groups (CIGs)

87. **In line with the country's sector policies which prioritize group-based delivery of extension services, NATP-II's primary counterparts at field level are the Farmer Groups (CIGs) formed and trained by the project and the previous operation.** NATP-II will deepen the interventions initiated by the previous project in existing *Upazilas* (vertical scaling up) and expand the geographic coverage to include new districts and *Upazilas* (horizontal scaling up). At field level, the project will develop and implement comprehensive support packages for CIGs, public and private extension workers, and rural entrepreneurs. A differentiated approach to CIGs will be required to account for the differences in needs, maturity and performance levels that exist between over 19,700 1st generation CIGs established under NATP, and over 22,000 2nd generation CIGs to be formed under NATP-II.²¹ It is expected that most 1st generation CIGs will be further up in the "NATP-II development path" than the 2nd generation CIGs (see Fig. 2 on p.18). NATP-II will also promote spillover effects between farmers CIG and non-CIG farmers (e.g., for technology dissemination), support the development of sustainable, inclusive (all farmers) market-

²⁰ 1st generation CIGs included 20 members. 2nd generation CIGs will include 30 members for crop and livestock CIGs, and 20 members for fisheries CIGs.

²¹ The rating system developed under NATP to assess CIG performance will be reviewed during the PPA phase in light of the introduction of AIF-2. There is a need to streamline the CIG performance criteria and ensure that the market-orientation and readiness of CIGs to manage grants is taken into account when rating CIG performance.

oriented producer organizations (POs), and adopt a **gradual phasing-out** of project support for mature and sustainable CIGs. In working at CIG level, NATP-II will give a particular attention to Homestead Gardening and Livestock CIGs to address some elements of the **gender** dimension in agriculture and contribute to improving **nutrition** at household level.

88. To contribute to the project objectives and scaling up previous achievements, NATP-II design will rely on a comprehensive program of training activities; this will be implemented at various levels and cover skills development, knowledge sharing and learning. Training is a core pillar of NATP-II implementation strategy across all components, in particular for field level stakeholders (e.g., CIGs and POs, public and private extension workers, lead farmers, and others). The project will rely on a **Training-of-Trainers** approach and introduce the use of ICT for an efficient and ‘as needed’ access to knowledge (e.g., on good agricultural practices). Training packages will be differentiated between NATP and new *Upazilas*. Second generation CIGs will receive ‘basic’ farm and group training on group formation, group management and governance, innovative production and post-harvest technologies and good agricultural practices. First generation CIGs will be introduced to non-farm specialized training such as, savings management, financial literacy, simplified procurement, collective marketing and more, as well as receive, where needed, refreshers on elements of the basic package. Much of the specialized training will be designed and delivered using learning material developed by service providers to be recruited by the respective PIUs.²²

Extension and Advisory Services

89. NATP-II will support DAE, DOF and DLS in ensuring that extension workers are sufficiently skilled to improve the quality and relevance of the advisory services they provide to farmers. NATP-II will invest in the development of technical skills of public (DAE extension staff) as well as private extension agents (CEALs, LEAFs) operating in the project area. Training programs will seek to develop agricultural as well as relevant non-agricultural skills. Agricultural skills training will particularly focus on environmentally sound and climate-smart good agricultural practices. The non-agricultural skills will include group mobilization and formation, extension and production planning, food safety and nutrition, as well as basic organizational development skills for CIGs including basic financial skills and savings management. To that effect, based on the outcomes of a comprehensive review of existing institutions and their curricula to be carried out during the PPA phase, the project will promote the development of close ties between DAE, DLS and DOF and selected public and private learning and training institutions to provide Training of Trainers (ToT) Courses for department officers and, where applicable, directly to a cohort of “master trainers” in the emerging producer organizations. Where required, NATP-II will invest in curriculum development, production of technical manuals for Good Agricultural Practices and will update the “Agricultural Extension Manual”, which may require consulting services. ToT will encompass new agricultural technologies, extension-related issues as well as post-harvest and marketing topics so as to widen competencies of extension workers, sector business associations and eventually of POs.

90. Furthermore, the project will ensure that extension workers (in particular CEALs and LEAFs) are adequately equipped to effectively and efficiently deliver their services to CIG

²² HORTEX Foundation has been identified as strategic partner to DAE for specialized training and other activities related to the promotion of market linkages; DOF and DLS will need to openly recruit a service provider on the basis of ToRs to be approved by the Bank.

and non-CIG farmers. At union level, DAE extension staff, as well as CEALs and LEAFs will be housed within the improved facilities of the Farmers Information and Advisory Centers (FIACs). NATP-II will support the development of FIACs to operate as fully equipped agricultural technology and knowledge sharing centers. Such support will include providing extension workers (LEAFs and CEALs), with a comprehensive “**extension kit**” that includes small equipment to provide most-frequently demanded services, adequate ICT and other equipment to adequately addresses connectivity and mobility constraints (e.g., bicycles). SAAOs in the project area, CEALs and LEAFs, will be equipped with mobile tablets which can connect using the mobile network or be synchronized periodically at the *Upazila* Agriculture Office. Based on lessons learned from NATP, the project will provide a compensation (up to 2,500 BDT per month) aimed at assisting CEALs and LEAFs with their travel and mobile costs. Acknowledging the importance of quality services to the farming community, the project will introduce a feed-back system (e.g., e-scorecard) to assess extension services provided by public and private extension workers associated with NATP-II, which will make use of an appropriate information feedback system to capture beneficiary’s satisfaction with project activities.

91. In collaboration with the project’s public and private extension workers (SAAOs, LEAFs and CEALs) and lead farmers, the project will pilot farmer-to-farmer extension and the introduction of innovative video-based extension methods. Such methods build on adult learning principles and are especially designed to also include and train female farmers and illiterate farmers. The methods build on the farm-level production of short video-clips on innovative agricultural practices and technologies, whereby local farmers, under the guidance of trained extension workers produce the videos. There will be a special focus on inclusion of women farmers in the video-clips, as well as on gender-related issues. After editing and technical validation by the respective subject-matter specialists at DAE, DOF and DLS, the video-clips will be regularly shown to farmers at village level by using special battery operated *pico*-projectors and speakers purchased by the PMU. The video screening and following discussions are facilitated by lead farmers and/or extension workers, who will receive training, including in gender sensitive and participatory approaches.

92. NATP-II extension approach will also reach out to agro-input dealers and jointly develop a targeted capacity enhancement program, to enhance their potential role in a broader agricultural technology system, both as promoters of technology transfer as well as resource persons for technical knowledge transfer and provider of advisory services. Agro input dealers will also specifically be targeted in the project’s awareness campaign on food safety issues and good agricultural practices.

Market Access, Food Safety, and Producer Organizations

93. Based on lessons learned from NATP, the proposed project will give a special focus to strengthening linkages between smallholders and markets – thereby contributing to an increase in the income of farming households. NATP-II will support a market-oriented, demand-driven agricultural technology system that takes into account the evolving domestic demand for diversified, safer and more nutritious food, and opportunities for supplying international markets with selected agricultural and food products. Evidence from the field shows that farm productivity increases as a result of farmers’ adoption of new technologies (including the adoption of market-oriented higher-value crops), resulting in marketable surplus production and/or the production of commodities for the market (e.g., flowers). A limited number of commodities have been proposed by the line departments involved in NATP-II for which the access to market activities will be

prioritized, subject to further analysis. These are, for DAE: bananas, vegetables (eggplant, selected gourd varieties, tomato, aromatic rice); for DOF: tilapia, *pangas*, *koi*, shrimp; and for DLS: dairy, goat, and beef meat. The project's efforts in facilitating the access to markets for smallholders will focus on these commodities and include selected infrastructure investments and capacity enhancing activities for the different actors involved, including at post-production stages.

94. **NATP-II will also promote food safety** issues related to crops (including fresh produce), fish and livestock commodities. Food safety is one of the major issues in the marketing of fresh fruits and vegetables, as well as fish and meat. To raise participants' awareness on food safety, and introduce food safety solutions and best practices along the supply chains for the selected commodities, the project will collaborate closely with the Food Safety Program currently implemented by FAO. Activities will focus on supporting producers and trading organizations in establishing or strengthening infrastructure facilities (storage and transport) and providing technical training to farmers, SAAOs, CEALs and LEAFs, in order to prevent the likelihood of the commodities being or becoming contaminated by both microbes and chemicals during production, processing, storage and distribution.

95. **Producer Organizations (POs) are key elements in facilitating a sustainable access to markets for smallholders.** NATP has had limited success in the establishment of POs given the lack of strategic vision and an approach that led to POs being formally established, but with little specific activities and almost no impact at local level. Under NATP-II, a fresh approach will be taken for establishing sustainable POs. POs will facilitate aggregate commodity and input marketing for increased bargaining power, as well as access to information, technical service delivery and access to financial services. POs will have a strong business orientation. The membership of the POs will not necessarily be limited by administrative boundaries or to CIG farmers, but by market demand and existing or emerging production clusters. Supported by value-chain analysis and market studies, POs will be enabled to target selected domestic markets at *Upazila* or district level, supermarket chains and processing enterprises. Support to these POs will focus on mobilizing larger volumes, higher quality, reduced transaction costs and post-harvest losses through: enhanced technical skills, market linkages with increased buyer competition, equipped collection centers capable to cater for volumes suitable for targeted buyers, as well as financial counseling and support to investment through the AIF.

Agricultural Innovation Fund (AIF)

96. **To scale up NATP achievements, the project design includes – embedded in the different project components – an Agricultural Innovation Fund (AIF).** The AIF is at the core of NATP-II scale-up strategy; it aims at providing grant funding for eligible research and micro-project proposals to be implemented by potential project beneficiaries. The AIF is fully aligned with the holistic approach to agricultural innovation promoted by the project. In order to effectively contribute to achieving the PDO, the AIF includes the following three funding windows: (i) AIF-1(USD24 million) will promote agricultural technology generation through a program-based research initiative (AIF-1 PBRG) and a competitive research grant program (AIF-1 CRG); (ii) AIF-2 (USD15 million), through matching grants, will promote farmers' adoption of innovative technologies generated by the research community; and (iii) AIF-3 (USD4.0 million), through matching grants, will support private operators in developing business and market opportunities for farmers, as well as in providing relevant private service to farmers. NATP-II will use calls for proposals, scientific and technical peer reviewing and transparent selection mechanisms for the allocation of all grants under the AIF; disbursement against the AIF is subject to the Bank's

approval of an AIF Manual of Operational Guidelines and Procedures. NATP-II will explore synergies between its AIF and the access to rural financial services promoted under IFAD's new project for Promoting Agricultural Commercialization and Enterprises (PACE).²³ More information on AIF is provided in Annex 8.

Gender, Targeting and Social Inclusion

97. Given the range of project activities relating to the introduction of new technology packages and the nature of the intended target communities, a participatory targeting strategy will be developed in order to avoid exclusion of certain groups from benefiting from project interventions. Building on lessons learned from NATP, the project will ensure inclusion and gender equity in the access to its services through the establishment of a component-specific targeting and gender mainstreaming action plan. The project will actively seek the participation of small and marginal farmers, as well as women (including female-only households) and specifically address their agricultural technology needs for raising productivity and incomes. Equitable participation of women will be ensured throughout the components, including a minimum of 35 percent participation in CIGs (or female-only CIGs), as well as equitable representation on executive committees of CIGs and POs.

Component 1: Enhancing Agricultural Technology Generation (USD52 million)

98. The objective of this component is to improve the performance of the national agricultural research system (NARS) by supporting the development of innovative agricultural technologies and by strengthening agricultural research institutions. The Bangladesh Agricultural Research Council (BARC) is the apex body for publicly funded agricultural research and is mapped to MOA. The BARC Act 2012, passed during NATP, authorized BARC to allocate research grants to some 12 NARS institutes. The NARS has recently not been performing at the intended level: witness the modest production of improved varieties of most crops (exceptions include rice and potato) in recent times. This situation reflects the sustained underfunding of the NARS, leading to an erosion of human capital in agricultural research and aging of the public research facilities. Laboratory infrastructure and research equipment of the NARIs are now mostly quite old, and insufficient to conduct much of the present-day needs-oriented research; further, more than 400 PhD-qualified agricultural scientists left Bangladesh in the late 1990s and early 2000s for better remunerated positions overseas - leaving more than 20 percent of scientific positions unfilled across the NARS. To make the 2012 BARC Act really functional and the research system more productive and effective, will require better physical and managerial capacity within BARC itself, and sustained support for the strengthening of institutional capacity (human capital building and infrastructure development) throughout the NARS.

99. To contribute to the PDO, Component 1 will support: (i) a demand-driven, market-oriented and decentralized approach to agricultural research that takes into account the multiplicity of actors involved in agricultural technology generation; (ii) the need for increasing agricultural output per unit of arable land while adapting to climate variability and longer-term climate change;

²³ PACE aims at enhancing livelihoods of rural women and men by improving profitable business opportunities for micro entrepreneurs, and creates wage employment for extreme and moderate poor people. PACE could provide NATP-2 FGs with business planning/development services to prepare business plans for funding through PACEs micro-enterprise loan program. In addition, crop, fisheries and livestock farmers unable to access NATP-2 matching grants could be referred to PACE loan schemes.

and (iii) the evolving domestic demand for diversified, safer and more nutritious food, and opportunities for supplying international markets with selected agricultural and food products. Component 1 will support this research agenda by enhancing the **institutional capacity** of BARC and the National Agricultural Research Institutes (NARI), by funding research through **competitive grants**, and by strengthening the **human capital** in agricultural research. The component will also finance a number of activities (including specific studies, policy notes, training, and others) in support of the 2012 BARC Act implementation approved under NATP.

100. To strengthen the institutional capacity of the public research system, NATP-II through this component will invest in:

- (a) **Capacity building**: In line with the NATP-II's focus on selected commodity groups and the lessons learned from NATP on institutional capacity needs, this component will fund **technical assistance** for BARC (e.g., for research management, institutional coordination, policy formulation), and twinning arrangements with international research centers, academia or others, to strengthen the institutional capacity of selected NARIs, in particular BFRI and BLRI. To further strengthen the NARIs, this component will provide financial assistance for no more than a total of 140 doctoral studies (with a maximum 60 PhDs overseas) in priority areas²⁴. Project funding for doctoral studies will be targeted at outstanding medium-level NARI scientists and a limited number of mid-career civil servants from BARC, DAE, DLS and DOF. Project funding for doctoral studies is subject to: (i) an independent assessment of the support provided for Ph.D. candidates under NATP; and (ii) the development/update of eligibility criteria, selection guidelines and draft Letter of Agreement between each selected candidate and BARC, acceptable to the Bank. All doctoral studies must be successfully completed no later than 6 months prior to project closing. No other **doctoral studies** will be funded with NATP-II proceeds outside of this component.
- (b) **Infrastructure development**: Based on a needs assessment and prioritization exercise coordinated by BARC, Component 1 will provide through BARC PIU limited support for the physical improvement of selected NARI facilities (e.g., renovations, laboratories, equipment). Fund transfer beyond the prescribed PIU bank account shall not be allowed. The support for facilities improvement will require that recipient institutes are adequately endowed with the human resources that can efficiently use the facilities to be improved (in particular for laboratories and specialized equipment).
- (c) **ICTs for research**: The project will support on-going efforts with the development of a comprehensive web-based agricultural research platform that will also serve as a research database and knowledge center. This NARS platform will be coordinated by BARC and will link the NARIs and their dispersed units, and be accessible by end-users (e.g., researchers in regional centers, technical staff from the local administration, as well as extension and advisory workers in the field). The project will explore synergies and cost-efficient solutions with the GoB's Digital Bangladesh initiative and the corresponding program implemented by the Bangladesh Computer Corporation.

101. **Under this component, a Program-based Research initiative (AIF-1 PBRG) and a**

²⁴ As per: *Research Priorities in Bangladesh Agriculture*. Agricultural Research Vision 2030 and Beyond. Bangladesh Agricultural Research Council (BARC), 2011; and subsequent updates

Competitive Research Grant program (AIF-1 CRG) will be implemented to support the development of innovative agricultural technologies, mobilize available research capacity, stimulate scientific creativity and promote efficiencies in the research system. The CRG program will be fully funded through the USAID TF allocated to AIF-1. The CRG program will be based on modalities that take into account lessons learned from NATP’s research component and global best practices for competitive research grants. An estimated 100 proposals will be funded under the CRG program. Eligible research providers (i.e., recognized in-country public and private research providers) will be selected on a competitive basis. CRGs are expected to be full grants of up to USD74,000 apiece. Since AIF-1 CRG is fully funded by the USAID TF which closes September 30, 2018, only eligible proposals for research activities that can be realistically completed by that date, shall be considered.

102. AIF-1 will also provide block grants to finance comprehensive research programs under NATP-II’s Program-based Research initiative (AIF-1 PBRG). These research programs will be led by a NARI (for institute specific core research) or coordinated by BARC (for research regrouping several research providers and for cross-cutting research themes). Proposed research projects will be solicited through two separate calls for proposals with distinct eligibility criteria to ensure that institutional diversity in leadership is maintained. In line with procedures applied under NATP, a contract (Letter of Agreement acceptable the Bank) governing the use of the research grant and outlining the responsibilities and accountabilities of the grant recipient, as well as of BARC, will be signed between the recipient and BARC. Some 33 proposals will be funded under the AIF-1 program-based grant initiative. Program-based research grants can amount to USD500,000 each.

103. In line with the BARC Act, AIF-1 will be managed by BARC. BARC has gained considerable experience with the management of research grants under NATP; nonetheless, the Bank’s assessment of BARC’s fiduciary capacity highlights shortcomings in the area of procurement and financial management, and consultants will be recruited to join the PIU at BARC. BARC responsibilities for the AIF-1 will include, among others, the implementation of all rules and regulations governing the use of AIF-1 as per the corresponding manual of procedures (see below), monitoring the implementation of the Letters of Agreement with grant recipients, ensuring environmental and safeguards compliance with the research activities funded, and monitoring and reporting on progress with implementation of the research activities funded.

104. BARC will use calls for proposals, scientific peer reviewing and transparent selection mechanisms for the allocations of CRG and PBRG grants. Disbursement of AIF-1 will be subject to the completion of an AIF-1 Manual of Operational Guidelines and Financial Procedures acceptable to the Bank²⁵. Key eligibility criteria for both CRG and PBRG will include: (i) proposed research should have direct linkages with NATP-II objectives and activities; (ii) proposed research should be clearly linked to a priority research area identified and (iii) research proposals should be for a maximum period of 4 years for PBRG and 3 years for CRG, in order to allow for enough time to adequately document and disseminate research results prior to the closing date of the respective sources of funding.

Component 2: Supporting Crop Development (USD66 million)

105. The objective of this component is to increase crop productivity, quality and output

²⁵ The AIF-1 Manual will be developed using Project Preparation Advance (PPA).

through the enhanced transfer of improved technologies, as well as to facilitate farmer access to markets. Bangladesh's agricultural crops sector is showing decreasing growth rates from 6.13 percent in 2009/10 to 0.15 percent in 2012/13. It is dominated by cereal food production: some 77 percent of total cropped area is dedicated to rice, and progress towards diversification into other crops (such as oilseeds, pulses, fruits and vegetables) remains slow. A significant shift towards market-oriented crop production has not yet been fully realized, and while considerable yield gaps still exist for many crops, the quality of the produce also needs to be improved in order to meet market and food safety requirements, as well as tackling the nutrition challenge. The sector is dominated by smallholder farmers with 0.05 to 2.5 acres of land and land fragmentation is further increasing. Soil fertility is declining due to depletion of soil organic matter, inappropriate application of chemical fertilizers, and to direct and indirect impacts of climate change, such as erosion, water logging, and increased salinity in coastal areas. To cater for the growing needs of a sector that must undergo a significant transformation to meet the evolving consumer demand, there is an increased need for agricultural mechanization, resulting from the shortage of animal draft power and the seasonal scarcity of farm labor. The component's interventions are aligned with the National Agricultural Policy (2013) which promotes farm productivity and agricultural diversification to ensure food and nutrition security, as well as with the new National Agricultural Extension Policy (NAEP 2012) which emphasizes a bottom-up and market-oriented extension approach through farmer groups, Farmers Information and Advisory Centers (FIACs), and better market integration of producers.

106. The strategic focus of this component is on crop diversification and increased production to meet the food and nutrition requirements as well as to cope with the challenges posed by climate change. For improved advisory services to crop farmers and accelerated technology generation, transfer and adoption this component will enhance the skills of DAE's extension staff and to promote the use of **ICT-supported extension services. Good agricultural practices (GAP)** developed under NATP²⁶, IAPP and other projects, as well as newly emerging technologies, will be promoted in order to address the need for food safety and pesticide risk reduction as well as for climate change adaptation. NATP-II will promote increased **mechanization** at field level in order to improve crop productivity and reduce post-harvest losses, as well as to support processing. To that effect, NATP-II will provide financing opportunities to CIGs and rural entrepreneurs through its Agricultural Innovation Fund (AIF). Given the potential for increased agri-business including agro-processing as well as for the establishment of machinery hire-services, collaboration with the private sector will be sought. Besides specialized training to promote a market-oriented approach, institutional strengthening will also cover limited investments by the project, including in selected infrastructure improvements (e.g., renovating markets, setting up collection points, and others). To support the generation and dissemination of more reliable agro-climatic data, NATP-II will liaise with the forthcoming IDA-funded Regional Weather and Climate Services Project, implemented among others by DAE and the Bangladesh Meteorological Department (BMD).

107. Under this component the project will support selected DAE Horticultural Centers through infrastructure development and capacity building in order to enhance their role in technology generation, dissemination and crop diversification. The prioritization of investments in the Horticulture Centers (primarily building renovations, equipment, and training) will take into account the project's selected agricultural commodities and needs of women,

²⁶ A selection of technologies developed under NATP is provided in Table 3 in Annex 2.

marginal and small farmers. The development/strengthening of linkages between specific NARIs and Horticultural Centers will be given special attention.

108. Under Component 2, NATP-II will add some 15,200 crop CIGs in 163 new *Upazilas* to the 11,880 crop CIGs formed and trained under NATP in 107 *Upazilas*. Direct support to eligible crop CIGs will be through training and matching grants from the Agricultural Innovation Fund (AIF) to promote technology adoption. Farmers will benefit from the AIF support to agribusinesses (e.g., local processors, seed multiplication, exporters) through the development of sustainable market linkages.

109. This component will also focus on addressing women's needs through the creation of new and the strengthening of existing women's CIGs. Homestead gardening under NATP has proved to be an effective tool to enhance women's income and household access to nutritious food will be upscaled. In line with NAEP, the project will support male and female crop CIGs in improving their capacity for participatory development of **micro extension and production plans** where their specific needs can be addressed.

110. Under this component, the project will finance investments in the development of marketing infrastructure. Under the leadership of HORTEX Foundation, NATP piloted the establishment of 25 Commodity Collection Market Centers (CCMC) in some 20 *Upazilas*. Subject to an independent assessment of the performance of existing CCMCs, good practices learnt from NATP CCMCs (sorting, grading, washing, proper up-/off- loading, packaging) will be adopted under this component and transferred in the creation or renovation of a few key assembly/collection centers and markets in selected unions or *Upazilas*, so as to benefit the largest number of market operators and in particular a better participation of members of crop CIGs (as well as non-members) and POs in the market.

111. Further investments will be considered under this component to support the on-going collaboration of MOA's Seed Wing with IFC. This collaboration covers the development of a new Seed Act and National Seed Policy. NATP-II will support the establishment of a seed testing laboratory at the Seed Certification Agency (SCA) to analyze the quality of the seed imported and marketed, subject to confirmation from MOA of staffing availability to operate the facilities.

112. This component will enhance effective linkages between crop research-, extension-, and farming community. NATP-II will promote the participation of researchers in the *Upazila*-, Extension Coordination Committees which play a central role in coordinating the extension activities of various stakeholders. Their participation will ensure enhanced communication of production problems encountered in the field to the research stations in order to influence the research agenda, as well as the planning and implementation of demonstration/validation trials or participatory action research trials in the fields of CIG members. Increased interaction between researcher and extension workers will be supported through special training programs on newly developed technologies for DAE-officers by research staff, as well as through regular common review workshops.

Component 3: Supporting Fisheries Development (USD37 million)

113. The objective of this component is to promote an integrated approach to achieve productivity and output increases through technology transfer, as well as better market access for fish farmers. Bangladesh's fisheries sector contributes with 25 percent to agricultural GDP (2013), with a total output of 3.4 million tons valued at US\$ 6,250 million. The fisheries

sector provides about 60 percent of the animal protein intake; more than 17 million people (11 percent of the total population) are directly or indirectly involved in this sector for their livelihoods. In Bangladesh, fish accounts for the second highest share of food expenditures after rice. Aquaculture is one of the fastest growing food producing sectors in the country with an average annual growth rate of over 6 percent during the last three years. Bangladesh is considered one of the most suitable countries in the world for freshwater aquaculture, because of its favorable resources and agro-climatic conditions. Over 370,000 ha of freshwater ponds and over 3 million farmers are dedicated to aquaculture alone. Open-water bodies are heavily fished and there is probably limited scope for any substantial catch increase in inland capture fisheries, particularly from the riverine sector. Moreover, leasehold rights of the fishing communities on open-water bodies are a constraint to further investments in *beel* and *haor*²⁷; these aspects need to be adequately taken into account by NATP-II prior to technology transfer and significant investments. However, there is extensive scope for increasing fish yields in areas under aquaculture in ponds, as a large gap exists between the technology available and the fisheries practices applied.

114. Through this component, NATP-II will provide support to CIGs for the sustainable development of pond aquaculture, as well as inland capture. NATP-II will aim to add some 3,000 fisheries CIGs in 163 new *Upazilas* to the 2,376 fisheries CIGs formed and trained under NATP in 107 *Upazilas*. The high degree of economic opportunities and benefits offered by the currently available and underutilised aquatic areas for aquaculture development will be a major consideration for this component. Building on lessons learned from NATP, IAPP and other projects with a fisheries component from USAID and IFAD, a particular focus of fisheries activities will be on the impact on small-scale and marginal farmers, including women. This will be achieved through: (i) the promotion of specific fish production models (mono and polyculture) involving fish varieties such as Genetically Improved Fish (GIF) Tilapia, *pangas*, freshwater prawn, *koi* and carp; (ii) the supply of better quality fish seed; (iii) the introduction of appropriate fish feed; (iv) the application of relevant community-based fisheries management (e.g., *beel* nursery, establishment of fish sanctuary, habitat restoration, following fishing code of conduct and stock enhancement programs) for enhancing *beel* and *haor* fisheries productivity; and (v) the creation of suitable market linkages for better access to markets. This component will also promote **climate-resilient and innovative aquaculture technologies**; key related interventions include: (i) bringing short seasonal water bodies under aquaculture by implementing short production cycle models; (ii) using tolerant species in salinity-impacted areas for aquaculture; and (iii) promoting innovative technologies such as cage fish culture and pen fish farming in open water in an environmentally sustainable manner. Main beneficiaries of the open water fish culture will be landless poor fishers/farmers.

115. The reliable supply of quality fish seed is an important intervention promoted under this component. Availability and access to quality fish seed emerges as a key constraint to aquaculture development. The on-station pure-line development activity involving GIF Tilapia, *Pangas* and *Koi* successfully implemented by BFRI under the IAPP project will be continued under NATP-II and a formal linkage will be established for delivering the same within the project areas. The purpose of this activity is to improve the genetic potential of the available fish seed. This involves three interventions: stock improvement of genetically improved farm *tilapia* (GIFT) through a family selection program; stock improvement of climbing perch (Thai/Vietnamese *koi*)

²⁷ A *haor* is a bowl shaped depression which is flooded every year during monsoon. It remains under water for seven months of the year. A *beel* is a lake-like wetland with static water (as opposed to moving water in rivers and canals).

through brood stock replacement techniques; and development of pure-line Thai *pangas* for stock improvement and mass seed production. The project will also support the production and supply of quality fingerlings, including through private sector alliances.

116. NATP-II will support institutional capacity enhancement for quality control in fish feed development through strengthening knowledge and skills, as well as improving relevant facilities. With the support of technical assistance financed by the project, the DOF will improve training opportunities for stakeholders involved in production technology transfer as well for others involved in fish feed development and sales. Support to the existing 6 training centers from DOF will be provided to improve quality of training (ToT), curriculum improvement, and the upgrading of facilities. In order to supply suitable fish feed at a lower cost, the component will be promoting formulated fish feed using locally available ingredients. The focus is to encourage the preparation of fish feed suitable to the endorsed production model and also to extend the regional feed formulation by taking into consideration the locally available ingredients which influence feed cost that accounts to over 60 to 70% of the total operational cost of fish farming.

117. Under NATP-II, the number of private Local Extension Agents for Fisheries (LEAFs) will be increased to over 2,600. In the absence of public field-level extension staff from DOF, NATP had recruited and formed 1,248 LEAFs and around 1,400 additional LEAFs will be mobilized under NATP-II. However, unlike CEALs, the sustainability of LEAFs is dependent on additional income through supply of aquaculture inputs to farmers. Therefore under NATP-II, LEAFs will be eligible for AIF-3 funding to support them with the development of a small business of fisheries inputs, such as fish seed, feed and fertilizer supply. The project will further provide each LEAF with a starter kit (small goods and equipment) and assistance for mobility and connectivity (e.g., small allowance, mobile tablet, bicycle). Project-related expenses incurred to the LEAFs will be covered by NATP-II. One of the important requirements in the selection these extension agents is that LEAFs must own/manage a pond or fisheries/aquaculture related activity that is located in the same union. In other words, LEAFs will be **lead farmers** located in the same local area to be readily available for providing extension services. To the extent possible, the selection of women LEAFs will be given special attention, with provision of any additional capacity building required in order to respond to gender-based constraints in this area.

118. The component will make provisions to bring together researchers, extension officers and farmers to demonstrate innovative fish production models, with a particular focus on inclusion of women farmers. Under the project, the introduction of technological packages (fish production models) will be carried out in three stages: (i) technology demonstration in farmer's water body (real farming conditions) involving researchers, departmental extension staff, LEAF and farmers; (ii) farmer adoption trials involving district extension staff, LEAFs and farmers; and (iii) wider adoption of technological packages by farmers with the support of LEAFs. In order to ensure the linkage of research and extension the joint demonstration activities will be properly structured and budgeted.

119. Under this component, NATP-II will support investments that facilitate fish farmers' access to markets and food safety. The project will assist with the improvement of fish marketing infrastructure and management of such facilities. A special focus will be given for the preservation of fish along the value chain; this would include setting up cold storage facilities in selected market places for temporary preservation of iced fish, the setting-up of small plants supplying ice to the CIGs and two landing centers positioned close to fish production clusters. The component will support market evaluation and analysis in order to facilitate access for farmers' fisheries products

considering existing conditions and potential opportunities. The project will back the organization of two smallholder-led business-oriented fisheries POs by funding the infrastructure required, while the AIF will among others co-finance the equipment for micro-small entrepreneurs interested in processing farmers' produce in those centers.

Component 4: Supporting Livestock Development (USD47 million)

120. The objective of this component is to promote an integrated approach to achieve productivity and output increases through enhanced technology transfer, service delivery as well as a better market access for smallholder livestock farmers. The livestock sector in Bangladesh provides around 44 percent of animal protein for the people; provides employment to a large number of poor people; and contributes to poverty reduction and gender empowerment. The contribution of animal farming to the sector has remained stagnant with a share of under 13 percent of agricultural GDP over the last two decades. Milk, meat, and eggs are the three important products from the livestock sector. During the period 2008-13, the annual growth rate of animal production has increased considerably, in particular for meat (46%) and milk (55%), reflecting a considerable increase in per capita consumption of animal products, particularly in urban areas. The leap in meat and milk production and growing demands are the main driver of livestock sector growth and a significant contributor towards diversification of food production away from rice. Smallholder farms continue to be the dominant group in livestock production. Poultry and dairy farming has specific advantages over crops or fisheries, as they require less land and are least influenced by seasonality. In addition, backyard poultry production, small ruminants farming, and increasingly dairy farming, are key activities for women. The livestock sector continues to face number of constraints that will be addressed under NATP-II: wide yield gaps between the traditional and intensive/semi-intensive livestock farming; non-availability of improved breeds of animals; limited access to finances; inadequate coverage of animal health services, with animal diseases accounting for half of the livestock mortality; lack of organized market for selling livestock products; absence of a food safety regulatory mechanism; and low investment in livestock research.

121. To achieve the component's objective and address the above constraints, NATP-II will cover the following aspects of livestock development: (i) the existing gap of the union-level extension and service delivery system will be filled by mobilizing a private sector-based community extension and service delivery agent (CEAL) on a self-sustainable basis, as successfully implemented under NATP; (ii) demonstrating improved and climate resilient animal husbandry practices; (iii) expanding the outreach programs (e.g., fodder development, preventive animal health care, artificial insemination, reproductive management); (iv) community level product aggregation (milk and live animals), storage (milk) and market linkages with the private sector; (v) policies and training on livestock food safety and quality; and (vi) institutional strengthening and capacity building for disease diagnostic, feed and food analytical labs, breeding and germplasm production unit.

122. This component will support the strengthening of linkages between the research agenda of Bangladesh Livestock Research Institute (BLRI) with DLS activities. In particular research activities at BLRI needs to be synergized with the critical needs of the field livestock programs. A special focus of the collaboration between BLRI and DLS would include animal husbandry, technical support to breeding programs and breeding stations, animal health services, surveillance and control measures for the dairy, beef, and goat production.

123. **NATP-II will aim to add some 4,580 livestock CIGs in 163 new Upazilas to 3,549 livestock CIGs already formed under NATP in 107 Upazilas.** The project-supported Producer Organizations are expected to help farmers at large (CIG and non-CIG members) through commodity aggregation, market linkage, access to information, technical and financial services, and will promote the participation of women across in livestock activities (including through the promotion of women CIGs). This component will further support the establishment of women CIGs, in particular for goats, poultry and dairy.

124. **Under NATP-II, the number of private Community Extension Agents for Livestock (CEAL) is expected to increase to around 2,800.** DLS does not have any extension support and service delivery staff below the level of *Upazila*. Under NATP, this was addressed by mobilizing 1,276 CEALs, who performed an appreciable role in providing extension, preliminary health care, farmer advisory and monitoring activities, and linked *Upazila* DLS and farmers. Many of them were able to earn significant levels of income through collection of fee from the farmers for the preliminary animal health care services they provided, hence suggesting considerable potential for long term sustainability. Under NATP-II this program will be scaled up. Around 1,500 new CEALs will be recruited and trained on basic animal health care and animal husbandry on a continuous basis. The project will provide each CEAL with a starter kit (equipment) and assistance for mobility and connectivity (e.g., small allowance, mobile tablet, bicycle). Project-related expenses incurred to the LEAFs will be covered by NATP-II.

125. **In line with the principles of the proposed National Livestock Extension Policy, this component will support farmer-to-farmer extension.** NATP-II will demonstrate Good Agricultural Practices relating to dairy, beef, goat, and poultry farming through selected farmers from old and new CIGs. Regular on-site training activities, demonstration of new technologies and GAP related to breeding, feeding, health care, farm hygiene and record keeping will be organized at the demonstration farms by NATP-II for the large numbers of CIG and non-CIG farmers. NATP-II will further promote farmer-to-farmer extension by developing a network of **CIG lead farmers**. Female lead farmers will be particularly encouraged.

126. **Expanding the outreach programs to large number of farmers.** The adoption of certain technologies in livestock management requires input availability at local level and a service providing personnel to administer certain medications and vaccines. In order to benefit large numbers of farmers, NATP-II will support the expansion of the outreach programs (AI, vaccination, deworming, infertility management, feed quality analysis, fodder cultivation).

127. **There is a strong need to demonstrate climate resilient technologies and control of greenhouse gas emissions from livestock sector.** The demos will include balanced feeding with locally available feed materials, manure management (biogas units and dung pits); low cost housing solutions to combat stress; promoting saline tolerant and submerge fodder species; targeted cattle and buffalo breeding strategy; and promotion of sturdy livestock species like ducks in waterlogged and saline regions.

Table 3: Selected agricultural technologies readily scalable under NATP-II

	Crops	Livestock	Fisheries
Productivity enhancing technologies	<p>Yield gap reducing technologies for main cereals and oil crops</p> <p>Alternate Wetting and Drying (AWD) irrigation for <i>Boro</i> rice</p> <p>Summer tomato production</p> <p>Enhanced orchard establishment and fruit tree management</p> <p>Compost production and improved soil management</p> <p>Integrated Pest Management (IPM) in vegetables</p> <p>Establishment of homestead vegetable gardens</p> <p>Promotion of newly released varieties (BAU Garlic-3, BARI Lentil-7, BINA Dhan-10, ...)</p>	<p>Improved management for poultry rearing (broiler, layer pullet, local breed)</p> <p>Improved management for duck rearing</p> <p>Modern management for dairy, sheep and buffalo farming</p> <p>Enhanced beef fattening</p> <p>Goat rearing using slat system for housing</p> <p>Production management for high yielding varieties of green fodder</p> <p>Silage and hay production</p> <p>Vaccination and deworming campaigns</p> <p>Artificial insemination</p>	<p>GIF Tilapia mono culture</p> <p>Tilapia carp polyculture</p> <p>Carp polyculture</p> <p><i>Pangas</i> carp culture</p> <p>Koi Polyculture</p> <p>Freshwater prawn culture</p> <p>Cage culture: (a) GIF tilapia (b) pangus</p> <p>Pen culture (a) polyculture of carp and GIF tilapia (b) Polyculture of pangus</p> <p>Application of formulated pellet fish feed prepared using locally available ingredients suitable to different production models.</p> <p>Pure line development of GIF fish varieties (Tilapia, Pahun and Koi)</p>
Post-harvest loss reducing technologies	<p>Enhanced post-harvest handling (packaging of rice, mustard, wheat and onions)</p> <p>Cleaning, sorting, grading and packaging of vegetables</p>	<p>Liming and cold storage for egg preservation</p> <p>Chilling plants for milk conservation</p> <p>Improved slaughterhouses and dressing houses for safer meat production</p> <p>Preparation of indigenous dairy products</p>	<p>Low-cost insulation/cold storage facilities</p> <p>Promotion of Styrofoam boxes for transportation</p> <p>Enhanced fish landing centers</p> <p>Improved transport equipment for live fish</p>
Agro-food processing	<p>Private sector-led processing of smallholder produced mungbeans, oil crops, and tomatoes</p>	<p>Milk pasteurization</p>	<p>Dressed fish (<i>koi</i>, tilapia, major carps)</p> <p>Production of fish fillet, fish balls, fish nuggets</p>
Others (e.g., adaptation to climate change)	<p>Promotion of heat tolerant wheat varieties</p> <p>Promotion of saline tolerant as well as short growth cycle varieties of rice</p> <p>Off-season vegetable production</p> <p>Promotion of mushroom production</p> <p>Promotion of dry seed bed</p> <p>Climate-smart agriculture, soil conservation through zero/reduced tillage</p> <p>Promotion of <i>dhap</i> (floating vegetable culture) in low lying areas</p>	<p>Promotion of salinity tolerant fodder varieties in coastal areas</p> <p>Introduction of duck, sheep and buffalo rearing in low lying areas</p>	<p>Shrimp and Tilapia for salinity prone areas</p> <p>Short-cycle aquaculture for draught/flood prone areas</p> <p><i>Beel</i> nursery (natural depressed water body)</p>

128. NATP-II plans to pilot community level market intervention as a mean to increase smallholder farmers' participation in livestock market opportunities. Through the dairy CIGs, milk collection, chilling and small scale processing facilities will be funded by AIF-3 in selected

potential dairy pockets and appropriate market linkages will be established. To meet market demand, some local dairy companies are in discussion with IFC on financing and expanding a sustainable business model. This proposal is expected to include milk procurement and technical advisory input to the dairy CIGs. With specialized technical assistance hired by NATP-II, such a pilot could be rolled out rapidly and eventually scaled up to other dairy companies through a call for proposals. In addition, viable activities developed by NATP with other dairy companies could be reviewed and further expanded with NATP-II support. IAPP project villages will be linked to the milk markets.

129. For the promotion of goat rearing and beef production, NATP-II will support potential CIGs to aggregate live goats at union market yard. Basic facilities (e.g., weighing machines, water troughs, shelter, and more) will be developed at the market yard and the sale of live goats will be carried out on the basis of market intelligence. Efforts will be made to link these farmers' groups with goat traders and meat processing companies. Similarly, to ensure hygienic **beef production**, NATP-II will support small-scale slaughter houses through AIF-3 with basic facilities (e.g., elevated clean floor, roof railings), trainings to butchers on selection of healthy animals, hygienic slaughter, meat handling and waste management, random meat inspection by the veterinarians and laboratory analysis of meat sample. In later stages efforts will be made to link the slaughter facilities to pharmaceutical companies for the collection of animal raw materials (e.g., blood meal) and to leather companies.

130. NATP-II envisages supporting institutional capacity enhancement for the institutions playing a support role in the livestock development activities. The institutions proposed for support under NATP-II includes Central Cattle Breeding and Dairy Farm, Savar (strengthening stud bulls and semen laboratory), six field as well as one central Disease Investigation Laboratory (FDILs and CDIL), Central Animal Nutrition Laboratory, Veterinary Public Health Laboratory, Veterinary and Officers Training Institute. The assistance will include infrastructure development, modernization with advanced analytical equipment, capacity building for the technical staff, curriculum improvement, training of trainers.

Component 5: Project Management (USD12 million)

131. This component will: (i) ensure that the project is carried out in line with the provisions in the official project documents, (ii) establish liaison mechanisms between the Bank and the project, as well as between the project and GoB, and (iii) coordinate the implementation of selected overarching project activities with the support of external expertise and technical assistance.

132. In particular, under this component a range of **fiduciary activities** will be carried out, including overall financial management, reporting and auditing, coordination of procurement, procurement of common items to be used across components (IT equipment, communication equipment, bicycles, and others), and corresponding support to other components. This component will further coordinate the overall **Project Monitoring and Impact Evaluation (M&IE)** and reporting activities of the project, including baseline, midline and endline surveys for the impact evaluation.

133. Under this component, the project will implement all activities related to **communication, public awareness and outreach**, including setting up a comprehensive project website that will also accommodate a space for capturing stakeholders' complaints and other observations regarding project activities.

134. Finally, under this component, the project will finance a variety of technical reports as well as **analytical studies** in support of evidence-based policy decisions relevant to agricultural research, extension, production, post-harvest handling and commercialization. This work will include commodity-specific market and value chain analyses, and the preparation of sector **policy notes** for senior decision makers. Studies would also include the development of strong analytical underpinnings in support of the preparation of a follow-up investment operation (possibly an NATP-3). This component will also fund an independent performance assessment of the AIF, as well as a baseline survey and stakeholder's analysis, and mid-term and end-of-project surveys for the development of a comprehensive impact evaluation.

Annex 3: Implementation Arrangements

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

Project Institutional and Implementation Arrangements

135. **NATP-II will be implemented under the responsibility of the Ministry of Agriculture (lead implementing agency) and the Ministry of Fisheries and Livestock.** NATP-II is a project fully **integrated in the GoB administration** and project implementation is designed to promote the use of existing GoB structures at central level, and when available, at decentralized levels. Where institutional capacity is limited and special skills are required, the project will reach out to outside expertise, including international technical assistance and consulting services. A **Joint Project Steering Committee (JPSC)**, composed of senior representatives from the agencies under MOA and MOFL involved in project implementation, as well as representatives from other relevant ministries, the Planning Commission, farmers and private sector, will provide overall strategic guidance, approve annual budget and activity plans, monitor overall implementation progress, facilitate interagency coordination required for smooth project implementation, and resolve any outstanding issues requiring high-level decision. Overseeing project implementation and coordinating among agencies will be delegated to a Project Management Unit (PMU).

136. **A PMU will be set up to oversee implementation of project activities, carry out day-to-day project management functions, facilitate coordination among components, and liaise with the World Bank on all project implementation related aspects.** The PMU will be headed by a full-time Project Director (PD) on deputation for the duration of the assignment; the PD will report to the JPSC. A Deputy Project Director (DPD), affiliated to a different ministry from the PD's will also be appointed. PD and DPD will be appointed by the relevant ministries, in consultation with the Bank, on the basis of ToRs acceptable to the Bank. All technical positions at PMU will be filled with individual consultants competitively recruited and subject to the Bank's prior review. The PMU will need to acquire the services of a limited number of high level technical specialists for cross-sectional work (preferably through a **technical assistance provider** with a pool of national/international experts for M&E coordination, gender promotion, project communication and public awareness, producer and marketing organizations, ICT solutions for agriculture, sector coordination, and research-extension linkages). Finally, in line with common practice in other Bank-funded operations in Bangladesh, the PMU will hire the services of a **Monitoring and Impact Evaluation** consulting firm with international expertise, to design and coordinate the stakeholders' analysis and impact surveys, develop a comprehensive project M&E framework, process project data, and compile all implementation progress reports including an updated Results Framework. Prior to project effectiveness, the PMU will submit for Bank clearance a complete **Project Implementation Manual (PIM)** detailing the operational, financial and administrative procedures of NATP-II. The PMU will also be responsible for the implementation of Component 5.

137. **All other project components will be integrated in the corresponding line department (or agency); each department/agency will set up a component-specific Project Implementation Unit (PIU).** Under MOA, BARC and DAE will each set up a PIU for the implementation of Component 1 (Agricultural Technology Generation) and Component 2 (Crops), respectively. Under MOFL, DOF and DLS will each set up a PIU for the implementation of Component 3 (Fisheries) and Component 4 (Livestock), respectively. All PIUs will be headed by

a full-time Director on deputation from the respective department/agency;²⁸ the core PIU positions will be staffed with in-house personnel on deputation, complemented with openly recruited consultants (e.g., financial management /environment/social specialists). To coordinate the implementation of component-specific project activities, the PIUs will use – in a manner consistent with GoB and World Bank fiduciary requirements – project funds allocated to the respective components (including for covering operating costs). Project activities in the field will involve district and *Upazilas* administration staff and be coordinated (or carried out) at union level by extension staff from DAE as well as LEAFs and CEALs recruited by the project.

138. Using project funds, DOF, DLS and BARC will recruit **service providers** (e.g., international institution, agro consulting firm, academia, or others) to deliver the technical assistance needed for strengthening their institutional capacity and supporting their respective PIUs with the implementation of component-specific activities. It has been agreed that the HORTEX Foundation, a public company under MOA, who implemented the pilot Supply Chain Management Component under NATP, will be strengthened with national/international consultants to provide such technical assistance in Component 2 under a Bank-approved **strategic partnership** arrangement with DAE (single source consultant firm contract²⁹). Furthermore, to introduce the use of video-based ICT in support of extension and knowledge transfer activities, the project could consider making use of single source selection to hire the services of a Digital Green³⁰ who has successfully been providing similar services in Bank-funded development projects in South Asia and Africa.

139. The guiding principles for the implementation arrangements of the AIF can be found in Annex 8.

Financial Management and Disbursements

Financial Management Capacity

140. **The project will develop an integrated FM system for all the PIUs.** The present accounting system is cash-based, follows single-entry bookkeeping, and does not include a statement of assets and liabilities. Although the proposed PMU and PIUs (BARC, DAE, DOF, and DLS) have gained adequate FM experience by working with the Association, there are still opportunities to improve the capacity for FM functions. These capacity improvement areas have been highlighted in the recently completed IFR (Integrated Fiduciary Review) and include, among others, improving audit trail/record keeping, enhancing asset management, addressing the incomplete fund reconciliation between PMU and accounting centers, and further clarifying general financial rules. Adequate risk-mitigating measures will be introduced during the first year of project implementation to strengthen financial management.

²⁸ In the event that a suitable consultant cannot be recruited for the position of PD and a staff from MOA is then recommended instead, the JPSC shall also recommend the PIU Director from either DLS or DOF to be the nominal NATP-2 Deputy Director.

²⁹ The consultant contract between DAE and HORTEX (subject to Bank's Prior Review) will provide details regarding the fiduciary, reporting and auditing requirements for HORTEX.

³⁰ Digital Green is an international non-profit development organization that builds and deploys information and communication technologies to amplify the effectiveness of development efforts to affect sustained, social change globally. Digital Green's approach combines technology and social organization to improve the cost-effectiveness and broaden the community participation in existing best practices (see also: www.digitalgreen.org).

Budgeting

141. A budget will be maintained for the entire term of the project, and detailed budgets for each fiscal year on each project component and cost category will also be produced to provide a framework for FM purposes. The annual budget, by source of funding and application of funds, will be prepared on the basis of the procurement plan and any other relevant annual work plans. These budgets will be monitored periodically to ensure actual expenditures are in line with the budgets, and to provide input for necessary revisions. The project budget will be included in line departments' overall budget. Given that resources are scarce and designated, it is important to stay within the budget and to ensure that cost and physical performance are well synchronized. Failure to stay within budget could result in unnecessary costs associated that may be incurred if liabilities are not settled as they fall due. The proposed accounting software would include budgetary control feature that will enable project accurate tracking of actual expenditure on a similar chart of accounts as the budget, and the preparation and review of regular budget monitoring reports

Internal Control

142. *Filing and Record-Keeping:* PMU and all PIUs will preserve all procurement records and documents in accordance with provisions of the Public Procurement Act 2006 (PPA 2006). These records must be made readily available on request for audit/investigation/review by GoB and the Bank. The PMU will retain copies of supporting documents for all project transactions. All project related documents must be filed separately to facilitate internal and external audits, as well as reviews by the Bank.

143. *Controls:* The financial procedures should include adequate internal control to provide reasonable assurance that: (a) operations are being conducted effectively and efficiently; (b) financial and operational reporting are reliable; (c) applicable laws and regulations are being complied with; and (d) assets and records are safeguarded. At a minimum, the procedures should include the following measures: (a) Reliable personnel with clear responsibilities i.e. segregation of duties, including separation of operational responsibility from recordkeeping responsibility, separation of the custody of assets from accounting, (separation of the authorization of transactions from the custody of related assets, and separation of duties within the accounting function; (b) Adequate financial records management system with complete audit trail; (c) Physical safeguard, including use of safe, locks, guards, limited access, and access by authorized persons to provide security for program assets; (d) Independent check, with procedures made subject to random independent reviews by internal auditors.

144. The project will use dedicated software to account for project transactions and all transactions must follow GoB review and approval procedures. Such controls have been reviewed and found satisfactory. **Signatories for the bank account** for project financing must include the PD and the Deputy PD to facilitate transaction, who would also act as custodians of the checkbooks for this account. In all PIUs the respective unit head responsible for project will be the signatory for designated OA. The senior FM Specialist will be responsible for reconciliation of the project bank account on a monthly basis, and any irregularities must be addressed in a timely manner.

145. *Internal Audit:* Internal Audit is a control that functions by examining and evaluating the adequacy and effectiveness of other controls throughout an organization. Internal audits will be carried out by an external professional auditing firm (recruited by the PMU) at least three times over the lifetime of the project. The **first internal audit** will be due by the end of the second year

of implementation. The subsequent audits will be carried out on a yearly basis. In each case, the project must submit the internal audit reports to the Bank within fifteen days from the receipt of the report. The internal audit activities should include prepayment audits as well as independent appraisals of the financial, operational, and control activities in the sector. The responsibilities of the internal auditors should include reporting on the adequacy of internal controls, the accuracy and propriety of transactions, the extent to which assets are accounted for and safeguarded, and the level of compliance with financial procedures and government laws and regulations. The **terms of reference** for the internal audits shall be prepared by the PMU's FM Specialist and must be submitted to the Bank for concurrence.

Governance and Oversight Arrangements

146. *External Audit:* The Foreign Aided Projects Audit Directorate (FAPAD) of the Comptroller & Auditor General's (CAG) would conduct an audit of the project's annual financial statements within six months from the end of the fiscal year. The PD will be responsible for audit follow-up and taking remedial actions. Meetings to resolve audit objections must be held within three months of the receipt of the external audit report from FAPAD. Under the ongoing project, there is no audit report overdue by the existing implementing agencies.

147. *Staffing:* Given the FM capacity and shortcomings of the internal control environment, the project will hire a Senior FM Specialist. The Senior FM Specialist must be a qualified professional accountant with adequate knowledge of project FM requirements of GoB and World Bank, and with a proven experience in working with computerized accounting systems. The consultant selection process must be prioritized so that the positions are filled from project effectiveness. The Senior FM Specialist will report to the PD and be assisted by qualified Accounts Officers/Accountants in order to carry out day to day activities. The key FM staffs will be placed in the PMU to administer the overall FM functions of the project while the other PIUs for each component will have adequate functional staff to manage record and report accounting information to the PMU.

148. The PMU, PIUs and every spending unit should maintain, during the project period, staff in positions agreed for handling finance functions. In the PIUs, the FM staff (in-house or hired) will be responsible for maintaining project accounts, maintaining internal controls and for providing expenditure statements to PMU. All staff undertaking these functions on a full or part-time basis will be provided training and on-going back-up support by the PMU to ensure compliance with fiduciary requirements of GoB and the project.

Accounting Policies and Systems

149. **The accounting policies and procedures of the project will be governed by the existing GoB system** outlined in the Project Accounting Manual of the Ministry of Finance. The PMU will have the primary responsibility to maintain a FM system, including adequate accounting and financial reporting, to ensure that they provide to the Bank and GoB accurate and timely information regarding project resources and expenditure. All project related transactions, i.e. all sources (IDA, USAID, IFAD and GoB) would be accounted for separately in the PMU following double-entry book-keeping principles and on a cash basis.

150. **The key project accounting functions for which PMU would be responsible** are as follows: (i) budget preparation and monitoring; (ii) payments for eligible project expenditure to NGOs/third parties; (iii) disbursement of project funds to various agencies as per approved work

plan; (iv) maintenance of books and bank accounts; (v) cash flow management including advance reconciliation among DAs and Operating Accounts; (vi) consolidation of financial reports from PIUs and submission to GoB, World Bank and other stakeholders; (vi) preparation of Withdrawal Application to claim funds from the World Bank, including IFAD fund; and (vii) assistance to external auditor and ensuring appropriate follow up of audit.

151. **The key accounting function for which PIUs would be responsible are** as follows: (i) fund requisition to PMU on the basis of six months estimated expenditure and approved work plan; (ii) transfer of funds to bank accounts of selected Upazilas of DAE, DLS and DOF on the basis of 3-month estimated expenditure and approved work plan of these agencies; (iii) preparation of standard reporting format (fund utilization report) for spending units; (iv) consolidation of reports from spending units together with bank statements; (v) submission of reports to PMU; and (vi) assistance to internal and external audit and timely response to audit.

Disbursement and Flow of Funds

152. **There will be three separate Designated Accounts (DA) for IDA, IFAD and USAID TF** in the form of a Convertible Taka Special Account (CONTASA) in a commercial bank acceptable to the Association. The IDA and IFAD DA will be used by the PMU solely for the purpose of financing all components of the project, while the USAID TF DA will be used by the PMU solely for the purpose of financing AIF-1's Competitive Research Grant program. Disbursement to the Designated Accounts will initially be SOE-based, i.e. on the basis of advances and replenishments. After one year of implementation, the Bank will review the FM performance and may recommend converting the disbursement modality to one based on interim unaudited financial reports (IUFs) including a six-monthly forecast of fund requirements. GoB contributions would be channeled through MOA and MOFL. Implementing departments/agencies would ensure that approved programs costs are included in budgets of respective ministries. The designated PD of PMU and, in his/her absence, the deputy, will be the authorized persons for operating the account. Project Implementation Units (PIUs) in other executing agencies, such as DAE, DOF, DLS, and BARC, will maintain separate operating accounts (OAs; for each agency: one OA for IDA and IFAD joint co-financing, and another one for USAID parallel cofinancing). PMU will be responsible for transferring IDA, IFAD and USAID funds to the operating accounts on the basis of six-month estimated expenditure and approved work plans of these agencies. The head PIU and their deputies will be the authorized persons for utilizing funds in the operating accounts. Advances from Designated Account to the Operating Account will need to be accounted for, preferably within 30 days but in no case beyond 90 days.

153. No **allowance** (per diem, honoraria, sit-in allowance, travel allowance, and others) shall be handed out as cash payment to trainees/participants and trainers/resource speakers in NATP-II training, knowledge transfer, or other capacity building activities (including workshops, seminars, and others). Instead, all such allowances (except for sit-in allowances, which are not eligible for IDA financing) should be paid via bank wire into the personal bank account of the eligible recipient (or CIG bank account in case of training for CIG farmers); allowances should be paid at the official rates applied by GoB at the time of the event.

Procurement

Implementation Arrangements in NATP2- Procurement

154. NATP-II procurement arrangements are consistent with the project's implementation plan:

one Project Management Unit (PMU) and four PIUs with the line agencies, namely DAE, BARC, DLS and DOF. Total volume of procurement under the project is around US\$ 53 million, with around US\$ 40.42 million procured in first 18 months. The first 18 months' agency-wise procurement distribution is presented below:

Procuring Entity	Procurement Volume (in million US\$)	Goods	Works	Services	Non-consultancy services
PMU	6.94	0.24	0	6.70	0
DAE	12.89	5.31	3.73	3.86	0
BARC	10.13	3.48	2.00	4.65	0
DLS	5.02	2.99	0.39	1.64	0
DOF	5.43	3.95	0	1.48	0
Total	40.42	15.97	6.12	18.33	0

Note: A few items which are the same for the four line agencies will be procured through the PMU

Review of Organization's (Line Agencies') Procurement Strategy

155. None of the line agencies have a specific procurement strategy, and the general practice is Public Procurement Act 2006 (PPA) and Public Procurement Rules 2008 (PPR). However individual line agencies have in their institutional policies and strategy documents several references to procurement.

Analyzing Procurement Portfolio and Developing a Procurement Profile

156. The Bank reviewed procurement activities of all four line agencies but the order and quality of recordkeeping in all of those is sub-standard, with the only source of information available being the reports and procurement plans of the previous project. This is done in the following three steps:

(a) Spend Analysis: Analysis of past and projected procurement expenditure was done based on the following parameters: (i) Spend and number of transactions per item, (ii) Number of suppliers per item, (iii) Average contract value per item, (iv) Total expenditure per supplier, (v) Spending distribution per agency, (vi) Number of procurement officers and consultants involved

(b) Risk Analysis: This is basically done in three levels: each line agency, the project and procurement environment. The Bank's standard application Procurement Risk Assessment and Management System (PRAMS) has been used to assess agency and project-level risk. The four line agencies' performance in NATP was also taken into consideration. The procurement environment was assessed based on the following parameters: (i) how critical the goods, works and services are to the line agencies, (ii) difficulty in securing the procurement items, (iii) market-related risks, (iv) supplier-related risks (v) nature of supply market (vi) probability of market failure (vii) strategic importance to line agencies

(c) Developing Procurement Profile: Based on information provided in the procurement plans, risk mitigation reports and mission aide memoirs, along with identified level of risk and the relative expenditure for each commodity or category of spend; the procurement portfolio was categorized as follows: (i) routine products (e.g., computers and accessories, furniture, stationeries, bicycles, photocopier, air

conditioner, multimedia projectors, junior and mid-level consultants, printing of books/manuals); (ii) bottleneck items (e.g., motorcycles, laboratory apparatus, chemicals, water testing kits, laboratory equipment, MIS applications incl. maintenance); (iii) leverage products (e.g., cross-country vehicles, special laboratory equipment); and (iv) strategic products (e.g., senior individual experts/consultants).

Analyzing Organizational Procurement Functions and Capability for NATP-II

157. This analysis was done parallel to the procurement portfolio, based on (i) roles, responsibilities, structure and reporting, (ii) procurement systems and processes and knowledge of their applications, and (iii) procurement skills and capacities. As a practice, all four line agencies depend heavily on procurement consultants funded through different projects. Among GoB officers, based on information received from NATP PMU, DAE, BARC and DLS each have only one person with national three-week training on public procurement. DOF has three such trained personnel. For each agency, this figure has to be increased to at least 10 within the first 12 months of the project (by June 30, 2016) and in each line agency PIU, at least three trained officers will be attached full-time. However, the project will need the services of **6 Procurement Specialists** (i.e. 6 consultants recruited competitively: 2 at PMU level³¹ and 1 at each PIU). This procurement consultant team will be responsible for handling all contract management issues and will provide systematic knowledge transfer to implementing agencies for long term organizational capacity development.

Procurement Risk Assessment and Management

158. The four line agencies concerned have experience in managing Bank financed procurement. However their human resources capacity is not sustainable as it is heavily dependent on consultancy services. Lessons learnt from NATP include excessive staff-power for fiduciary works. Each implementing agency had individual procurement and financial management consultants. Even after that, there was always ambiguity in giving procurement solutions. Based on past performance under NATP, on the number of staff trained in procurement and on the past performance of procurement plan implementation, the four line agencies have **substantial procurement risk**. This is consistent with the country governance context and from the standpoint of procurement operation and contract administration. Several measures to mitigate the risks are either in place or will be put in place as described below.

(a) Fewer and larger procurement packages: Design the procurement packages in a manner that will reduce the number of packages and increase the size without compromising competitiveness thus ensuring adequate due diligence and control by both the implementing agencies and the Bank. This measure is also the principle by which the PMU will coordinate the pooled procurement process for elected goods or services that are common to two or more project components, as agreed under the procurement plan. Each PIU will have a lot for itself in case of pooled procurement and PMU will also have a separate lot. Procedures for procuring same items are provided in Table 4 below as a project specific arrangement in addition to provisions under the Government's PPA/PPR. This procedure will be duly reflected in the PIM of the

³¹ At PMU level, the 2nd procurement consultant may be recruited only until MTR. All others (including for PIUs) should be hired until no more than 12 months prior to project completion

project.

(b) Bid/Proposal Evaluation Committee: All of the four implementing agencies and PMU shall ensure that the **bid/proposal evaluation committees** are formed in a manner acceptable to the Bank, and Bank's no objection shall be required on the formation of the bid/proposal evaluation committees.

(c) Larger contracts, more ICB/NCB packages and less shopping contracts: In case of contract packages warranting competitive bidding processes, the PMU will provide advice and ensure that the procurement plan includes as less shopping (Request for Quotations, RFQ) packages as possible. In NATP and other projects in Bangladesh, shopping has caused the highest number of unacceptable bidding practices resulting in remedial actions by the Bank. In every case, the PMU will make best effort to make contracts packages as large as practicable, which may result in better qualified bidders and economies of scale.

(d) Introducing electronic procurement plan and monitoring system: Electronic procurement plan and monitoring system (SEPA) will be used to prepare and regular updating and getting no objection of the procurement plans of this project.

(e) Adopt contract implementation monitoring tool by PMU and four line agencies: This tool will project quarter-wise milestones for each contract under the Project and related disbursement, and will track its accomplishments. The agencies will report to the Bank on a quarterly basis on the accomplishment of milestones and related disbursement against the target set in this tool. Specific reporting requirements/milestones and related disbursement figures will be finalized during project implementation in agreement with the Bank.

(f) Due-diligence measures: the following steps will be followed as part of procurement and implementation arrangements:

- (i) by December 31, 2016 all line agencies under NATP-II will have at least ten persons with completed national three-week training on procurement and all concerned officers for NATP-II will have completed specialized training arranged by line agencies on red flags of fraud and corruption;
- (ii) all bid evaluation reports will cover verification of recommended bidders' post-qualification information (for goods and works);
- (iii) all contract negotiations will be preceded by additional due diligence by line agencies on verification of recommended consultants' experience and curriculum vitae of key staffs (for consultancy services);
- (iv) make bidders generally aware about fraud and corruption issues;
- (v) award of contracts within the initial bid validity period, and closely monitor the timing;
- (vi) take action against corrupt bidders in accordance with Section I of the Bank's Procurement/Consultant Guidelines besides provisions of PPA/PPR;
- (vii) preserve records and all documents regarding public procurement, in accordance with the Bank Guidelines and PPA/PPR, to facilitate smooth

procurement audit or post-review;

- (viii) publish contract award information on CPTU and line agencies website within two weeks of contract award (and in UNDB and Bank’s external website for ICBs or international consultancies); and
- (ix) ensure timely payments to suppliers/contractors/consultants; line agencies’ procurement performance monitoring will use GoB’s PROMIS format.

Identifying Strategic Procurement Objectives under NATP-II

159. Measures on Spend Categories: After analyzing the procurement performance and practices of NATP, a few key strategic procurement objectives have been identified. The full result of earlier analyses has been used as input.

Category	Supply Difficulty	Relative Expenditure	General Objectives	Solution
Routine	Easy	Low	Minimize Administrative Effort	<ul style="list-style-type: none"> • Use PMU to procure common items (bicycles, ICT equipment, and others). • Supply and acceptance test at agency field office premises. • Post-sales services contracts at agency level.
Leverage	Easy	High	Reduce Total Expenditure	<ul style="list-style-type: none"> • Use PMU to procure common items. • Introduce long-term contracts (lab consumables, chemicals)
Bottleneck	Difficult	Low	Ensure supply quality and continuity	<ul style="list-style-type: none"> • Use PMU to procure common items. • Long-term life-cycle costing and contracting (specific/patented lab equipment)
Strategic	Difficult	High	Manage supplier relationship and reduce risk and cost	<ul style="list-style-type: none"> • Use PMU to procure common items • Use single source contracts for strategic partnerships (i.e., HORTEX, Digital Green) • Maintain a pool of short-term consultants for indefinite delivery contracts

160. Procurement Management Objectives: Improving the capability of the project agencies in a sustainable manner will be a focus in this project. The two Senior Procurement Specialists at PMU level and 4 Procurement Specialists at PIU level will have systematic capacity development of agencies included in their contract deliverables. At each agency level, roles, responsibilities, structure, reporting, procurement systems, skills and capacities will be used at optimized ways. Such objectives are:

- (a) Increase coordination of common user items across the agency (like the common procurement items by PMU under the project).
- (b) Introduce electronic procurement system (e-GP) by using national e-GP system.
- (c) Develop a roadmap to ISO 9001 compliance for at least one agency during the project.
- (d) Increase number of officers with procurement accreditation or certification.

Procurement Process - Planning, Requirement Definition, Sourcing and Market Research

161. Planning: The key aspects of efficient procurement planning would consider: (i) advance identification of suitable suppliers through market survey, (ii) development of standard specifications and TORs, (iii) key performance indicators in line with Government's procurement performance indicators (PROMIS), (iv) effective and timely completion of procurement and supply/completion of contract, (v) early identification of needs and right quantities, (vi) close monitoring of the plan, (vii) avoiding unnecessary exigencies and urgencies, enabling full compliance with Bank Procurement Guidelines and Government's PPA/PPR, (viii) examine alternative procurement approaches, and (ix) systematically and procedurally correct procurement performance based on PROMIS reporting outcome.

162. Requirement definition: Necessary requirement definitions are spelled out in the Bank's Procurement and Consultant Guidelines, as well as the standard bidding documents,, requests for proposals and contracts for goods, works and services. The Procurement Specialist in each line agency will ensure: (i) no competition hindrance i.e., use of brand names, (ii) exact technical and quality needs, (iii) avoid over-/under-specifications, (iv) non-ambiguous and generic technical specifications and TORs, (v) advice line agency on completeness of procurement items, sourcing of supplies and determining most practical procurement methods. Key steps of this function in the following sequence: (i) requirement analyses; (ii) information gathering; (iii) writing specifications/TORs; and (iv) requisitioning and process scheduling.

163. Sourcing (Market Research): This will be done in parallel with Requirement definition above; technical market research is done while developing technical specifications and TORs. Market research identifies suppliers, products, long list of consultants etc. Open wide advertisement is a key way to collect market information, along with collection of information through internet, reference and other previous project database. Special skills are required for market research and developing specifications database. Agency officials would need to attend specific national and international training programs in order to develop the necessary skill set. The following table lists available sources of information to complete market survey of requirements under the procurement plan:

Internal	<ul style="list-style-type: none"> • Established rosters, shortlists • Former contracts • SPC, MPC and colleague consultation
MDB and UN Systems	<ul style="list-style-type: none"> • UNDB and dgMarket contractor/supplier and consultant (DACON) list • Enlistment of UN agencies
Internet References	<ul style="list-style-type: none"> • Regional trade directories • Yellow pages (local suppliers) • Product-specific resources like Alibaba.com™ • Professional networks like "LinkedIn" (consultants)
Other	<ul style="list-style-type: none"> • Commercial/specialized journals • Chambers of commerce, trade delegations, permanent missions, Government procurement database • Business seminars • Published financial reports

164. Through the market survey, line agencies may meet with prospective suppliers and consultants, within the following baseline on transparency and fairness:

- (a) Maintaining the sensitivity of the supplier market, no biased specification or perception of favoritism;
- (b) No bidder/consultant would be given an unfair advantage through up-front information, and any information provided will be published or sent in written to all suppliers/consultants;
- (c) No bidder/consultant should get an impression that they have an increased opportunity to be awarded a contract, unless specifically advised by the Procurement Specialists about the relative commercial advantage of direct contracts and single source selection on a case-by-case basis.

Selecting Procurement Strategy - Applicable Legislation, Primary and Secondary (Methods and Standard Documents)

165. Procurement financed under the project will be carried out in accordance with the World Bank's "*Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers*" dated July 2014 (Procurement Guidelines) and "*Guidelines: Selection and Employment of Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers*" dated July 2014 (Consultant Guidelines), and the provisions stipulated in the Financing Agreement.

166. **Methods for Goods and Works:** Except as otherwise agreed in the procurement plan, works and goods may be procured on the basis of **International Competitive Bidding (ICB)**. Procurement of goods and works having estimated value less than the ceiling stipulated in the Procurement Plan may follow **National Competitive Bidding (NCB)**, Framework Agreement, and Shopping. NCB would be carried out under Bank Procurement Guidelines following procedures for **Open Tendering Method (OTM)** of the People's Republic of Bangladesh (Public Procurement Act 2006 - PPA, 1st amendment to PPA (2009) and The Public Procurement Rules 2008, as amended in August 2009) using standard/model bidding documents satisfactory to the Bank. **Shopping** will be carried out based on a model document satisfactory to the Bank. Framework Agreements can be used as an alternative to NCB and shopping methods in cases consistent with the Procurement Guidelines. **Direct Contracting** (Goods/Works) may be allowed under special justified circumstances with prior approval of the Bank.

167. For the purpose of NCB the following shall apply:

- (a) Post bidding negotiations shall not be allowed with the lowest evaluated or any other bidder;
- (b) Bids should be submitted and opened in public in one location immediately after the deadline for submission;
- (c) Lottery in award of contracts shall not be allowed;
- (d) Bidders' qualification/experience requirement shall be mandatory;
- (e) Bids shall not be invited on the basis of percentage above or below the estimated cost and contract award shall be based on the lowest evaluated bid price of compliant bid from eligible and qualified bidder; and

(f) Single-stage two-envelope procurement system shall not be allowed.

168. **Methods of Procurement of Consultants' Services:** Selection of Consultants will follow the Bank's Consultant Guidelines and the Bank's Standard Request for Proposals (SRFPs) is applicable for all types of selection processes. The following methods will apply for selection of consultants: **Quality and Cost based Selection (QCBS), Quality-based Selection (QBS), Fixed Budget Selection (FBS), Consultants' Qualification (CQ), Least Cost Selection (LCS), and Single Source Selection (SSS)**. Shortlist of consultants for services estimated to cost less than US\$500,000 equivalent per contract may be composed entirely of national consultants. Single Source Selection (Consultants) may be allowed under special circumstances with prior approval of the Bank. The Procurement Plan will specify the circumstances and threshold under which specific methods will be applicable, along with the Bank's review and implementation support requirements. All **ToRs for consultant services** and detailed cost estimates for the assignment are subject to the Bank's prior approval.

169. **Use of Standard Procurement Documents:** For procurement through International Competitive Bidding and for selection of consultants, the Bank's Standard Bidding Documents (SBDs) and Standard Request for Proposals (SRFPs) will be used, including the form of contract attached with SBDs and SRFPs. For all NCB packages, the implementing agencies will use tender documents based on model tender documents (MTD) agreed with the Bank.

Electronic Government Procurement (e-GP)

170. **All NCB procurement under NATP2 will be allowed to be done through electronic government procurement (e-GP).** e-GP has been rolled out in June 2011 under the Government's Procurement Reform. The Bank has approved the system to use in NCB contracts under Bank-financed project in Bangladesh. The following steps will be implemented by NATP-II in order to gradually implement e-GP; until full readiness has been determined, regular procurement procedures will apply.

- (a) Assessment of its readiness and technical capacity to do e-GP and identify hardware, software and training needs (December 2015). This readiness will include, among others, computer hardware, availability of adequate bidders (list of bidders generally participating in concerned line agency) and robustness of internet connectivity.
- (b) Acquire necessary training on e-GP (June 30, 2016)
- (c) Conduct a campaign to all its bidders in the past on move to e-GP (June 30, 2016)
- (d) Pilot e-GP in each line agency and at PMU with one contract per procuring entity within 6 months after project effectiveness.
- (e) The Procurement Specialists of each line agency and the PMU will be proficient in e-GP and will function as main trainer for each line agency.

Sustainable Procurement

171. Beside financial and commercial factors, the bidding documents to be used for NATP will include as much as practicable, economic, social and environmental considerations in line with responsible and sustainable procurement. These are, but not limited to:

- (a) Value-for-money considerations including price, quality, availability and functionality;
- (b) Life cycle costing of certain products (sophisticated laboratory equipment, vehicles, motorcycles, and others)
- (c) Green procurement principles, reducing pollution, waste and hazardous substances, using renewable energy, reliable, non-hazard and recyclable raw materials in supplied products.
- (d) Aspects of poverty reduction, eradication of inequality in gender and resource distribution, labor conditions, fair trade, human right, and others.

Measuring Results and Performance Monitoring

172. Line agencies' procurement performance monitoring will use Government's PROMIS format. This requires agencies' authorization from CPTU and registration with the online PROMIS tool. This registration needs to be completed before the first contract in NATP-II is awarded.

Procurement Plan (18 months)

173. For each contract to be financed by the Project, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements and time frame are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan dated May 7, 2015 of all five project components has been prepared by the agencies in agreement with the Bank and submitted to Bank's approval in consolidated form. It will also be available in the Project's database and in IDA's external website for this project. Besides, all expected major procurements will be announced in the General Procurement Notice (GPN), published in the Bank external website and United Nations Development Business (UNDB). The procurement plan will be updated semi-annually or as required and will be the basis of Bank's procurement supervision plan. Bank's electronic procurement plan and monitoring system (SEPA) will be used to prepare and regular updating and getting no objection of the procurement plans of this project. Officials from all four line agencies received training on SEPA prior to appraisal of the project.

174. All **motorized vehicles** purchased for NATP-II to implement and supervise project activities will be financed at 100 percent by the GoB contribution to the project (parallel co-financing from GoB). No proceeds from the IDA credit, IFAD loan or USAID TF will be used to finance motorized vehicles. Motorized vehicles will be listed separately and procurement procedures, estimates or other aspects of procuring these items will not need IDA's review or no objection. At appraisal, counterparts identified the need for a total number of vehicles not to exceed 71 non-luxury vehicles. It is understood that purchased vehicles will be assigned for the lifetime of the project to each PIU and the PMU for project related functions only. Most vehicles are required by district offices and selected NARIs for monitoring project activities in the field. The information pertaining to the procurement, type, use and assignment of project vehicles will be inserted in the GoB's DPP.

175. The participation of project and/or line agency staff in training activities is not reflected in the Procurement Plan. Instead, a draft **Annual Training Plan** for PMU, PIU, line agency and other GoB staff for which project funding is expected to be solicited, will be submitted for Bank approval; no participation by project and/or line agency staff in a training activity will be financed

with project proceeds without the activity being included in an Annual Training Plan acceptable to the Bank. ToRs and cost estimate for each training activity in the Annual Training Plan should be sent to the Bank for prior approval. Training includes also workshops, seminars, tours, conferences, and the like.

Bank Implementation Support

176. **Prior review Thresholds.** The initial 18-month Procurement Plan agreed with PMU and the line agencies indicates the agreed prior review thresholds based on initial capacity assessment and mitigation measures. This will be updated annually or semi-annually during implementation support missions, based on the integrated fiduciary assessment at supervision (IFAS), and will be reflected in the updated procurement plan as appropriate. In case of a contract package awarded in the form of lots or sub-packages, the combined estimated cost of all lots/sub-packages in a particular procurement package will determine whether it is subject to prior- or post-review.

177. **Post Review.** For compliance with the Bank's procurement procedures, the Bank will carry out sample post review of contracts that are below the prior review threshold. Such review (ex-post and procurement audit) of contracts below the threshold will constitute a sample of about 15 percent (fifteen percent) of the post-review contracts in the project. Procurement post-reviews will be done on annual basis depending on the number of post-review contracts.

Table 4: Procurement process for pooled procurement for selected goods and services

	Key Processing Steps	PMU	Implementing Agencies				
			Ministry of Agriculture			Ministry of Fisheries and Livestock	
			PMU	PIU DAE	PIU BARC	PIU DOF	PIU DLS
1	Preparing initial procurement plan for Negotiations	coordinates	prepares	prepares	prepares	prepares	prepares
2	Approving procurement plans	coordinates	HOPE approves	HOPE approves	HOPE approves	HOPE approves	HOPE approves
3	Transferring procurement plan to SEPA	combines (including PMU's own requirement) and enters in SEPA	-	submits to PMU	submits to PMU	submits to PMU	submits to PMU
4	Seeking IDA's no objection	submits PP through SEPA; provides clarifications	-	clarifies to PMU	clarifies to PMU	clarifies to PMU	clarifies to PMU
5	Combining common items into larger packages	conducts	-	-	-	-	-
6	Packaging	prepares 2 packages with 4 lots (4 contracts)	Lot A	Package 1 Lot B	Lot C	Package 2 Lot D	Lot E
7	Advertisement	advertises for all packages	-	-	-	-	-
8	Receiving bids	receives for all packages	-	-	-	-	-
9	Evaluating bids	evaluates all and prepares 4 bid evaluation reports	-	-	-	-	-
10	Submitting evaluation reports for approval (as per GoB's delegation of financial powers)	submits 4 BER to relevant approving authorities	HOPE or delegate approves	HOPE or delegate approves	HOPE or delegate approves	HOPE or delegate approves	HOPE or delegate approves
11	Issuing notification of award	coordinates	issues	issues	issues	issues	issues
12	Receiving performance security	coordinates	receives	receives	receives	receives	receives
13	Signing contracts	facilitates	signs with contractor	signs with contractor	signs with contractor	signs with contractor	signs with contractor
14	Contract management including dispute resolution	assists IAs with technical and legal support	manages	manages	manages	manages	manages
15	Procurement plan updates during project tenure	combines and enters in SEPA		submits to PMU	submits to PMU	submits to PMU	submits to PMU
16	Approving procurement plan updates	coordinates	HOPE approves	HOPE approves	HOPE approves	HOPE approves	HOPE approves
17	Seeking IDA's no objection	submits PP through SEPA; provides clarifications		clarifies to PMU	clarifies to PMU	clarifies to PMU	clarifies to PMU

The procurement of Selected Goods and Services will be pooled following the procedures set forth in the Project Implementation Manual

Environmental and Social (including safeguards)

178. **GoB has compiled a Social Management Framework (SMF), as well as an Environmental Management Framework (EMF) with a Pesticide Management Plan (PMP) acceptable to the Bank.** EMF/PMP and SMF have been disclosed in both English and Bangla by the Bank and the Borrower before Appraisal. Each NATP-II PIU is staffed with one full time consultant to ensure safeguards compliance in the respective component; in addition, a budget has been set aside in each component for safeguards training and to implement measures supporting safeguards compliance and for safeguards monitoring.

179. **NATP-II is not expected to have any significant adverse social impacts;** in fact the impacts are expected to be largely beneficial. Under NATP, a comprehensive Social Assessment was undertaken and a detailed SMF was prepared and updated in 2012. It served as a basis for the preparation for the new SMF for NATP-II which incorporates the lessons learned from the original project.

180. **On Involuntary Resettlement:** Following the social assessment undertaken for the preparation of the NATP-II SMF, OP 4.12 was not triggered. No land will be acquired under NATP-II. Potential issues related to resettlement in AIF sub-projects are not expected; should any arise during implementation, they will be addressed adequately, based on the provisions and guidelines incorporated in the SMF.

181. **On Indigenous Peoples:** Although OP 4.10 (Indigenous Peoples) was not triggered under the previous project, it is expected that with the geographic expansion of NATP-II, project activities will operate in areas where small ethnic and vulnerable communities live. Therefore OP 4.10 has been triggered for NATP 2. The project does not anticipate any adverse impacts on small ethnic and vulnerable communities. Since the *Upazilas* where interventions will take place have not been determined at this stage, the SMF will be prepared after conducting an SA in sample areas (where small ethnic and vulnerable communities live) to include a Small Ethnic and Vulnerable Communities Management Framework. The SMF will include a screening format (to be implemented at the time of sub-project submission) to determine if project areas include small ethnic and vulnerable communities. If so, the sub-project will be required to prepare and implement a Small Ethnic and Vulnerable Communities Management Plan, in compliance with the SEVCMF included in the SMF. The project will ensure consultation and communication with small ethnic and vulnerable communities (to seek their consent and participation in project activities) in an inclusive and culturally appropriate manner and seek to enhance their participation and voice in the design and implementation of sub-projects that impact them.

182. **On Gender and Social Inclusion:** NATP-II activities may have special impacts on women or can enhance benefits to them and other vulnerable groups. The SMF includes a Gender and Inclusion Framework (GIF) focused on participatory processes, social inclusion and accountability. All sub-projects will follow the guidelines provided in the GIF and maintain the requisite consultation processes and documentation. The lessons learned from the original NATP regarding women's participation in the project from design of sub-projects to implementation have been positive. NATP required that under the extension component the CIG must comprise of 20 percent female members. Under DAE, the CIGs now comprise 30 percent female members. The CIGs under DLS comprises of 26 percent female members. The CIGs under DOF comprises 18 percent female members. According to field missions carried out the women members in the CIGs are found to be better informed and more engaged in the group's activities. Their participation in

the decision making process is also robust, and female members are often found in leadership positions in the CIGs (president, secretary or treasurer). NATP-II will build on the positive experience of the original project and will design strategies under the GIF to further enhance voice, participation and inclusion of women and vulnerable groups through information dissemination, and an on-going strategy for consultation and communication. The mobilization, consultation and communication strategy will be focused on the above. The gender and inclusion elements should be incorporated and implemented project wide. To that effect, the PMU will recruit a full-time consultant specialized in Gender Promotion.

183. Given the range of activities relating to the introduction of new technology packages and the nature of the intended target communities, a participatory targeting strategy will be developed in order to avoid exclusion of certain groups from benefiting from project interventions. Building on lessons learned from NATP, the project will ensure inclusion and gender equity in the access to its services through the establishment of a component-specific targeting and gender mainstreaming action plan, formed on the basis of in-depth targeting and gender studies and audits. The project will actively seek the participation of marginal, small-scale, women (including female-only households), and tenant farmers, and specifically address their agricultural technology needs for raising productivity and incomes. Equitable participation of women will be ensured throughout the components, including a minimum of 35 percent participation in CIG membership, as well as equitable representation on CIG and PO executive committees.

184. Mitigation measures, monitoring and evaluation, and implementation arrangements: In addition to the Resettlement Policy Framework, the Tribal Peoples Development Framework and the Gender and Inclusion Framework, the SMF will include a Monitoring and Evaluation Strategy for the project at the sub-project and the overall project level along with roles and responsibilities stated clearly. Third party monitoring and social accountability elements will be highlighted, and specific M&E indicators and criteria for social assessment performance will be identified. An accessible and usable **grievance redress mechanism** will be devised in close consultation with communities within the first year after project effectiveness. The SMF will contain implementation arrangements, reporting and budget indication.

185. The environmental safeguard policies triggered in the NATP-II are Environmental Assessment (OP4.01) and Pest Management (OP 4.09). NATP-II is classified as a “Category B” under OP/BP 4.01 with a partial assessment as the impacts are likely to be small-scale, site specific with no irreversible impacts and mitigation measures can be designed more readily. NATP-II is not expected to have any major adverse impacts on the environment as it designed to support sustainable production practices of crops, fisheries and livestock. Some of the NATP-II activities that would require mitigation actions are: community collection marketing centers, cold storage, biogas plant, handling and management of wastes from livestock, chilling plant, and other related activities.

186. The details for AIF sub-project activities and interventions are not fully available and their specific location can only be identified in the later stages of the AIF recipient selection process. Thus, a framework approach has been adopted. GoB has developed an Environmental Management Framework (EMF) to identify potential environmental risks in sub-projects, and procedures to mitigate any potentially adverse environmental impacts, a mechanism for environmental monitoring as well as a guideline for capacity enhancement. The EMF includes relevant environmental codes of practices to avert negative impacts and strengthen positive

outcomes expected to be generated from the selected interventions. In addition, the EMF includes a list of negative activities that will likely have significant adverse impacts on the environment, including any research involving Genetically Modified Organisms (GMOs) which have not been approved by an independent panel of internationally recognized experts, and cleared by the World Bank.

187. **GoB has also developed a Pest Management Plan (PMP) to address pest infestation and pesticides related issues in NATP-II** focusing on the promotion of IPM technologies, judicious use of nationally approved pesticides, environmental code of practices for nutrient and pest management, and creation of awareness about soil and nutrient management. The PMP recommends that NATP-II arranges training agro inputs dealers, and initiates balanced fertilizer use and production of compost to reduce the dependence on chemical fertilizers. This will be done as much as possible throughout project activities especially through training activities which will be discussed and agreed during project implementation.

188. DAE, DOF, DLS and BARC have prior experience of working with a Bank-financed project and are familiar with the Bank's safeguard policies. However, these agencies still need considerable capacity improvement with regard to environmental management and to comply with Bank's safeguards requirements since the new project would concentrate more on market-led production and access to markets for CIGs/POs' sustainability. NATP-II will maintain a database for sub-project specific environmental screening/assessment, EMPs and implementation monitoring of EMPs. The project M&E system will capture that information as well. The mid-term and end-of-project performance assessment of the AIF will include an **environmental audit** to be carried out to assess and evaluate the quality of environmental compliance of the sub projects.

Monitoring & Evaluation

189. **Adequate human and financial resources have been allocated at PMU and PIU level to properly implement the Results Monitoring and Impact Evaluation approach**, assess the overall project performance, project impact, and fully carry out monitoring and reporting functions. In view of the limited M&E capacity prevailing with the implementing agencies, and to follow common practice adopted in many other IDA-funded projects in Bangladesh, the bulk of the implementation of the Results Monitoring and Impact Evaluation system for NATP-II will be outsourced to a **third-party M&IE** specialized firm with international expertise. The firm will be hired by and report to the PMU; it will work in close collaboration with the PIUs for each component. The M&E specialized firm will also be tasked with **developing M&IE capacity** in DAE, DOF, DLS and BARC. While the M&IE will be responsible for the Results Framework and the core elements of the system, the PMU and the PIUs will be responsible for day-to-day monitoring of project activities and implementation progress, and for data collection, processing and reporting on the indicators in their respective section of the M&IE Framework.

Annex 4: Systematic Operations Risk-Rating Tool (SORT)

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

Stage: Appraisal

Systematic Operations Risk - Rating Tool (SORT)	
Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Low
OVERALL	Substantial

190. **The risk assessment for the proposed project uses the Bank's new Systematic Operations Risk-rating Tool (SORT).** The risks considered are the risks to development results associated with the operation (as per the PDO and Results Framework): both the risks to not achieving the intended (positive) results pursued by NATP-II; and the risks of NATP-II causing unintended (negative) results. In addition, the assessment takes into account both the likelihood of the risk materializing, as well as the severity of its impact on the achievement of the intended results. The risk assessment in the SORT matrix above is based on *current residual risk*, i.e., after taking into account the impact of mitigation measures that have already been implemented; but not presuming any future additional mitigation measures, beyond those already in place.

191. **The overall risk for NATP-II not to achieve the PDO and targets is considered substantial.** Overall risk assessment and management is strongly derived from the lessons learned from NATP. For maximum ownership, the project is fully integrated in the existing administration and the project design aligned with the institutional landscape across MOA and MOFL. To accelerate the generation of agricultural technology (including climate-smart technologies) by public and private sector as well as to facilitate their adoption by farmers, a grant-based Agricultural Innovation Fund has been introduced and the public/private agricultural extension system developed under NATP will be further enhanced (including through the application of ICT). Similarly, with a focus on gender in agriculture, no major social and environmental risks not related to safeguards compliance are expected. The bulk of the risks associated to NATP-II are linked to fiduciary and governance aspects, to the differences prevailing in the institutional strength and capacity between the implementing agencies BARC, DAE, DOF and DLS, and to a low degree of interaction among the line agencies, potentially enhanced by a project design that follows the prevailing institutional mapping.

192. **Several risk mitigation measures have been taken into account in the project design and implementation arrangements.** The substantial risks identified with regard to policies and sector strategies refer to the potential for lack of operationalization of the BARC Act, the delays in the hiring of public extension workers for MOFL, and the lengthy approval process for the validation of the NAEP. Under NATP-II, these are addressed through: (i) strengthening the institutional capacity of BARC in the area of research management through the hiring of an international service provider; (ii) expanding the use of private community-based extension agents for livestock and fisheries with the aim of developing sustainable models for private extension (e.g. scaling up fee-based services for livestock, promoting additional sources of revenues for LEAFs); and (iii) adopting in NATP-II some of the core pillars of the NAEP (e.g. promoting group approach, complementary farmer-to-farmer extension; promoting private extension services, and more).

193. The substantial risk identified with respect to institutional capacity for implementation refers to the challenges in coordinating four line agencies from two different ministries and their capacity to implement the respective components. As shown in the previous project, the coordination challenge can be adequately addressed through a PMU with a strong leadership. The competitive recruitment of technical experts (consultants) at the PMU level is a key factor for the successful coordination across line agencies - and ultimately for a successful project implementation. An important mitigation measure in the implementation arrangements for NATP-II (different from the previous project) is the external technical assistance from service providers recruited internationally for each line agency (TA for Component 2 will be provided by HORTEx).

194. The substantial risk rating for the Political and Governance are in line with the ratings of this category in investment project financing in Bangladesh, as derived from country parameters used across the portfolio of Bank projects.

Annex 5: Implementation Support Plan

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

Strategy and Approach for Implementation Support

195. The Implementation Support Plan (ISP) articulates the Bank's approach to help borrowers achieve the expected project results based on the project's nature and risk profile. Its purpose is to put more attention on the inputs and actions required to facilitate better risk management, better results, and increased institutional development, while ensuring compliance with the Legal Agreements to meet the Bank's fiduciary obligations.

Implementation Support Plan

196. The ISP puts particular emphasis on: (i) **monitoring and evaluating results** on the ground; (ii) **facilitating the timely implementation** of the risk management measures identified in the project's SORT (see Annex 4), and iii) **providing the necessary technical advice** to the implementing agencies to build capacity. The majority of the Bank team that will support the project implementation agencies will be based in the Bank office in Dhaka. This will enable the Bank's rapid response to any requests for support from the PMU and the PIUs. As soon as the PMU has recruited the independent Monitoring and Impact Evaluation firm, the Bank team will facilitate the technical dialogue and flow of information between CMU and M&IE firm. Specifically, the Bank will use its global knowledge and technical expertise to assist the M&IE firm, the PMU and PIUs with the design and implementation of: (i) the project's stakeholder analysis and baseline survey; (ii) the development of a viable M&E system for the project; and (iii) a comprehensive impact evaluation with midterm and end of project survey.

197. The bulk of the Bank team involved in MFSP will be based in the country, which will enable the Bank to provide technical assistance to the PMU and the PIUs and respond rapidly outside of the bi-annual implementation support missions to any emerging needs from the implementing agencies. A large part of the resources devoted by the Bank to implementation support will be aimed at strengthening the implementing agencies with fiduciary management (including the development and implementation of the procurement plan and the compilation of timely financial reports), environmental and social safeguards compliance, GAAP implementation, and implementation of risk mitigating measures. The Bank will also support the PMU and PIUs with the introduction of best practices from other countries in the areas of competitive research grants, as well as grants for private rural entrepreneurs and farmers groups. An important area of technical support to be provided by the Bank will include the monitoring of CIGs performance over time and the development of sustainable Producer Organizations.

Table 5: Overview of skills needed by PMU in early stages of project implementation

Time	Focus	Skills Needed	Resource Estimate	Partner Role
PPA period 6 months	Post appraisal activities	GoB project document (DPP) Communication and awareness FM and Procurement Gender strategy/action plan Agric. Research and Extension Agricultural value chains	PPA team (11 short term consultants) recruited for 6 months	Hiring of various consultants to ensure that agreed outputs funded through the PPA are delivered on time and are acceptable to the Ban.
First 24 months	Procurement	Development of Procurement Plan and monitoring of its implementation Processing consultant contracts	Full time procurement team (2 procurement specialists at PMU; 1 procurement specialist in each PIU)	Hiring Procurement Specialists Processing of various contracts in the PP
	Financial Management	Financial reporting Preparation of conversion to report-based FM (i.e. IUFR) Adoption of computer-based FM	Full time FM team (with FM specialists and Accountants at PMU and PIU levels) External courses required	Hiring Financial Management Specialists and Accountants Attending specialized training courses.
	GAAP implementation	Monitoring of Governance Accountability and Action Plan (GAAP) implementation	To be covered by the independent Monitoring and Impact Evaluation Firm	PMU to lead the implementation of the GAAP
	Monitoring and Impact Evaluation	Project M&E Design and implementation of the Impact Evaluation GAAP monitoring	To be covered by the independent Monitoring and Impact Evaluation Firm	PMU to promptly initiate the recruiting process
	Safeguards compliance	Environment and Social safeguards	Each operational component has a line item with safeguards mitigating measures Each PIU hires an environment/social specialist	PMU to oversee all safeguards activities related to the project, and project activities are in adherence to with EMF, SMF and PMP
	Agricultural Innovation Fund	Finalizing operational guidelines and procedures for AIF-1 (research grants), AIF-2 (grants for farmer groups), and AIF-3 (grants for private entrepreneurs)	AIF-1 guidelines can draw on those implemented under NATP AIF-2 and AIF-3 guidelines will require external expertise	PMU to prepare an AIF Manual of Administration and Operational Procedures acceptable to the Bank
	ICT and Agriculture	Design and implement ICT solutions for NATP-II	ICT to be mainstreamed across NATP-II	PMU to liaise with corresponding Digital Bangladesh initiative from PM Office

Table 6: Overview of early implementation support provided (first 24 months)

Skills mix required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Procurement	16	Sr. PS based in WBDO	In-house resources
Financial Management	12	FMS based in WBOD	In-house resources
Impact Evaluation - baseline and mid-term survey; stakeholders analysis	8	2 trips per year	WB to hire consultant
GAAP implementation	4	Specialist based in WBOD	TTL to identify specialist to accompany GAAP implementation
Agricultural Innovation Fund (AIF): Management of research grants and matching grants	8	2 trips per year	FAO-CP expertise to be hired to oversee AIF
Project Monitoring and Evaluation	12	2 trips per year	FAO-CP expertise to be hired for project M&E
Grievance Redress Mechanism	6	Local consultant	WB to hire local consultant
Gender promotion	8	2 trips per year	FAO-CP expertise to be hired to mainstream Gender in project
Environmental and Social Safeguards compliance	12	Specialists based in WBOD	
Farmers' Cooperatives Specialist	8	2 trips per year	FAO-CP expertise to be hired to mainstream Gender in project
ICT solutions for Agriculture	8	2 trips per year	Bank ICT expert is part of the SPN team

Partners

Name	Country	Role
USAID	USA	Research: provide technical assistance to PMU and BARC on all aspects related to research activities, including the AIF-1
IFAD	Global	Gender and Poverty targeting: support the monitoring of implementation of all aspects related to Gender as well as Rural Poverty (see also PAD Annex 10) Market access: support the monitoring implementation of smallholders access to markets and commodity value chains

Annex 6: Economic and Financial Analysis

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

Introduction

198. The proposed development objective of this project is to *increase the agricultural productivity of smallholder farms and improve smallholders' access to markets in selected districts*. To that effect, the project will support a decentralized, demand-driven agricultural research and extension services, and promote market-oriented smallholder production. This project supports a longer-term program from the GoB and follows up on the National Agricultural Technology Project (NATP) that closed on December 31, 2014.

Rationale for public sector financing

199. GoB is strongly committed to ending extreme poverty. The generation and dissemination of agricultural innovations for small and marginal farmers, and promoting their integration into pre- and post-harvest agricultural value chains is a key element in this process. Currently, private agricultural research is still limited and so are private advisory services. Where the latter exist, their full cost is out of reach of small and marginal farmers. Hence, there is still a strong need for continued public support in these two domains. Similarly, the marketing chains between farmers and ultimate consumers are often times inordinately long, severely undercutting the price pass-through between the ultimate retail value and the farm-gate price. Finally, there is a strong need for public sector support in improving food safety and strengthening early warning systems in disaster prone areas.

Value added of Bank's support

200. Transformation of the agricultural innovation and knowledge dissemination institutions and mechanisms is a long term process that requires consistent support. The Bank has been (under NATP) and should continue supporting GoB in this domain not only because of the significant resources that this long term program needs (resources that Bangladesh does not have), but also because of the global experience that the Bank brings and that Bangladesh needs. The Bank's continued support will also facilitate capitalizing on the lessons of NATP and other programs in the sector supported by the Bank and other partners. In addition, the Bank's presence is important in anchoring support from other partners such as IFAD and USAID.

Financial and Economic Analysis

201. The project's viability assessment is based on projecting net benefits from the projects interventions, and computing the project's internal rate of return, economic rate of return, and net present value. The yield and cost assumptions draw from NATP experience. The fiscal impact of the project investments is also assessed.

Expected Source of Project Benefits

202. The project's impact on incomes of farmers engaged in raising crops, livestock, and

fisheries in project areas is expected to arise from: (i) increased *productivity*; (ii) increased *price pass-through*; and (iii) reduction in *production costs* in some cases.

(a) Expected increase in productivity/reduction in post-harvest losses

Crops. Increased crop productivity in the project areas is expected to primarily arise from: (a) expanded use of higher yielding and ecologically adapted seed (such as salinity tolerant seeds); (b) better soil fertility management (such as increased use of organic fertilizers through vermicomposting, as well as application of the right kind, amount, and proper timing of chemical fertilizers as per crop specification; and (c) better crop husbandry practices such transplanting rice seedlings at optimal growth stages, better irrigation water management, better tillage, etc.). Under NATP, these technologies led to a weighted average increase in crop yields of about 21 percent over baseline in the project areas (with some variation across crops).

Livestock. Increased livestock productivity in the project areas is expected to primarily arise from: (a) improved animal breeds through artificial insemination; (b) improved animal health through regular deworming and vaccination; and (c) improved animal feeding such as supplementing the less nutritious rice straw with fresh Napier grass, etc. Under NATP, cross-breeding and better husbandry led to net increases in milk production among crosses of about 5 liters per day, and net daily livestock weight gains averaging around 300 grams. There were also significant within-breed gains, of around 75 percent in milk production, and an average of about 60 percent weight gains in beef fattening.

Fisheries. Increased fish productivity in the project areas is expected to primarily arise from: (a) expanded use of a judicious combination of fish species under *fish polyculture* farming for optimal use of the farmers' water bodies; (b) expanded use of good quality carp and tilapia fingerlings; (c) better pond management including liming, fertilizing, and use of appropriate fishing gear, among others. Under NATP, these measures were shown to virtually double pond productivity among primary project beneficiaries.

(b) Expected increase in price pass-through/value-addition

Crops. The gap between the retail value and the farm gate price will be narrowed through better linkages between farmers and off-takers, especially through organized/coordinated marketing. When this approach was piloted under NATP, prices for participating farmers increased by 10 to 15 percent. Similar gains are expected under NATP-II's value chain strengthening activities, especially among the selected focus value chains.

Livestock. In addition to the promotion of indigenous value dairy products, better linkages with off-takers whether for local markets or major dairy companies will be promoted. This is expected add at least 5 percent to the price of milk of participating farmers.

Fisheries. Better prices are expected from coordinated fish harvesting to facilitate linkages with off-takers, and from increased use of other interventions such as Styrofoam crates and transporting live fish (especially over short distances) which give flexibility to farmers in their marketing strategies and maintain the quality of their product. These interventions are expected to add about 5 to 10 percent to prices

received by participating farmers.

(c) Expected reduction in production costs

Crops. The practice of alternative wet and drying, which will continue to be promoted, has been shown to reduce irrigation costs by between 10 and 15 percent. Similarly, Integrated Pest Management (IPM) such as the use of pheromone traps, which will also continue to be promoted, has been shown to reduce the cost of pesticide use by 10 and 15 percent in the relevant crops. This also had an additional advantage of reducing pesticide residues in the food supply chain thus contributing to food safety.

Fisheries. About 70 to 80 percent of the cost of raising fish is the cost of feed. Feed costs will be reduced by teaching farmers how to produce quality feed using locally available materials, and by promoting the feed pelleting practice. This is expected to reduce the cost of feed by about 10 to 20 percent.

Projected Number of Beneficiaries

203. Number of Beneficiary Farmer Groups. As in NATP, the project will be implemented through Farmer Groups (CIGs). NATP-II will continue working with NATP CIGs ('1st generation CIGs'), while creating new (2nd generation) CIGs:

	2 nd generation CIGs	1 st generation CIGs	Total
Crops	15,270	11,880	27,150
Livestock	4,413	3,921	8,334
Fisheries	2,918	2,496	5,414
Total	22,041	19,707	40,898

204. Number of Beneficiary Households. 1st generation CIGs have about 20 members each group, whereas 2nd generation CIGs will have about 30 members each group (except for fisheries CIGs which will continue to have 20 members). In addition, the project will promote new technologies to non-CIG farmers in the community (not member in an NATP-formed CIG). For financial and economic analysis under NATP-II, a more conservative figure of 2.7 is assumed. Taking all this information into consideration, the expected number of beneficiaries is approximated as follows:

	Households in 2 nd generation CIGs	Households in 1 st generation CIGs	Other Households	Total
Crops	458,100	237,600	1,191,510	1,887,210
Livestock	132,390	78,420	357,453	568,263
Fisheries	61,080	47,520	236,358	344,958
Total	661,230	394,140	1,785,321	2,800,431

Financial and Economic Analysis

205. A series of assumptions have been made based on NATP-1 experience, and integrated in the modeling. The assumptions have been kept conservative, with the numbers to be validated at the project's mid-term review (as is the new practice) when the economic and financial analysis will be updated by taking into consideration the actual outturn and emerging trends for the assumed parameters. These assumptions include, but are not limited to:

(a) For Crops: (i) yields for principal crops, such as rice, are assumed at 14 percent (minimum); (ii) integrated pest management is expected to reduce crop protection costs by some 10 percent among CIG members, and 5 percent among non-CIG members; (iii) market linkages are assumed to add at least 5 percent to the price received; it is further assumed that the rollout of these linkages will start with the currently existing CIGs; and (iv) the price of seed is similar across farmers since improved seed is subsidized by Government to cost no more than ordinary seed.

(b) For Livestock: (i) the local breed : cross-bred ratio among productive herds (due to genetic improvement) is expected to decrease from 90:10 to 75:10 in project areas over ten years (local bulls command a premium price for beef, hence the farmers' judicious approach to genetic herd transformation); (ii) improved breeds yield at least 4 liters of milk per day over a 305 day lactation cycle.

(c) For Fisheries: (i) an average pond is 30 decimals; (ii) participating farmers practice polyculture; (iii) feed for participating farmers will reduce by 10 percent (and 5 percent among non-CIGs).

206. For economic analysis, parity prices were derived for paddy at BDT 18.16 (rice is the predominant, internationally traded crop grown in Bangladesh). For non-tradables, a standard conversion factor of 0.9 was used (as commonly used in similar projects in Bangladesh), and for labor, the opportunity cost conversion factor of 0.7 was used (also as commonly used in similar projects in Bangladesh). Inputs are heavily subsidized in Bangladesh: improved seed is about 77 percent of market value; fuel for agriculture about 71 percent of market value; and fertilizers about 50 percent of market value. The financial prices of these inputs were adjusted accordingly to bring them up to their corresponding economic values. A 12 percent opportunity cost of capital has been used.

207. **The project's internal rate of return (IRR) has been calculated at 28 percent.** The project's economic rate of return (ERR) has been calculated at 31 percent, and the corresponding net present value at USD 49.9 million. This economic rate of return remains robust under hypothetical scenarios of a 10 percent decrease in expected net revenues and/or a 10 percent increase of project costs.

	As Assessed	Assuming a 10% Decrease in Net Benefits	Assuming a 10% Increase in Investment Costs	Assuming both a 10% Decrease in Net Benefits and an Increase in Investment Costs
ERR (%)	31	25	25	20
NPV (USD Mill.)	49.9	33.5	38.5	22.0

208. From the table below, it is clear that farmers who are not members in a group formed by NATP contribute significantly to the Project's net benefits. As a result, the Project envisages expanding training and information opportunities for these non-CIG farmers. It will be important that the degree and quality of outreach to non-CIG farmers be closely monitored during the Project's implementation.

Benefits of 1 st and 2 nd generation CIGs:	54%
Net Benefits of non-CIG farmers:	46%
Total	100%

Fiscal Impact

209. The Project's direct fiscal impact is minimal. For crops, the Project uses the existing Government agricultural extension staff. For livestock and fisheries, it uses private service providers. GoB direct monetary contribution to the Project of USD 6.4 million is limited compared its overall budget of USD 32 billion in 2014/2015. Future costs beyond the projects, such as periodic replacement of vehicles (USD 6.0 million) as well as their operation and maintenance, while always a challenge in Government generally, does not seem to impose an undue fiscal burden relative to the overall national budget.

Annex 7: Governance and Accountability Action Plan (GAAP)

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

210. The Governance and Accountability Action Plan (GAAP) for NATP-II is designed to minimize governance and corruption risks in the project. It outlines a framework for action, institutional arrangements, specific responsibilities, and additional measures to facilitate effective and appropriate use of project funds. This plan is based on Bank experience in addressing governance and anti-corruption issues and, in particular, the Bank's experience in earlier projects financed in the country, including NATP. The GAAP will be adjusted as necessary during implementation to reflect governance issues which may emerge and/or to strengthen or add actions. This GAAP has been shared with the implementing agency and takes into account the concerns and perspectives of all stakeholders involved.

211. The GAAP is a matrix jointly developed by the project and the World Bank utilizing a participatory consultation with stakeholders at all levels. The framework is a key risk management tool designed to be used by PMU, GoB and the World Bank. The main objectives of the GAAP matrix are: (i) to assess governance risks that may threaten the attainment of project objectives and implementation results; and (ii) to ensure that appropriate risks mitigation measures as planned are implemented and working. Several risks and risks mitigation measures related to implementation arrangements, procurement, financial management, and environmental and social safeguards compliance have already been described in the corresponding parts of the PAD, including Annex 4 on SORT. Thus, the focus of this GAAP is on **complementarity and value-addition to the risk mitigation measures in the fiduciary and safeguards areas**. The NATP-II GAAP focuses therefore on two main pillars: (i) information and public disclosure, and (ii) social accountability and third-party monitoring.

212. **Information and public disclosure.** In line with the World Bank's Disclosure Policy and Bangladesh's Right to Information Act (RTI), access to all information in the project will be made public. This includes public disclosure of all project documents including project information and description, disclosure of procurement and other related information and a centralized information system in Dhaka that will allow the public to access information on the project. The PMU will hire an individual consultant (Information and Communications Specialist, mid-level) as per the Right to Information Act dedicated to NATP-II for requests for information. The consultant will be provided with sufficient training on the RTI regime and adequate administrative support to carry out an expansive communications program of proactive disclosure. A comprehensive web-based project Management Information System (MIS) will be at the core of NATP-II disclosure policy.

213. **The management and allocation of the AIF will be given special attention with respect to information and public disclosure.** NATP-II will have a website referred to on the homepage of MOA (BARC, DAE) and MOFL (DLS, DOF). The project MIS will cover all information pertaining to the AIF, stored in an easily accessible manner for the public (e.g. through project website); this will include an AIF Manual of Operational and Financial Procedures, with the eligibility criteria, review process, and selection modalities for accessing the grants under the 3 funding windows of the AIF. Moreover, call for proposals, in particular for AIF-2 (for farmer Common Interest Groups) and AIF-3 (for rural entrepreneurs), as well as awarded sub-project proposals, will be posted on the public boards of the respective *Upazila* offices. Research proposals

selected for AIF-1 funding will be available for consultation on the project website.

214. **Complaints and grievance redress mechanisms.** The project website and quarterly published NATP-II newsletters will state clearly how to file complaints through prominently displayed text. The PMU will maintain a log of complaints that will track the status of response or follow-up. Depending on the nature of the complaint, the PMU will assign the review to internal auditors or third party auditors, or may transfer the investigation of the complaint to other appropriate investigative bodies. All complaints received shall be responded to within five days of receipt, with a copy to the JPSC and the Bank. Recording and appropriate referral of all incoming complaints will be undertaken by the PMU with each case generating an automatic, standard format report including the full text of the original complaint to the Bank. In addition, a monthly report tracking the status of complaints and measures taken will be provided to the JPSC with copy to the Bank. Reports summarizing complaint cases that have been resolved will be published on the website. At all times and in all documents the anonymity of the complainant will be maintained.

215. **Social Accountability and Third Party Monitoring.** The project will make use of social accountability and transparency measures to improve project performance through third party monitoring and project-level monitoring. Specific measures will be designed on: (i) consultation, feedback, and grievance-redress mechanisms to alert project staff to problems identified by beneficiaries, affected people, and other stakeholders; and (ii) participatory monitoring to identify problems. NATP-II will use project extension agents (public and private) as focal points for complaints and feedback on the project's design, impacts, and implementation at field level. Local communities will be consulted early in the process, and will be elicited to monitor progress with local project activities under implementation. An **independent project monitoring and impact evaluation** firm will be hired competitively; its team of international and national experts will assess overall project performance, project impact, and carry out project monitoring and reporting functions, in collaboration with the PIUs and the PMU. Quarterly implementation progress reports approved by the JPSC and the Bank will be publicly disclosed on the project website. The project will further promote **citizen engagement** and, through the use of an e-scorecard, will seek beneficiaries' feedback on project activities, in particular with respect to the delivery of agricultural extension (for crops, fisheries and livestock) and technical advisory services received in the project area.

216. **GAAP Monitoring and Bank supervision.** The third-party M&IE firm will be tasked with monitoring implementation of the GAAP. The PMU will monitor the GAAP implementation on an interim basis, until the firm has been recruited. In addition, the Bank will conduct six-month reviews of GAAP implementation, at the time of the regular project implementation support missions. The reviews will assess progress, gauge the efficacy of measures, agree among all parties on areas for improvement, and make adjustments as appropriate. The Bank will update its assessment of GAC risks on an ongoing basis, and anticipates that adjustments to the GAAP will be likely to reflect what will be most effective in the context of the project. Table 7 provides the matrix of GAAP-related actions and responsibilities.

Table 7: NATP-II Governance and Accountability Action Plan

Issues/Risks/Objective	Actions	Agency Responsible	Timeline	Early Warning Indicators to Trigger Additional Action
Information and public disclosure	<ul style="list-style-type: none"> ▪ Organization of public awareness workshops (for private sector and development partners) ▪ Organization of regional workshops ▪ Hiring of Public Awareness and Communication specialist (full-time consultant) ▪ NATP-II JPSC to include representatives from farmers and private sector ▪ NATP-II dedicated project website up and running, with direct links on MOA, BARC, DAE, MoLF, DLS and DOF websites; repository for all disclosable information related to project activities 	CMU	<ul style="list-style-type: none"> ▪ During PPA phase ▪ Within 6 months of effectiveness ▪ Within 2 months of effectiveness ▪ Within 3 months of effectiveness ▪ Within 6 months of effectiveness – continuous maintenance required 	<p>No dedicated project website is publicly accessible</p> <p>No project updates are available on the project website</p>
Operational complaints and redress mechanism (C&R) from local to central level	<ul style="list-style-type: none"> ▪ NATP-II JPSC to include representatives from farmers and private sector ▪ C&R contact point in each Upazila identified and trained; list established and published ▪ C&R focal point in PMU and each PIU identified and trained; list established and published ▪ Comprehensive C&R mechanism for NATP-II developed (later upgraded to mobile-phone based mechanism) and guidelines acceptable to the Bank disclosed 	<ul style="list-style-type: none"> ▪ MOA ▪ CMU ▪ CMU PIUs ▪ CMU 	<ul style="list-style-type: none"> ▪ Within 2 months of effectiveness ▪ Within 3 months of effectiveness ▪ Within 2 months of effectiveness ▪ Within 6 months of effectiveness (upgrade within 18 months) 	<p>No list of C&R focal points at CMU and PIU level shared with the Bank</p>

<p>Transparent management and fair allocation of AIF-1 research grants</p>	<ul style="list-style-type: none"> ▪ Creation of a pool of independent national/international scientific reviewers, based on acceptable ToRs, profile and advertising ▪ Development of an AIF-1 manual of operational guidelines and procedures acceptable to the Bank, with eligibility criteria and selection process ▪ Public call for proposals ▪ Arrangements for online only submission of proposals ▪ Arrangements for coding system for review of proposals 	<p>PMU, BARC</p>	<ul style="list-style-type: none"> ▪ Within 6 months of effectiveness ▪ Within 3 months of effectiveness (disbursement condition) ▪ Within 3 months of effectiveness ▪ Within 6 months of effectiveness 	<p>AIF manual not acceptable to the Bank</p>
<p>Transparent management and fair allocation of AIF-2 and AIF-3 grants for CIGs/POs and rural entrepreneurs</p>	<ul style="list-style-type: none"> ▪ Creation of a pool of independent reviewers, based on acceptable ToRs and reviewer profile ▪ Development of an AIF-2 and AIF-3 manual of operational guidelines and procedures acceptable to the Bank, with eligibility criteria and selection process ▪ Arrangements for online only submission of proposals ▪ Arrangements for coding system for review of proposals 	<p>PMU DAE, DOF, DLS</p>	<ul style="list-style-type: none"> ▪ Within 6 months of effectiveness ▪ Within 3 months of effectiveness (disbursement condition) ▪ Within 6 months of effectiveness ▪ Within 6 months of effectiveness 	<p>AIF manual not acceptable by the Bank</p>
<p>Accurate project implementation progress reports</p>	<ul style="list-style-type: none"> ▪ Hiring of an 3rd party Monitoring and Impact Evaluation firm with international expertise ▪ Stakeholders assessment and baseline survey ▪ Medium term impact survey ▪ Impact Evaluation and end-of-project survey ▪ Public disclosure of all M&E reports 	<p>PMU Monitoring and Impact Evaluation firm</p>	<ul style="list-style-type: none"> ▪ Within 6 months of effectiveness ▪ Within 12 months of effectiveness ▪ Year 3 of implementation ▪ Year 6 of implementation 	<p>Delays with the hiring of the M&IE firm</p>

<p>GAAP Monitoring and Evaluation</p>	<ul style="list-style-type: none"> ▪ Hiring of an 3rd party Monitoring and Impact Evaluation firm with international expertise to be tasked with GAAP monitoring 	<p>Monitoring and Impact Evaluation firm</p>	<ul style="list-style-type: none"> ▪ Within 6 months of effectiveness; maintained throughout project implementation 	<p>Delays with the hiring of the M&IE firm</p> <p>Delays with the implementation of the GAAP</p>
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Annex 8: Guiding principles for the Agricultural Innovation Fund (AIF)

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

217. The AIF is at the core of NATP-II's scale-up strategy. Under NATP-II it is the main source of direct funding for research activities, technology transfer and market access facilitation. The AIF builds on NATP's experience by seeking to provide competitive grants for research, and, in addition, introduces a matching grant system for farmers and rural entrepreneurs in the project area. The AIF has been conceived in response to repeated requests from farmers under NATP for financial support to access some of the technologies demonstrated by the project. AIF contributes to achieving the PDO by providing grants to: (i) support the generation of technologies aimed at increasing agricultural productivity directly, (ii) ease the adoption of these technologies, and (iii) facilitate smallholder farmers' participation in markets.

218. **Procedures.** Operational, administrative and financial procedures governing the use of the AIF will be documented in a publication that the PMU will develop with NATP-II Project Preparation Advance; disbursements against the AIF are subject to Bank's approval of the AIF Manual and its disclosure by the project. Design and management of the AIF draw from the Bank's and IFAD's global experience with investment operations that include competitive research and/or matching grants.³²

219. **Objectives and grant recipients.** The AIF will be structured around the following three funding windows:

- (a) AIF-1 will promote agricultural technology generation for eligible research providers through a competitive research grant program (CRG) and a program-based research initiative (PBRG);
- (b) AIF-2 will, through a program of matching grants for eligible CIGs, support smallholders' adoption of the technologies generated by the research community; and
- (c) AIF-3 will, through a program of matching grants for eligible rural entrepreneurs, support rural economic activities beneficial to farmers and/or the provision of services to the farming community.

220. **Modalities.** AIF will finance selected sub project proposals from eligible recipients with a grant amount that does not exceed predetermined ceilings (irrespective of the full amount of the proposal). Grant ceilings and cost sharing proposed have taken into account current practices in the sector under other programs and projects at MOA. Grant ceilings and cost sharing arrangements can be reviewed for subsequent calls for proposals, subject to Bank's endorsement and NATP-II Joint Project Steering Committee's approval. Current parameters are as follows:

- (a) AIF-1: selected research proposals are fully funded (100 percent grant) for up to USD500,000 per grant for larger research programs (AIF-1 PBRG), and USD74,000 per grant for specific research activities (AIF-1 CRG);

³² The World Bank (2010): *Designing and Implementing Agricultural Innovation Funds: Lessons Learned from Competitive Research and Matching Grant Projects*. Economic and Sector Work #54857-GLB;

IFAD (2012): *Matching Grants – Technical Notes*; International Fund for Agricultural Development (IFAD)

- (b) AIF-2: selected sub project proposals (simplified template) are funded with a matching grant not to exceed 70 percent of the total sub project costs or up to USD5,000 per grant; recipient contribution is expected to be at least 30 percent in cash (subject to further adjustment);
- (c) AIF-3: selected sub project proposals (simplified template) are funded with a grant not to exceed 50 percent of the total sub project costs or up to USD7,500 per grant; recipient contribution is expected to be at least 50 percent in cash (subject to further adjustment).
221. **AIF-1 review process.** AIF grants will be allocated in a transparent manner, on the basis of publicly disclosed procedures and criteria, following the outcomes of a multi stage, independent evaluation and review process, to be described in the AIF Manual.
222. All AIF-1 research proposals will be submitted online. They will be reviewed in a two-stage process: first by BARC on basic eligibility criteria, and then by an independent scientific committee (composed of 2 national and 1 international scientists) acceptable to the Bank and the JPSC, who will then formulate recommendations to BARC.
223. AIF-1 will be **managed** by the BARC PIU under Component 1. Call(s) for research proposals should be designed to accommodate: (i) program-based research grants (PBRG) in support of a research program specific to a NARI; (ii) program-based research grants (PBRG) in support of a cross-cutting research program involving several research providers, in particular led by a non-NARIs research entity; and (iii) competitive research grants (CRG) in support of smaller activities hosted with a recognized research provider (including non-NARI).
224. **AIF-1 grant recipients** are in-country research providers and other entities carrying out research (e.g., NARIs, academia, private sector, NGO, and others).
225. It is expected that AIF-1 funding for eligible proposals (i.e., that are aligned with the official research priorities from the NARS) would be used to **cover research costs** associated with researchers involved, operating costs, equipment required and monitoring of the research activities proposed.
226. AIF-2 and AIF-3 proposals and grant recipients will be **managed and coordinated** by the line department's PIU to which recipients are thematically linked.
227. **AIF-2 and AIF-3 review process.** AIF-2 and AIF-3 proposals will use a simplified format which can be filled out in the FIAC with the support from the extension workers (SAAOs, LEAFs and CEALs). The *Upazila* Officers from the respective line departments can then review the proposals on basic eligibility criteria and transfer all files to the respective PIU, where proposals can be further reviewed by a mixed technical committee (i.e., that includes also external reviewers).
228. **AIF-2 grant recipients** are well-performing CIGs (or POs) formed by NATP, officially registered and with a bank account in the name of the group in a financing institution. The matching grant is intended as a one-time seed funding to increase the CIG's own capital (group savings) in order to make the technology promoted by the project more affordable and accessible to the farmers. By increasing the CIG/PO's productive assets, and thus, potential income, it is expected that some of the grant recipients become bankable clients for (micro) finance institutions.
229. **AIF-3 grant recipients** are registered rural entrepreneurs and private sector companies

with a business history and whose sub projects benefit smallholder farmers in the project area, either by providing a market opportunity for farmers and their produce, or by providing services relevant to the smallholder farmers in the project area. In some cases, registered POs (and possibly even CIGs), as well as LEAFs and CEALs could be eligible for AIF-3 grants.

230. It is expected that AIF-2 and AIF-3 funding for eligible proposals would be used to co-finance **capital investments** and **technical assistance**, rather than operating costs, agricultural inputs or other consumable goods – these would be financed through the recipient's contribution.

231. **Flow of funds and procurement.** AIF grants would be released by the PMU from the DAs to the OA of the corresponding PIU at BARC, DAE, MoF or MLS, and transferred from the corresponding OA to the AIF grant beneficiary's bank account. Grant recipients would be responsible for acquiring the goods and services listed in the approved proposal, using (i) competitive procurement, (ii) simplified procurement (shopping), or (iii) direct procurement procedures, as specified in the AIF Manual. In case many approved proposals include the same items (e.g., farm machinery), procurement could be centralized and performed by the PIU following procurement procedures applicable to NATP-II.

232. The coordinating PIU will be responsible for **monitoring** the progress on implementation of the funded research or sub project proposal, and will report to the PMU on a semi-annual basis, progress achieved with the research activity supported or the sub project implementation.

233. Since disbursing an AIF grant will be registered as Expenditure from OA on receipt of utilization report, the financial audit will be limited to the OA. However, the subsequent disbursement will be made only upon utilization/adjustment of prior advances to OAs. Nonetheless, the PMU would commission an **AIF Performance Assessment** (mid-term and in the final year of project implementation) that will also review all financial aspects of the AIF implementation, including acceptable documentation on fund utilization, reclassification of funds not utilized but classified as expenses, along with efficiency in the selection and disbursement processes, efficacy, safeguards compliance, gender dimension and more.

Annex 9: Leveraging ICT to improve NATP-II performance

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

234. NATP-II will promote an integrated approach to leverage ICT to ensure linkages between the various components and stakeholders. ICT within the project will be harmonized to align with ongoing national ICT initiatives under Digital Bangladesh. This entails that the project will utilize common standards, delivery platforms, connectivity, Data Centre facilities, and use of the GoB cloud – to leverage synergies and reduce duplication. The building of an Agriculture Knowledge Repository (AKR) and a Knowledge platform to disseminate this knowledge will be important ICT initiatives under the NATP-II project.

235. **ICT Architecture in NATP-II.** The frontline workers in the project (SAAOs, LEAFs and CEALs) will receive mobile tablets to interact with farmers in their fields or meeting places. The mobile tablets will be used for data collection, training, communication, collaboration, market access, citizen feedback and social accountability. Data from the mobile tablets will use the mobile phone network (or Wi-Fi) to go to the GoB Cloud. From there, it will be routed to the relevant MIS systems housed at the National Data Centre. All the major MIS systems and the Agriculture Knowledge Repository will be housed in the National Data Centre at Bangladesh Computer Council (BCC). However, the ownership and management of the different MIS systems will remain with the respective NATP-II line agencies. The project will build common Knowledge & Learning platforms atop the connectivity layer to enable capture, processing, storage and dissemination of data, information and knowledge. It is expected that the ICT foundation will be provided under the Digital Bangladesh and Info Sarkar projects to all project agencies. The Bangladesh Computer Council (BCC) is responsible for providing all these ICT foundational resources on behalf of GoB. All implementing agencies (BARC, DAE, DLS, DOF) will be connected to a high speed GoB fiber backbone with entry/exit speeds of 10 GBps. This entails that all implementing agencies will have VOIP and video-conferencing facilities also. The connectivity between agencies and their MIS systems hosted at the National Data Centre will be through a secure VPN network.

Key Objectives

236. ICT will be leveraged within the project for four main objectives: (a) service delivery pertaining to crops, livestock and fisheries; (b) project tracking for timely decision support in the areas of research, extension and post production activities; (c) knowledge-based agriculture through cost-effective outreach to farmers & communities, and (d) use of mobile phones to leverage network effects – for data collection, communication, collaboration, market access, citizen feedback and social accountability.

ICT Interventions under NATP-II

237. **ICT Foundation** comprises of Connectivity (government fiber backbone & institutional local area networks), National Data Centre, GoB Cloud and other common services that will be provided to all the project agriculture agencies to enable them to leverage ICT more effectively. These horizontals will be provided by BCC as part of their mandate to ensure that all ICT initiatives within Bangladesh are aligned to the national ICT vision and framework.

238. **Information & Knowledge Systems:** the following ICT interventions are expected to be

financed under the project.

(a) Service Delivery Management Information System (SDMIS): Relevant information generated under this project and related to crops, livestock or fisheries will be included under the SMIS and shall remain available after project closing. This system is called “Service Delivery Management Information System” because most of this information may relate to provision of services to farmers under the three sub-categories – crops, livestock and fish. The SDMIS is expected to contain project information regrouped into three modules, each owned and maintained by the respective agencies as follows: : (i) agriculture technologies generated, field trails & release data, associated costs (ii) agriculture technologies adopted, adoptive trials data, secondary adoptions, yields & associated costs (iii) local extensions agents information, interaction data, services & satisfaction data (iv) CIG/PO information (v) community profile information, and (vi) other needed information. The SDMIS will be hosted at the National Data Centre (NDC) and will be owned and managed by the respective agencies overseeing the implementation of NATP-II. The design and development of the SDMIS will be undertaken in first year of project implementation.

(b) Project Management Information System (PMIS): Project management needs appropriate information (project activities & financial information) to take timely decisions to ensure that the project interventions achieve their intended objectives. This entails the capture, processing & reporting on information that will facilitate decisions pertaining to the project. The PMIS is expected to contain project information pertaining to: (a) project M&E information; (b) Extension agent services data; (c) IEC information & media campaigns; (d) Capacity Building & trainings information, and (e) other needed information. The PMIS will be hosted at the National Data Centre (NDC) and will be owned and managed by the PMU. The design and development of the PMIS will be undertaken in the first implementation year.

(c) Knowledge-based Agriculture: Knowledge based agriculture is expected to leverage innovative technological solutions to support: (i) Strengthening research-extension linkages; (ii) Knowledge Validation & Content Development: define a process to standardize, validate and digitize knowledge inputs under the management of the Technical Working Group; (iii) Agricultural Knowledge Repository: review, strengthen and build an Agricultural Knowledge Repository that will be the knowledge base to help promote agriculture; (iv)) Integrated Knowledge & Learning Platform: build a convergent Knowledge Platform to capture and disseminate agricultural knowledge; (v) Video based Extension & Learning platform: pilot a video-based extension & advisory services approach initially in 5 districts and potentially scale up; (vi) Innovative delivery platforms: leverage innovative delivery channels to disseminate agriculture knowledge to the Extension & Advisory Services to support Bangladeshi farmers.

(d) Mobile phone based Grievance and Redress System: NATP-II intends to setup a Grievance & Redress (G&R) system that will use the ICT platform to register grievances and provide notifications back to the concerned citizen. The traditional system of registering, disposing and monitoring of grievances is outdated and not efficient in terms of time, cost and labor effectively. Regular monitoring of the G&R system will be undertaken to see how it is functioning. The underlying platform for the

G&R system will be a web-enabled, mobile phone connected MIS system that will be based upon the Open Source platform. The project will determine whether an off-the-shelf system can be obtained and customized or a simple G&R system needs to be developed during the first year of the project.

Capacity Development for ICT

239. Capacity Development is essential due to the low level of ICT literacy and practice amongst the project stakeholders and institutions. The project will support: (a) technical training for relevant ICT staff that will support the SDMIS and PMIS; (b) user training for SDMIS and PMIS users at all levels; (c) basic ICT training for farmers groups to access agriculture information using various service channels, and (d) basic ICT training to operate relevant devices to facilitate Farmer-to-Famer outreach, training & Community-to-Community learning.

ICT Governance

240. The PMU will provide leadership and management oversight of ICT activities under the project. A full time consultant specialized in ICT solutions for agriculture will be hired for the NATP-II at the onset of the project implementation period. S/he will be responsible for the representation of business activities, prioritization of ICT work, budget formulation, procurement facilitation and risk management. S/he will set up a NATP-II ICT Technical Working Group, comprising of ICT representatives from BARC, DAE, DOF, DLS and BCC. It will meet periodically to discuss and propose actions pertaining to ICT project activities.

Annex 10: Poverty, Targeting and Gender

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

Overview

241. **The 2014 Human Development Index ranks Bangladesh 142 out of 187 countries, and 115th in the 2013 Gender Inequality Index.** The poverty headcount in rural areas (still 35.2 percent) has not declined as fast as in urban settings; moreover, the proportion of people living in extreme poverty in rural areas is still three times higher than in urban areas. There are multiple dimensions of poverty in Bangladesh, linking to factors including low assets (physical, financial and human), gender, land size, indebtedness and poor infrastructure and public services. A major feature of poverty and vulnerability relates to the frequent natural disasters such as floods and cyclones, which have the greatest impact on the poorest groups who inhabit the marginal areas and lack the resources to withstand shocks. Many of the poorest resort to coping mechanisms that have negative long-term implications, including depletion of assets, reduction of essential consumption and taking high interest loans from money lenders.

242. **Agriculture.** Bangladesh remains a predominantly agricultural country. Although the contribution of agriculture to the country's economic output has declined over the last decade, the agriculture sector 2012-13 growth rate was 2.17 percent³³ and it remains one of the main contributors to GDP growth, and importantly in poverty reduction. The majority of poor people lives in rural areas and depend on agriculture for their livelihood, with most being small-scale, marginal and landless farmers owning less than one acre of land, and commonly renting land under share cropping arrangements. Small and marginal farmers comprise approximately 86 percent of the farming community.³⁴

243. **Women in agriculture.** Women play a large, vital and growing role in agriculture, nutrition, food security and a wide range of income-generating activities.³⁵ Production activities largely undertaken by women include post-harvest activities, processing and preservation of crops. Women are also involved in seed preservation, cow fattening and milking, and fishnet making. Relative to men, women are (i) involved in homestead agricultural activities, including operating homestead ponds and plant nurseries; (ii) in charge of small-scale fruits and vegetables, poultry and goat rearing; (iii) engaged in production of perishable, but often nutrient-dense foods; and (iv) involved in production for home consumption rather than for the market. Men are more engaged in field-based agriculture and larger-scale, higher value business activities further from the home.

244. **NATP-II is fully aligned with the three strategic objectives of IFAD's results-based Country Strategic Opportunities Program:** (i) the livelihoods of poor people in vulnerable areas are better adapted to climate change; (ii) small producers and entrepreneurs benefit from improved value chains; and (iii) marginalized groups, including poor rural women, are economically and socially empowered.

³³ 'Recent Trends of Growth in Agriculture, Industry and Power', Bangladesh Economic Update, Volume 5, No. 3, Economic Policy Unit, Unnayan Onneshan, Dhaka, March 2014.

³⁴ National Extension Policy, 2012.

³⁵ As is evident in many studies, e.g., Ahmed et al., 2009.

Policies, strategies and priorities for poverty reduction and women's empowerment

245. **National policy framework.** The central goal of Bangladesh's economic policy is to reduce poverty in order to lift the majority of people above the poverty line and improve their quality of life. The Government has attempted to take affirmative action to integrate gender equality and poverty concerns into the development process, as articulated in national policy documents including: (i) the **National Agriculture Policy** (2013); (ii) **National Extension Policy** (2012); (iii) **National Fisheries Policy** (1998) and **Strategy** (2006) (iv) **National Livestock Policy** (2013), and; (v) **National Food Policy** (2006) and **Plan of Action** (2008-2015). These policies and strategies promote inclusive participation in agriculture, including through supporting: (i) the special needs of women, small and marginal farmers in gaining management control through formation of community based organizations including women's farmer groups; (ii) equitable access to agricultural inputs, technologies and extension programs; (iii) demand-led, pro-poor, varied extension approaches, achieved through participatory methods; (iv) encouraging women's SME agri-business development; (v) creating gender awareness in both female and male farmers; (vi) encouraging decision-making positions for women farmers in higher level farmer organizations; (vii) promoting homestead gardening, and; (viii) increasing the number of women employed by support agencies and developing their linkages with women farmers.

Key issues, main constraints and challenges

246. **Gender inequalities faced by women include access to and control over productive assets and resources such as land, finance and technologies, and women are constrained in owning, managing and developing small and medium businesses.** Women's participation in decision making remains limited at all levels due to customary power relations as well as time and mobility constraints, which relate to domestic responsibilities and traditional norms. Women's enrolment and graduation from agricultural universities and training programs is also limited. There is low involvement of women in the staffing and conducting of agricultural research and extension, with most agricultural scientists and extension agents being male. The widespread perception that women are not involved in agricultural production persists, and the division of labor between men and women in agriculture remains poorly understood. Women may not be considered 'farmers', which is linked to their lack of land ownership and the issue that much of their work in crop production is unpaid and produced for the household. That women tend to be 'invisible' in the agricultural sector also reflects cultural norms valuing female seclusion from public spheres and undervaluing female labor.

247. **Mobility and market constraints.** Traditional norms limiting women's mobility leads to the exclusion of women from markets, with men (husbands, sons, etc.) marketing the household's agricultural produce, even when produced by women. This means that women may not control the proceeds of their production. Women do, however, sell or exchange their products at the farm gate, to neighbors, other villagers, or passing vendors and traders. While women's mobility is restricted throughout the country, this varies across families, communities, regions³⁶ and religions. Linked to poverty and food shortage, social norms and traditions are more relaxed in landless, small and

³⁶ For example, women from Thakurgaon (in the North-West) are more involved and visible in agriculture, whereas women from Noakhali (in the South-East) are least involved in agriculture. With fish and prawn farming, women have a high involvement in the Southern districts, whereas in other regions they are limited to care taking, feeding, etc.

marginalized farm households, where women's involvement in all aspects of agricultural production including field-based activities is greater and more visible, and improvements in technology tends to increase the efficiency and involvement of women.³⁷ Women are increasingly stepping outside of traditional norms, which partly links to increased male migration seeking work in urban areas or abroad. This trend also relates to the increase in mechanized farming methods which reduce the need for male labor in tilling lands. In many rural areas, there is now a predominance of women and female-only households.³⁸

248. **Extension services.** The poorest categories - landless, small and marginal farmers, lack access to extension services to a greater extent than others, and services are often denied to women because the land they work is registered in their husbands' names. Agricultural extension which adopts a 'one size fits all' approach without targeting and tailoring to different groups tends not to meet their specific needs and interests. DAE reports that only 9 percent of its 12,330 extension agents (SAAOs) are female. Furthermore, the performance of extension workers and their accountability to farmers is not measured to evaluate service quality, and this links to lack of farmer organization and empowerment.

249. **Technology development.** The potential transition of women from homestead to field-based agriculture may increase women's physical labor burden as well as negatively impact homestead gardening, which is important for nutrition. Interventions including technology development to support homestead gardening and reduce women's workloads will be important. There is also the risk that post-harvest technological development may reduce the involvement of women, with men replacing this work. While this may reduce women's time constraints, it may also contribute to their devaluation and lack of access to improved technologies.

NATP-II gender, social inclusion and targeting strategy

250. As an integral part of the Social Management Framework (SMF) and Social Management Plans, the project will develop a Gender and Inclusion Framework (GIF) and component-specific **Targeting and Gender Mainstreaming Action Plans**, formed on the basis of targeting and gender studies.

251. The targeting strategy will include: (i) use of participatory targeting methodologies at the community level to identify and select the targeted farmers³⁹; (ii) mechanisms for participatory planning and strengthening of CIGs and POs, including training in group governance and M&E⁴⁰, and; (iii) development of inclusive mechanisms for farmers to provide feedback on service quality, including a performance-based incentive scheme for extension services, as well as the establishment of a two-tier grievance redress mechanism under the SMF, devised in close consultation with communities. In addition, geographical areas have been targeted based on criteria including scope for poverty reduction (including agro-ecologically stressed areas, and high prevalence of small and marginal farmers), and value chains have been selected on the basis of

³⁷ 'A Rapid Assessment of Gender in Agriculture of Bangladesh', Naved, R. T et al., International Maize and Wheat Improvement Center (CYMMIT)/ International Rice Research Institute (IRRI)/ WorldFish Center, September 25, 2011.

³⁸ Underlying the concept of "female-headed" as well as "male-headed" households are difficulties and assumptions concerning "headship" (e.g., see Buvinić and Gupta, 1997), therefore the term "female-only" household is used – i.e., only female adults are present.

³⁹ CIGs will be formed with a maximum of 30 members of a similar economic status.

⁴⁰ Including a focus on selection, evaluation and rotation of leaders, and to enable monitoring of benefits to members at different levels.

multiple criteria including impact on small, marginal and women farmers.

252. **Gender mainstreaming and women's empowerment.** A key element of social inclusion and targeting is the focus on women and the application of mechanisms to facilitate their involvement in project interventions. Main measures include: (i) tailored extension services to address women's mobility issues and specific needs, including through use of ICT, e.g., mobile phones and video; (ii) activities specifically targeting women, including homestead gardening, goat rearing and poultry farming; (iii) mobilization of women's CIGs and facilitation of appropriate linkages⁴¹; (iv) focus on promoting women's leadership through female lead farmers and development of female lead farmer networks; (v) targeting female LEAFs and CEALs, with provision of any additional capacity building required including appropriate provision to address mobility issues, and; (vi) ensuring a high level of women's participation in trainings, field days, exposure visits, demonstrations, and more, and designing the approach according to context. Considerations include timing, location and literacy levels, and any need for gender segregation. Furthermore, gender and poverty concerns will be included in the selection criteria for sub project proposals under the Agricultural Innovation Fund (AIF). This includes research subject areas, CIG sub projects, and SMEs promoting farmer participation in markets. Proposals will include indicators to facilitate the monitoring of gender-related outputs.

253. To promote women's equitable representation on executive committees, in mixed CIGs and POs at least one third of committee members should be female. If the chairperson is male, the position of vice-chairperson should be held by a woman, and vice versa.

Development of the Targeting and Gender Mainstreaming Strategy

254. To provide capacity-building support, a full-time gender specialist with expertise in participatory methods will be hired by the project for the PMU (mid-level consultant) and will among others lead the development of the Targeting and Gender Mainstreaming Action Plans and ensure their integration in the project implementation manual (PIM). Furthermore, the consultant will ensure overall inclusion of all gender and poverty concerns in the PIM. The consultant will work in close collaboration with all stakeholders including BARC, DAE, DOF, DOL and the PIUs Safeguards specialists, and in coordination with the planned value chain scoping/mapping studies and stakeholder/beneficiary analysis. The consultant will provide backstopping support in subsequent years of the project and will carry out the following four key tasks:

(a) Targeting and gender studies. Building on lessons learnt from NATP and drawing from existing studies as well as primary research, the consultant will: (i) conduct an in-depth assessment of male and female farmers of different poverty levels in each project component, with a focus on impact of agricultural technology generation and diffusion, and market access interventions; (ii) identify any further opportunities and measures to promote target group inclusion in the context of NATP-II; (iii) conduct a participatory organisational gender audit as a basis for developing the most efficient and effective gender mainstreaming strategies, and; (iv) explore linkages with organisations working to address similar challenges to build on lessons learned and extend successful practices

⁴¹ For example, UzPO role in facilitating linkages and exchange visits among women's groups for mutual learning, and with other programmes/projects and institutes for credit, technical support and product marketing particularly with a gender focus.

developed⁴².

(b) Development of Targeting and Gender Mainstreaming Action Plans. Stakeholder workshops will be organised to discuss the results of the studies and audit and contribute to the establishment of a Targeting and Gender Mainstreaming Strategy and Action Plan for each project component. The plans will i) detail actions and activities required to expand women's and poorer households' inclusion and empowerment; ii) develop the elite capture mitigation and monitoring mechanism; iii) include participatory revision of project manuals and guidelines as required, and; iv) have both output and outcome perspectives for monitoring.

(c) Linking with the ICT-based extension pilot. The consultant will use the learning gained from the studies to strengthen the ICT pilot for farmer-to-farmer extension, which is especially designed to include and train female farmers and illiterate farmers. Modules and videos will be produced with female farmers, and lead farmers as well as relevant staff will receive capacity building support in gender and participatory facilitation skills to better lead discussions after the video screenings⁴³.

(d) Capacity building in gender and participatory methods for SAAOs, LEAFs, CEALs, lead farmers and PIU Safeguards Specialists. The consultant will deliver tailored training based on needs identified, following a training of trainers approach. Where required, the consultant will also deliver specific gender training for staff and partners at other levels, as well as training in participatory and gender-sensitive M&E.

Project Management

255. The Gender consultant with the PMU will ensure that terms of reference and contract deliverables for service providers, staff and implementing partners reflect attention to gender equality and women's empowerment concerns, with gender and inclusion targets and indicators. S/he will organize capacity building as required for project staff and implementers. Responsibilities of all staff in gender mainstreaming will be outlined in the Action Plans. A Safeguards Specialist (junior-level consultant) in each PIU will be responsible for ensuring that targeting and gender mainstreaming is applied throughout project activities in accordance with the Action Plans, and in collaboration with the Gender consultant at PMU, and officials from DAE, DLS, DOF, BARC and other relevant staff and partners.

256. The third-party independent M&IE consulting firm to be recruited by the PMU will develop mechanisms to monitor targeting effectiveness, including gender-sensitive quantitative and qualitative indicators and specific indicators on gender equality and women's empowerment. Communities will be included in the definition of indicators, data collection, analysis and dissemination of results, and participatory M&E will be used to gather feedback from the different target groups, including beneficiary satisfaction surveys. All data will be disaggregated by gender where applicable, and all studies including baseline, mid-term and impact evaluation will include gender and poverty targeting analysis. In addition, a participatory and inclusive communication

⁴² For example the IFAD-funded PACE, which is providing support to poor women by offering skills training, access to financial services and value chain development activities.

⁴³ Digital green in India, for example, uses video screenings to engage over 70% women at the village level through working with existing women's groups, and has found this to be a very popular form of outreach.

and consultation strategy will be developed.

257. Performance indicators for gender equality and women's empowerment to be integrated in the M&IE framework may include the following: (i) % women's CIG sub-projects funded by the AIF matching grant; (ii) % gender and poverty-responsive technologies; (iii) adoption rate of labor saving/ improved or new technologies by women; (iv) % female staff, extension agents, committee members and lead farmers. Such areas may be monitored in special studies or as part of impact assessments, for example.

Annex 11: Complementarity with IFAD strategy, current loan portfolio and lessons learnt
BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

COSOP Objectives	IFAD funded Projects	Lessons Learn from IFAD funded projects
<p>The NATP2 development objective “<i>increase the agricultural productivity of smallholder farms and improve smallholders’ access to markets</i>” is aligned with the three strategic objectives of the COSOP:</p> <ol style="list-style-type: none"> 1. SO1 the livelihoods of poor people in vulnerable areas are better adapted to climate change: NATP2 will develop and promote improved technologies and agricultural practices with the goal of making the country’s agriculture (crop, fisheries and livestock) more sustainable, more profitable, more competitive and better adapted to the changing climate. 2. SO2 small producers and entrepreneurs benefit from improved value chains: NATP2 will develop and promote the creation of market linkages through various matching-grant and co-financing arrangements with the private sector. 3. SO3 marginalized groups, including poor rural women, are economically and socially empowered: poor rural women will be the focus of CIG membership and hence program interventions. 	<p>All IFAD funded projects promote either agricultural production (including the introduction of new technologies) or market linkages (infrastructure and services) or both. These projects would complement the activities of NATP2 if efforts are made to avoid duplication and to add value to the existing IFAD portfolio by directly linking these projects to NATP2. All projects could benefit from the improved agricultural practices and climate smart technologies to be developed by NATP2. NATP2 could benefit from technologies and services developed by IFAD funded projects.</p> <ul style="list-style-type: none"> • Participatory Small-Scale Water Resources Sector Project (PSSWRSP) - sub-projects include irrigation works with the aim of enhancing agricultural productivity, on which beneficiaries could capitalize by receiving extension and marketing support from NATP2. • Promoting Agricultural Commercialization and Enterprises (PACE) could provide NATP2 households with business planning/ development services to prepare business plans for funding through PACEs micro-enterprise loan program. In addition, beneficiaries ineligible for NATP matching grants could be referred to PACE loan schemes. • Haor Infrastructure and Livelihoods Improvement Project promotes beel fisheries by poor fisher communities. 	<p>NATP2 could integrate a number of lessons learnt through experiences of IFAD funded projects to further test/scale up their outcomes in NATP2. Specifically:</p> <ul style="list-style-type: none"> • 5 IFAD funded projects in Bangladesh with varying extents of VCD activities, have shown that a combination of financial and non-financial services is critical to achieve (i) increased production, (ii) application of knowledge from various trainings and technologies introduced, and (iii) enhanced incomes. • Solutions to challenges related to access to market, production and technology improve productivity, help diversify businesses. • Successful introduction of new technologies, products, improved production process, development of skills etc. led to increase in business and farm income in a sustainable manner. • Research outcomes from a project led by the International Rice Research Institute (IRRI) showed that smallholder and marginal farmers in coastal areas could adapt to the adverse effects of increasing soil salinity by adopting <i>Sorjan</i> systems (a system of raised beds for wet season dry crop production and ditches between the beds for rice and fish production). • The same IRRI research identified a number of rice varieties in different areas of the country. Results are available in various reports and can be scaled-up in NATP2. For example, in Dacope three varieties (BRRI dhan47, BRRI dhan55, and BINA dhan-8) were selected for their tolerance of soil salinity and satisfactory yield • A partnership with the World Fish Centre, exploring the potential of small fish species to improve human nutrition, has shown that the introduction of mola does not affect the production of carp in ponds and increases the overall productivity of the pond by increasing its own production and augmenting the production of other small fish recruited naturally in the ponds. Furthermore, in ponds connected to rice fields the production of mola along with other small fish and carp increased significantly more than in un-connected ponds. Mola are extremely rich in micronutrients.

Annex 12: Geographic Coverage of NATP-II by districts and *Upazilas*

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

258. The Ministry of Agriculture has selected 270 *Upazilas* to be covered by NATP-II. These include 107 out of the 120 *Upazilas* from NATP, plus 163 new *Upazilas*. The new *Upazilas* have been selected on the basis of the criteria listed below. The matrix provides the listing of all districts and *Upazilas* covered by NATP-II. The selection criteria are:

- (i) High potential for increasing crop, livestock and fish yield and productivity through improvement of existing farm practices;
- (ii) High scope for intensification and diversification through dissemination of available knowledge and technologies;
- (iii) High potential for high value crop production and developing agri-business;
- (iv) Farming population dominated by small and marginal farmers and ample scope for improvement of livelihoods of vast farming community;
- (v) Highly responsive farming community eager to find and adopt better options to improve livelihoods and alleviate poverty and malnutrition;
- (vi) Relatively less developed area in agriculture due to inadequate development initiatives with very limited support of development projects;
- (vii) Includes climatically distressed (drought, flood, water logged and salinity prone) areas with high potential for climate change resilient technologies and extension services; and
- (viii) Ease of communication and accessibility.

Extension Region	District	NATP <i>Upazilas</i> covered in NATP-II (1st generation)	New <i>Upazilas</i> for NATP-II (2 nd generation)	Selection criteria for NATP-II <i>Upazilas</i>	
1	2	3	4	5	
1. Dhaka	1. Dhaka	1. Savar	1. Dohar		
		2. Dhamrai			
	2. Narayanganj	3. Norshingdi	3. Shibpur	2. Araihasar	i, iv, v,vi
			4. Palash		
			5. Sadar		
			6. Belabo		
			7. Monohardi		
	4. Gazipur	8. Shreepur	8. Shreepur	3. Raipura	i,ii,iii,iv
			9. Kapasia		
			10. Kaliakoir		
	5. Munshiganj			4. Kaligonj	i, iv, v,vi,
5. Lohajang					
6. Gazaria					
7. Tongibari					
6. Manikganj			5. Lohajang	i,ii,iii,iv,vii, viii	
			6. Gazaria	i,ii,iii,iv,vii	
			7. Tongibari	i,ii,iii,iv,vii	
			8. Harirampur	i,ii,iii,iv,vii	
			9. Saturia	i,ii,iii,iv,vii	
			10. Singair	i,ii,iii,iv,vii	
			11. Ghior	i,ii,iii,iv,vii	

Extension Region	District	NATP Upazilas covered in NATP-II (1st generation)	New Upazilas for NATP-II (2 nd generation)	Selection criteria for NATP-II Upazilas	
1	2	3	4	5	
	7. Tangail	11. Ghatail	12. Shivalaya	i,ii,iii,iv,vii, viii	
		12. Shakhipur	13. Dhanbari	i,ii, iv,vi	
		13. Tangail Sadar	14. Basail	i,ii,iii,iv,vi	
		14. Madhupur	15. Nagarpur	i,ii,iii,iv,vi,viii	
		15. Kalihati			
		16. Gopalpur			
		17. Bhuapur			
			18. Delduar		
2. Mymensingh	8. Mymensingh	19. Haluaghat	16. Ishwarganj	i,ii,iii,iv,vi	
		20. Muktagacha	17. Nandail	i,ii,iii,iv,vi	
		21. Trishal	18. Dhobaura	i,ii,iii,iv,vi,vii	
		22. Gaffargaon			
		23. Fulbaria			
		24. Phulpur			
	25. Gouripur				
	9. Jamalpur		19. Jamalpur Sadar	19. Jamalpur Sadar	i,ii,iii,iv
			20. Islampur	20. Islampur	i,ii,iii,iv,v,vii
			21. Melandaha	21. Melandaha	i,ii, iv,v,vii
			22. Sarishabari	22. Sarishabari	i,ii, iv,v,vii
			23. Madarganj	23. Madarganj	i,ii,iii,iv,v,vii
			24. Baksiganj	24. Baksiganj	i,ii,iii,iv,v,vii,viii
	10. Sherpur		25. Dewanganj	25. Dewanganj	i,ii,iii,iv,v,vii
			26. Nakla	26. Jhenaigati	i,ii,iii,iv,v, vii, viii
			27. Nalitabari		
	28. Sreebordi				
	11. Netrokona		27. Madon	27. Madon	i,ii, iv,v, vii
			28. Barhatta	28. Barhatta	i,ii, iv,v, vii
			29. Atpara	29. Atpara	i,ii, iv,v, vii
			30. Kendua	30. Kendua	i,ii, iv,v, vii
			31. Purbadhala	31. Purbadhala	i,ii, iv,v, vi,viii
			32. Mohanganj	32. Mohanganj	i,ii, iv,v, vi,vii
			33. Kalmakanda	33. Kalmakanda	i,ii, iv,v, vi,vii
	34. Khaliajuri	34. Khaliajuri	i,ii, iv,v, vi,vii		
	12. Kishoreganj		29. Sadar	35. Mithamain	i,ii, iv,v, vi,vii
			30. Kuliarchar	36. Pakundia	i,ii, iv,v, vi,viii
			31. Katiadi	37. Bajitpur	i,ii, iv,v, vi,viii
32. Bhairab			38. Karimganj	i,ii, iv,v, vi,vii	
			39. Hossainpur	i,ii, iv,v, vi	
			40. Itna	i,ii, iv,v, vi,vii	
	41. Tarail	i,ii, iv,v, vi,vii			
3. Chittagong	13. Chittagong	33. Sandwip	42. Banshkhali	i,ii, iv,v, vi	
		34. Patiya			
		35. Rangunia			

Extension Region	District	NATP Upazilas covered in NATP-II (1st generation)	New Upazilas for NATP-II (2 nd generation)	Selection criteria for NATP-II Upazilas		
1	2	3	4	5		
		36. Mirsharai				
		37. Hathazari				
		38. Anwara				
	14. Cox's Bazar		43. Kutubdia	i,ii, iv,v, vi,vii		
	15. Noakhali			44. Companiganj	i,ii, iv,v, vi, viii	
				45. Subarnachar	i,ii, iv,v, vi,vii	
				46. Chatkhil.	i,ii, iv,v, vi	
	16. Feni			47. Hatiya	i,ii, iv,v, vi,vii	
				48. Daganbhuiyan	i,ii,iii, iv,v, vi	
	17. Laxmipur			49. Fulgazi	i,ii,iii, iv,v, vi	
50. Ramganj				i,ii, iv,v, vi		
51. Raipur				i,ii, iv,v, vi		
4. Rangamati	18. Rangamati		52. Sadar	i,ii, iii, iv,v, vi		
			53. Kawkhali	i,ii, iii, iv,v, vi		
	19. Khagrachhari			54. Sadar	i,ii,iii, iv,v, vi	
				55. Ramgarh	i,ii,iii, iv,v, vi	
				56. Mahalchhari	i,ii, iii,iv,v, vi	
	20. Bandarban			57. Sadar	i,ii,iii, iv,v, vi	
58. Naikhongchhari				i,ii,iii, iv,v, vi		
5. Comilla	21. Comilla	39. Chandina	59. Debidwar	i,ii,iii, iv,v, vi,viii		
		40. Daudkandi	60. Brahmanpara	i,ii,iii, iv,v, vi,viii		
		41. Chouddagram				
		42. Laksham				
		43. Nangalkot				
	22. B. Baria			61. Nasirnagar	i,ii,iii, iv,v, vi	
				45. Kasba	62. Bijoyagar	i,ii, iv,v, vi,viii
				46. Nabinagar	63. Bancharampur	i,ii, iv,v, vi,vii
	23. Chandpur			64. Kachua	i,ii, iv,v, vi,viii	
						47. Shahrasti
48. Chandpur Sadar						
49. Haziganj						
6. Sylhet	24. Sylhet	50. Matlab (Uttar)				
		51. Dakshin Surma				
		52. Sylhet Sadar				
		53. Jointiapur				
		54. Beanibazar				
25. Moulavibazar			65. Juri	i,ii, iv,v, vi		
					55. Golapganj	
					56. Kamalganj	
					57. Sadar	
					58. Rajnagar	
26. Habiganj			66. Ajmiriganj	i,ii, iv,v, vi,vii		
					59. Sreemangal	
		60. Barlekha				

Extension Region	District	NATP Upazilas covered in NATP-II (1st generation)	New Upazilas for NATP-II (2 nd generation)	Selection criteria for NATP-II Upazilas		
1	2	3	4	5		
			67. Madhabpur	i,ii,iii, iv,v, vi		
			68. Baniyachong	i,ii, iv,v, vi,vii		
			69. Nabiganj	i,ii, iv,v, vi,vii		
			27. Sunamganj	70. Derai	i,ii, iv,v, vi,vii	
			71. Jagannathpur	i,ii, iv,v, vi,vii		
			72. Tahirpur	i,ii, iv,v, vi,vii		
7. Rajshahi	28. Rajshahi		73. Godagari	i,ii,iii, iv,v, vi,vii,viii		
			74. Bagmara	i,ii,iii, iv,v, vi,vii,viii		
			75. Charchhat	i,ii,iii, iv,v, vi,vii,viii		
			76. Mohanpur	i,ii,iii, iv,v, vi,vii,viii		
			77. Puthia	i,ii,iii, iv,v, vi,vii,viii		
	29. Naogaon		78. Sadar	i,ii,iii, iv,v, vi,vii,viii		
			79. Niamatpur	i,ii,iii, iv,v, vi,vii,viii		
			80. Patnitala	i,ii,iii, iv,v, vi,vii,viii		
			81. Manda	i,ii,iii, iv,v, vi,vii,viii		
			82. Mohadevpur	i,ii,iii, iv,v, vi,vii,viii		
			83. Raninagar	i,ii,iii, iv,v, vi,vii,viii		
	30. Natore	61. Boraigram				
						62. Lalpur
						63. Natore Sadar
						64. Shingra
	31. Chapai Nawabganj			84. Sadar	i,ii,iii, iv,v, vi,vii,viii	
				85. Gomastapur	i,ii,iii, iv,v, vi,vii,viii	
				86. Shibganj	i,ii,iii, iv,v, vi,vii,viii	
87. Nachole				i,ii,iii, iv,v, vi,vii,viii		
8. Bogra	32. Bogra	65. Bogra Sadar	88. Adamdighi	i,ii,iii, iv,v, vi,viii		
			66. Dhunot	89. Gabtali	i,ii,iii, iv,v, vi,vii,	
			67. Kahaloo	90. Sariakandi	i,ii,iii, iv,v, vi,vii	
			68. Sherpur	91. Nandigram	i,ii,iii, iv,v, vi,viii	
			69. Shibganj	92. Dhupchanchia	i,ii,iii, iv,v, vi,viii	
			70. Sonatala			
	33. Joypurhat			93. Akkelpur	i,ii,iii, iv,v, vi,vii,viii	
				94. Panchbibi	i,ii,iii, iv,v, vi,vii,viii	
	34. Pabna			95. Santhia	i,ii,iii, iv,v, vi,vii,viii	
				96. Faridpur	i,ii,iii, iv,v, vi,vii,viii	
				97. Ishwardi	i,ii,iii, iv,v, vi,viii	
				98. Atgharia	i,ii,iii, iv,v, vi,vii,viii	
				99. Chatmohar	i,ii,iii, iv,v, vi,vii,viii	
				100. Bhangura	i,ii,iii, iv,v, vi,vii	
				101. Bera	i,ii,iii, iv,v, vi,vii	
102. Sujanagar				i,ii,iii, iv,v, vi,viii		
9. Rangpur	35. Rangpur	71. Pargacha				
		72. Pirganj				

Extension Region	District	NATP Upazilas covered in NATP-II (1st generation)	New Upazilas for NATP-II (2 nd generation)	Selection criteria for NATP-II Upazilas		
1	2	3	4	5		
		73. Mithapukur				
		74. Kaunia				
		75. Badarganj				
	36. Gaibandha			103. Sughatta	i,ii,iii, iv,v, vi,vii,viii	
				104. Gobindaganj	i,ii,iii, iv,v, vi,vii,viii	
105. Palashbari				i,ii,iii, iv,v, vi,vii,viii		
10. Dinajpur	37. Dinajpur	76. Chirirbandar	106. Biral	i,ii,iii, iv,v, vi,vii,viii		
		77. Kaharol	107. Ghoraghat	i,ii,iii, iv,v, vi,vii,viii		
		78. Khanshama				
		79. Parbatipur				
		80. Birganj				
	38. Panchagarh			108. Atwari	i,ii,iii, iv,v, vi,vii	
				109. Debiganj	i,ii,iii, iv,v, vi,vii	
	39. Thakurgaon			110. Sadar	i,ii,iii, iv,v, vi,vii,viii	
				111. Baliadangi	i,ii,iii, iv,v, vi,vii,viii	
				112. Pirganj	i,ii,iii, iv,v, vi,vii	
	11. Khulna	40. Khulna	81. Dacope			
			82. Batiaghata			
83. Dumuria						
84. Paikgacha						
41. Satkhira						
						85. Kalaroa
						86. Satkhira Sadar
42. Bagerhat				113. Sadar	i,ii,iii, iv,v, vi,vii,viii	
				114. Sarankhola	i,ii,iii, iv,v, vi,vii	
				115. Chitalmari	i,ii,iii, iv,v, vi,vii	
43. Narail				116. Sadar	i,ii,iii, iv,v, vi,vii,viii	
				117. Lohagara	i,ii,iii, iv,v, vi,vii	
				118. Kalia	i,ii,iii, iv,v, vi,vii	
12. Jessore		44. Kushtia	88. Bheramara			
			89. Kumarkhali			
	90. Mirpur					
	91. Kushtia Sadar					
	45. Chuadanga			119. Damurhuda	i,ii,iii, iv,v, vi,vii	
				120. Alamdanga	i,ii,iii, iv,v, vi,vii	
	46. Meherpur			121. Gangni	i,ii,iii, iv,v, vi,vii	
				122. Mujibnagar	i,ii,iii, iv,v, vi,vii,viii	
				123. Sadar	i,ii,iii, iv,v, vi,vii,viii	
	47. Jessore		92. Abhoynagar			
			93. Bagherpara			
			94. Chowgacha			
			95. Jhikargacha			
		96. Keshabpur				

Extension Region	District	NATP Upazilas covered in NATP-II (1st generation)	New Upazilas for NATP-II (2 nd generation)	Selection criteria for NATP-II Upazilas
1	2	3	4	5
		97. Jessore Sadar		
		98. Monirampur		
		99. Sarsha		
	48. Jhenaidah	100. Kotchandpur	124. Harinakunda	i,ii,iii, iv,v, vi, viii
		101. Kaliganj		
13. Faridpur	49. Faridpur	102. Alfadanga	125. Nagarkanda	i,ii,iii, iv,v, vi, viii
		103. Faridpur Sadar	126. Boalmari	i,ii,iii, iv,v, vi
		104. Madhukhali	127. Bhanga	i,ii,iii, iv,v, vi, viii
	50. Rajbari	105. Baliakandi	128. Kalukhali	i,ii,iii, iv,v, vi, viii
		106. Pangsha		
		107. Rajbari Sadar		
	51. Gopalganj		129. Gopalganj Sadar	i,ii,iii, iv,v, vi,vii, viii
			130. Muksudpur	i,ii,iii, iv,v, vi,vii, viii
			131. Kashiani	i,ii,iii, iv,v, vi,vii, viii
			132. Kotalipara	i,ii,iii, iv,v, vi,vii, viii
			133. Tungipara	i,ii,iii, iv,v, vi,vii, viii
	52. Madaripur		134. Madaripur Sadar	i,ii,iii, iv,v, vi,vii viii
			135. Rajoir	i,ii,iii, iv,v, vi,vii viii
			136. Kalkini	i,ii,iii, iv,v, vi,vii viii
			137. Shibchar	i,ii,iii, iv,v, vi,vii viii
			138. Sadar	i,ii,iii, iv,v, vi,vii viii
	53. Shariatpur		139. Zajira	i,ii,iii, iv,v, vi,vii viii
			140. Bhedarganj	i,ii,iii, iv,v, vi,vii
			141. Naria	i,ii,iii, iv,v, vi,vii viii
142. Damuda			i,ii,iii, iv,v, vi,vii	
143. Gosairhat			i,ii,iii, iv,v, vi,vii	
144. Sadar			i,ii,iii, iv,v, vi,vii	
14. Barisal	54. Bhola	145. Borhanuddin	i,ii,iii, iv,v, vi,vii	
		146. Tojumuddin	i,ii,iii, iv,v, vi,vii	
		147. Monpura	i,ii,iii, iv,v, vi,vii	
		148. Bhandaria	i,ii,iii, iv,v, vi,vii	
	55. Pirojpur	149. Nazirpur	i,ii,iii, iv,v, vi,vii	
		150. Mathbaria	i,ii,iii, iv,v, vi,vii	
		151. Magura Sadar	i,ii,iii, iv,v, vi,vii viii	
Jessore	56. Magura	152. Sreepur	i,ii,iii, iv,v, vi,vii viii	
		153. Mohommadpur	i,ii,iii, iv,v, vi,vii viii	
		154. Shalikha	i,ii,iii, iv,v, vi,vii viii	
		155. Sadar	i,ii,iii, iv,v, vi, viii	
Rajshahi	57. Sirajganj	156. Chauhali	i,ii,iii, iv,v, vi,vii	
		157. Tarash	i,ii,iii, iv,v, vi,vii	
		158. Ullahpara	i,ii,iii, iv,v, vi,vii,viii	
		159. Shahjadpur	i,ii,iii, iv,v, vi,vii,viii	
		160. Kazipur	i,ii,iii, iv,v, vi,vii	
		161. Raiganj	i,ii,iii, iv,v, vi,vii viii	

Extension Region	District	NATP <i>Upazilas</i> covered in NATP-II (1st generation)	New <i>Upazilas</i> for NATP-II (2nd generation)	Selection criteria for NATP-II <i>Upazilas</i>
1	2	3	4	5
			162. Kamarkhanda	i,ii,iii, iv,v, vi,vii viii
			163. Belkuchi	i,ii,iii, iv,v, vi,vii viii

Annex 13: Lessons Learned from NATP: Synthesis of the Impact Assessment

BANGLADESH: National Agricultural Technology Program, Phase II Project (NATP-II)

259. **The Project:** NATP, first phase of the APL, focuses on improving the effectiveness of the national agricultural technology management (research and extension) system. Total estimated cost of the project is \$ 84.6 M, including contingencies. The project supports demand led competitive and sponsored agricultural research, dissemination of ready-to-use available agricultural crop, livestock and fisheries technologies and supply chain development to increase farm productivity, farm income and technology adoption rate with better price realization by small and marginal farm producers. NATP is projected to directly benefit about 330,000 farm households (FHHs) through 18,000 CIGs, as per PAD.

260. **Methodology:** Impact assessment (IA)ⁱ of NATP was done in 2013 (April-Aug) by the external consultants hired by the PMU. This study covered 17 (out of 65) major agriculture technologies covering crops (9), livestock (2), fisheries (2), and value chain development (4). The selected technologies for IA study accounted for 60% of the total demonstrations conducted by NATP covering crops, livestock, fisheries and SCDC. These technologies are also diverse in nature representing yield enhancing, cost reducing, resource conserving, post-harvest loss reducing and producer price increasing impacts at farm level. A total of 6044 randomly selected sample farmers, covering 2,522 CIG farmers, 2,522 non-CIG farmers and 1,000 control farmers were surveyed. The sample CIG farmers are drawn from 387 CIGs spread over five diverse agro-ecologies representing saline, drought, flood and flash flood prone and other areas. Sampling distribution was done based on proportionate allocation method: (i) across crops, livestock, fisheries and supply chain interventions, in proportion to their share in total CIGs (20,012); and (ii) across selected technologies and agro-ecologies, in proportion to their share in total demonstrations conducted (61,678 until 2011/12). Control farmers were drawn from non-NATP districts/UZs but within the respective agro-ecological typologies of project sample farmers.

261. This summary of IA covers three PDO indicators namely; (i) technology adoption, (ii) agriculture productivity and (iii) farm income related impacts in the project benefitted farm households. The results, estimated first for the sample and projected next for the whole project area, are summarized below.

262. **Technology Adoption Rate:** This is estimated by using the IA sample database as follows:

(i) Number of sustained adopters (adopting the most critical elementsⁱⁱ of technology for more than one season for non-demo farmers and for more than one season but excluding the demo season for the demo farmers) are estimated separately for CIG and non-CIG farmers and aggregated for over all sample, (ii) While aggregating for non-CIG farmers, possible overestimation in the estimation of other adopters during the survey is netted out by conservatively assuming a maximum limit of 50%

T-1 Estimated Adoption Rate and Ratio for NATP by farm size

Impacts on Sample Farms	MF	SF	Medium farms	Total farms
CIG Farmers	610	1367	528	2505
CIG Adopters	499	1046	462	2006
Non-CIG Adopters	1668	2893	851	5412
Total Adopters	2167	3938	1313	7418
CIG Adoption Rate (%)	81.8	76.5	87.4	80.1
Adoption Ratio [@]	3.3	2.8	1.8	2.7

Source: Impact Assessment Report and database, 2013. [@] refers to the ratio of non-CIG adopters to CIG adopters. Marginal farms includes near landless also. Medium farms include large farms also. MF-Marginal farms and SF-Small farms

overlapping responses, (iii) Proportion of adopters within CIG and adoption ratio of other adopters to CIG adopters are derived from the sample, (iv) Using the same proportion of CIG adopters and adoption ratio, total technology adopters is estimated for the NATP as a whole, (v) technology adoption rate for NATP is estimated based on the total number of farmers in the project domain, (vi) technology adoption rate for NATP is disaggregated by farm size using the farm size wise analysis of IA sample data. The assumption regarding the overlapping responses in case of non-CIG adopters was validated with sample dataⁱⁱⁱ and projected total technology adopters is also tested for its sensitivity to varying overlapping response assumptions.

263. Based on IA study, out of 2505 sample CIG farmers, 2006 farmers are adopting one or more NATP technologies in more than one season as defined above. Collectively, these 2006 CIG adopters are able to motivate and influence 5412 non-CIG farmers to adopt one or more of the technologies demonstrated within the CIGs (T-1).

264. During NATP implementation up to Aug. 2013, the project has supported extension service delivery through 20,212 organized CIGs. CIG's need based technology demos (82,406) covering 65 technologies (crops, livestock, fisheries and supply chain development), were organized in

82,406 farmers' fields covering all 20,012 CIGs, impacting farm level adoption in 398,735 CIG farmers. A total of 57,746 field days, organized around all CIG demos, helped in exposing the NATP demonstrated technologies to over 1.5 million farmers participated in the field days, which excludes the number of farmers trained in selected technologies^{iv}.

T-2 Projected adoption of NATP technologies by farm size

Project Area	MF	SF	Medium farms	Total farms
Total Farmers	1109943	2260961	748360	4119265
CIG Farmers	97113	217519	84103	398735
CIG Adopters	79453	166434	73492	319378
Non-CIG Adopters	265498	460441	135448	861387
Total Adopters	344951	626875	208940	1180765

Source: Impact Assessment Report and database, 2013. Marginal farms includes near landless also. Medium farms include large farms also.

265. Technology adoption levels are scaled up for the project as a whole using the adoption rate within CIGs (80.1%) and adoption ratio between non-CIG and CIG farmers (2.7), derived from the IA report. Based on this, CIG and Non-CIG farmers adopting the demonstrated technologies is estimated respectively at 0.32 M and 0.86 M for NATP (T-2).

266. Total technology adopters in NATP area until 2012/13 is 1.18 M, when technology adoption is counted only once irrespective of number of technologies adopted by each farmer. And these are sustained adopters of the technology as they are adopting it for more than one year/season after getting exposed to the technology either through CIG based demos or CIG led field days. As against this, technology adopters reported up to 2012/13, as 2.07 M farmers^v refers to (i) all farmers who have adopted critical elements of technology at least once, and (ii) total technologies adopted by the adopters

T-3 NATP: Summary of farm level adoption impacts

Project Area	MF	SF	Medium farms	Total farms
Share of Farmers	26.9%	54.9%	18.2%	4119265
Share of Adopters	29.2%	53.1%	17.7%	1180765
Adoption Ratio [@]	3.34	2.77	1.84	2.70
Adoption Rates				
Estimated	31.1%	27.7%	27.9%	28.7%
PAD target	10.0%	20.0%	30.0%	19.1%

Source: Impact Assessment Report and database, 2013. Marginal farms includes near landless also. Medium farms include large farms also. [@] refers to the ratio of non-CIG adopters to CIG adopters.

where farmers adopting more than one technology get counted as many number of times^{vi}.

267. NATP is implemented in 25 districts. But the project is implemented only in 120 (out of 200) UZs in these 25 project districts. Within the project UZ, all unions are covered for livestock and fisheries but for crops, within the project union, all blocks are also covered. Each project union has ten crop CIGs and three CIGs each for livestock and fisheries. Based on this, NATP target domain is defined by 120 UZs which has a total of 4.12 M farmers^{vii}. Hence, over all technology adoption rate for NATP is estimated at 28.7% (T-3).

268. In the project area, distribution of farmers by holding size^{viii} is 27% for marginal farms (MF, including near landless category), 55% for small farms (SF), and 18% for medium farms (including the large farms). Distribution of technology adopters by farm size is 29% for MF, 53% for SF and 18% for medium farms. As of now, Technology adoption rate is estimated at 31.1% for MF, 27.7% for SF and 27.9% for medium farms.

269. The PAD targets for technology adoption rates are 10% for MF, 20% for SF and 30% for medium farms, which are over achieved for MF and SF and under achieved for medium farms as of now. Weighted by the share of size wise farm distribution, overall targeted technology adoption rate as per PAD is 19.1% as compared to the estimated overall technology adoption rate of 28.7% in 2012/13. In absolute numbers, PAD targeted 786780 adopters by EOP and project has achieved 50% more than the target until 2012/13. This is partly attributed to; (i) number of CIGs supported by the project, which exceeded the PAD target of 18,000 CIGs, by about 11% and (ii) number of CIG farmers covered by the project, which exceeded the PAD target of 330,000, by about 21%. The rest of the adoption impact has come from the demand-led-extension services delivered effectively through decentralized extension support system in partnership with CIGs.

270. However, the estimated technology adoption rates are considered conservative due to the following reasons: (i) Overlapping responses for non-CIG adopters is considered at a maximum level of 50%^{ix}, (ii) During 2012/13, about 20,700 technology demos were conducted, and 20,100 field days organized to expose the demonstrated technologies additionally to 0.51 M farmers, whose impacts can be captured only after one year from now. (iii) Similarly, technology demos planned for 2013/14 will further improve the technology adoption rate two years later into post project implementation period.

T-4 NATP: Increase in yield levels by farm size over BL

Agriculture	Unit	BL	Yield increase, WP over BL		
			MF	SF	Medium farms
Paddy	t/ha	4.4	18%	17%	14%
Mustard	t/ha	1.0	49%	39%	39%
Wheat	t/ha	2.6	40%	31%	31%
Lentil	t/ha	0.9	49%	39%	52%
Tomato	t/ha	20.4	25%	17%	16%
Brinjal (IPM)	t/ha	18.5	41%	34%	32%
Cow Rearing	l/day	5.1	64%	65%	55%
Carp polycultue	t/ha	3.1	64%	60%	68%
Tilapia	t/ha	4.0	69%	76%	63%

271. **Agriculture Productivity Impacts:** This is estimated by using the IA sample database as

follows: (i) average productivity of crops, cows and fisheries is estimated for technology adopters (separately for CIG and non-CIG adopters) and control farmers, further disaggregated by three farm sizes. (ii) using area for crops/fish ponds and number for livestock as weights, combined average productivity is estimated for all adopters (CIG and non-CIG). IA also compared this with the BL productivity levels. This was done for each of the sample major agriculture technologies covered in IA survey. In case of paddy, the yield data are averaged across boro and aman paddy with area as weights^x.

T-5 NATP: Farm level productivity impacts, all farms

Agriculture	Unit	BL	Change in yield	
			WP/BL	WP/WOP
Paddy	t/ha	4.4	17%	10%
Mustard	t/ha	1.0	43%	40%
Wheat	t/ha	2.6	33%	25%
Lentil	t/ha	0.9	46%	24%
Tomato	t/ha	20.4	18%	12%
Brinjal (IPM)	t/ha	18.5	36%	28%
Cow Rearing	l/day	5.1	61%	42%
Carp polyculture	t/ha	3.1	64%	48%
Tilapia	t/ha	4.0	71%	53%

272. Agriculture productivity in the project area, across farm sizes, has increased by 14% to 52% for crops, 54% to 65% for livestock and 60 to 76% for fisheries, as compared to 8% projected in PAD over the BL values. Productivity increases are higher: for paddy, wheat, mustard, tomato and brinjal for MFs; for cow rearing and tilapia farming for SFs; and for lentil and carps farming for medium farms. Among various technologies adopted by the farmers, productivity increase over BL for mustard, lentil, milk, carp and tilapia is higher than others (T-4).

273. Weighted average productivity across all farm sizes is compared with both BL and WOP situation. Agriculture productivity has improved under WOP over BL, which varied from 2% to 17% across all crops, livestock and fisheries. As compared to WOP, average agriculture productivity for technology adopting farmers has increased by 10% to 40% for crops; 42% for cows; and 48% to 53% for fisheries for the technology adopters. In all cases, increase in agriculture productivity for the adopters, in the project area, over BL is much higher than the PAD projected level of 8% for all farm sizes. This is more pronounced in case of fisheries, livestock, mustard and brinjal as compared to others (T-5).

274. The project has directly benefitted 0.32 million CIG farmers and 0.86 million non-CIG farmers who have adopted the demonstrated technologies by improving their agriculture productivities. Average productivity levels among the CIG adopters are higher than non-CIG adopters by about 3% to 28% across technologies (T-6). The gap in productivity between CIG and non-CIG adopters is more in case of fisheries, livestock and lentil. Taking paddy as an example, if productivity by season is compared, then non-CIG adopters of RYGM technology in boro paddy get 0.5 t/ha less yield than the CIG adopters. And, there are more than 681,500 non-CIG farmers who are adopting RYGM in boro paddy in the project area.

T-6 NATP: Farm level productivity impacts, all farms

Agriculture	Unit	WOP	CIG	Non-CIG	CIG/Non-CIG
Paddy	t/ha	4.7	5.3	5.1	103%
Mustard	t/ha	1.0	1.4	1.3	112%
Wheat	t/ha	2.8	3.6	3.3	109%
Lentil	t/ha	1.1	1.5	1.2	120%
Tomato	t/ha	20.4	25.4	23.1	110%
Brinjal (IPM)	t/ha	18.5	26.0	24.4	107%
Cow Rearing	l/day	5.8	8.7	7.5	116%
Carp polyculture	t/ha	3.5	5.6	4.5	124%
Tilapia	t/ha	4.4	7.4	5.8	128%

275. CIG based RYGM demos organized by DAE in the project area have consistently shown that potential incremental productivity gain (average of 2008/09 to 2011/12) due to this technology

adoption under farmer management is 1.2 t/ha^{xi}. As compared to this, incremental boro paddy yield, realized by CIG and non-CIG adopters are 0.8 t/ha (66% of the potential) and 0.3 t/ha (25% of the potential) respectively. For maximizing the productivity gains due to adoption, it is important to reduce the; (i) yield gap between non-CIG adopters and CIG adopters; (ii) yield gap between CIG adopters and CIG based demos; and (iii) reduce the yield variability within the CIG adopters.

276. **Farm Level Income Impacts:** This is estimated by using the IA sample database as follows: (i) average gross margin for the technologies adopted by CIG and non-CIG adopters and control farmers, further disaggregated by three farm sizes is estimated. (ii) using area for crops/fish ponds and number for livestock as weights, combined average gross margin is estimated for all adopters (CIG and non-CIG). This was done for each of the sample major agriculture technologies covered in IA survey. (iii) for farm level income analysis, five major farming systems are considered-rice based, crop diversification based (rice with pulses/oilseeds/vegetables), mixed farming based (crop diversification with livestock), livestock based (cow rearing/beef fattening), and fish farming based (carp/tilapia). (iv) Farm level income for the technology adopting farmers is estimated for different farm sizes namely; marginal (0.2 ha), small (1.0 ha), and medium (2 ha). For livestock and fish farming, a unit size of two for cows, three cycles for beef fattening^{xii} and 0.23 ha for fish ponds are considered based on the IA data analysis (T-7).

277. *Rice based farming:* Farmers adopt only rice in their cropping pattern in both the seasons. Across farm sizes, farm income increased by 23 to 47% due to the adoption of demonstrated technologies in rice, which includes RYGM and AWD. But in AWD, incremental net income is captured only through reduced production cost due to reduced number of irrigations (30%) as compared to non-adopters. IA survey did not cover the yield impact of this technology as being reported by DAE in their annual reports (DAE, Annual Progress Report, 2011/12). Hence, to that extent, incremental net income gets under estimated. Next, minimizing the yield gap as discussed in para. 5.3 & 5.4 would further enhance the net income of rice based farming technology adopters.

278. *Crop diversification based farming:* With project, farmers adopt rice cultivation in 80% of the farm area in both the seasons. In the remaining area (20%), crop diversification is followed by

T-7 NATP: Farm level income impacts by farm size and type of farming (constant 2013 prices)

Types of farming	Marginal farms		Small farms		Medium farms		Landless/ near landless	
	BL	WP/BL	BL	WP/BL	BL	WP/BL	BL	WP/BL
I. Rice based	7150	47%	35751	31%	71503	23%		
II. Rice plus diversification	8890	78%	44452	60%	88903	58%		
III. Mixed farming (Rice plus Diversification with livestock)	50202	79%	85764	69%	130215	64%		
<i>Cow rearing</i>	70480	54%	106042	55%	150493	55%		
<i>Beef fattening</i>	29924	135%	65486	92%	109937	77%		
IV. Livestock based							41312	79%
<i>Cow rearing</i>							61590	51%
<i>Beef fattening</i>							21034	159%
V. Fish farming							71605	68%
<i>Carp polyculture</i>							57239	66%
<i>Tilapia</i>							85970	69%

WP/BL refers to percent increase for technology adopters over BL.

adopting the technologies demonstrated for pulses (lentil), oilseeds (mustard) and vegetables (brinjal/tomato). As against this, the control farmers are following rice in 90% of their farm area and diversified crops in the remaining 10% area. Across farm sizes, farm net income increased by 58% to 78% due to the adoption of demonstrated technologies by the diversified crop farmers by adopting the demonstrated technologies in rice (RYGM/AWD), mustard, lentil, brinjal and tomato. As compared to rice based farming system, crop diversification technology adoption has almost doubled the net income of MFs followed by about 72% increase in net income in case of SFs and medium farms.

279. *Mixed farming (crop diversification with livestock)*: This farming type covers farmers who are following rice based but diversified crop farming along with; (i) two units of cow rearing for milk, or (ii) two or three cycles of beef fattening. Adopting multiple technologies, demonstrated and disseminated through CIGs, field days and trainings, in the mixed farming system helped in substantially improving the farm net income as compared to non-adopters. For technology adopters, increase in farm net income varied from 54% to 55% in case of mixed farming with cow rearing and 77% to 135% in case of mixed farming with beef fattening as compared to non-adopters.

280. *Livestock based farming*: (cow rearing or beef fattening): This farming type, most common for landless and nearly landless HHs covers farmers who are rearing cows for milk production and/or doing beef fattening for sale for income generation. There are about 370,420 nearly landless HHs in the project area. Considered independently, technology adopters have increased their farm net income by as much as 159% through beef fattening aided by feed management technology as well as by intensifying the beef fattening activity following the exposure to beef fattening technology. With cow rearing, farm net income for the technology adopters has increased by 51% as compared to the non-adopters.

281. *Fish farming* (carp polyculture or tilapia): This farming type, common for nearly landless HHs covers farmers who are rearing fish in ponds. There are about 165,000 ponds, owned by both single and joint ownership in the project area. Technology adopters practice either carp polyculture or tilapia farming. Adoption of these demonstrated technologies increased the farm net income by 66% for carp polyculture and 69% for tilapia in the project area, as compared non-adopters.

282. *BL and WP income levels compared*: For adopters, average farm income, as compared to BL situation, increased by various magnitude across MFs, SFs and medium farms as follows: (i) 23 to 47% for rice based farming system; (ii) 58 to 78% for rice plus diversification with pulses/oilseeds/vegetables; (iii) 54 to 55% for rice with diversification plus cow rearing; and (iv) 77 to 135% for rice plus diversification with beef fattening. Farm income for technology adopting land less and near landless families has increased by (i) 51% for cow rearing, (ii) 68% for fish rearing, and (iii) 159% for beef fattening.

T-8 NATP: Farm level productivity impacts, all farms (1.02 ha)

Types of Farming	WOP	WP	WP/WOP
Rice based	37237	46582	25%
Crop Diversification	46006	72110	57%
Mixed Farming	91482	145940	60%
<i>Cow rearing</i>	115924	165262	43%
<i>Beef fattening</i>	67040	126619	89%
Livestock	45476	73831	62%
<i>Cow rearing</i>	69918	93153	33%
<i>Beef fattening</i>	21034	54509	159%
Fiaheries	79680	120256	51%
<i>Carp polyculture</i>	63500	94868	49%
<i>Tilapia</i>	95860	145643	52%

WP/WOP refers to percent increase for technology adopters over WOP.

283. *WOP and WP income levels compared:* Farm level net income impacts in the project beneficiary farms are compared with control farms (WOP) for an overall farm holding size of 1.02 ha (T-8). For adopters, average farm net income, as compared to WOP situation, increased by various magnitudes depending on type of farming system as follows: (i) 25% for rice based farming system; (ii) 57% for rice plus diversification with pulses/oilseeds/ vegetables; and (iii) 60% for mixed farming with diversified cropping and livestock rearing. Farm income for technology adopting land less and near landless families has increased by (i) 33% for cow rearing, (ii) 57% for fish rearing, and (iii) 159% for beef fattening.

284. *Mixed farming system with livestock and/or fish farming is critical to generate substantial impact on farm income particularly for 89% of the farm families who are near landless, marginal and small farm holders.* NATP's design supported technology cum agriculture sub-sector specific CIGs for crops/livestock/fisheries. But location of CIGs facilitated the multiple adoption of crop, livestock and fisheries technologies in the project area. For example, in each union within the project area NATP has ten crop CIGs and three CIGs each for livestock and fisheries, with a total membership of about 320 CIG members to actively participate in extension planning and management. They collectively influence 3700 farmers (including nearly landless) in the same union through formal (field days/trainings/exposures) and informal interactions for disseminating the demonstrated technologies. This has resulted in adoption of multiple technologies cutting across agriculture sub-sectors^{xiii} with substantial improvement in productivity and farm income as compared to BL and Control. However, having the farm-centered focus for productivity and income enhancement would have resulted in larger benefits with significant impact on the income of nearly landless, marginal and smallholder farmers.

ⁱ Final Report for Impact Assessment of National Agricultural Technology Project (NATP): Phase-1, PCU, NATP, Oct 2013

ⁱⁱ For example, in case of Rice Yield Gap Minimization technologies (RYGM), using quality seeds and optimum age of the seedling and timely transplanting, are considered critical elements of RYGM technology. For Alternate Wetting and Drying (AWD) technology, application of irrigation of water after the disappearance of ponded water in the paddy fields (when 15 cm water depth below the surface is reached) by monitoring with perforated field water pipes is critical element of AWD technology (Ref: Annual Progress Reports, 2009/10 to 2011/12, Ministry of Agriculture (MOA), DAE, NATP Phase-1, PIU, Dhaka)

ⁱⁱⁱ Each sample CIG had 5 to 6 non-CIG sample farmers, who reported the number of other adopters. For each CIG, following steps are followed: (i) First, assuming *no overlapping* in the reporting of other adopters by non-CIG responses, other adopters as reported by all non-CIG sample farmers is aggregated (say, N₁ for first CIG). (ii) Next, for the same CIG, the maximum value (for other adopters) from these responses was selected. By assuming that, responses from all other non-CIG farmers are overlapping (*full overlapping*) with this maximum value, only this value was taken to account for other adopters (say, n₁ for first CIG). (iii) Above two steps were repeated for all sample CIGs and values are aggregated separately for step (i) as N and for step (ii) as n. (iv) Finally, the ratio of (1-n/N) is estimated as the extent of overlapping, which came to 0.47. Hence, maximum level of overlapping is taken as 50% and in any case actual overlapping will always be less than this value. Relaxing this restrictive assumption to 40% will increase the overall technology adoption rate to 30.1% and in case of no overlapping at all, over all technology adoption rate will reach a maximum of 36%, corresponding to 1.48 M technology adopters.

^{iv} Status Reports of NATP and Presentations made to the 11th ISM by PCU, DAE, DLS, DOF and Hortex, Sep. 29-30, 2013.

^v 10th ISM Aide Memoire, NATP, World Bank, April. 2013.

^{vi} For example, total CIG adopters for crops is reported as 0.66 M up to Aug.2013, while total CIG members for crops is 0.27 M. (Ref: Status Report for Agriculture Extension Component, PIU-DAE, 11th ISM, Sep 24, 2013.

^{vii} Estimated from Year Book of Agricultural Statistics of Bangladesh, BBS, Statistics Division, Ministry of Planning, GoB, May 2011.

^{viii} Farm size classification followed here is similar to what is followed in NATP PAD, 2005, which is as follows: Marginal Farms (including near landless) with 0.01 to 0.49 acres; Small farms with 0.50 to 2.49 acres and medium farms (including large farms) with above 2.50 acres of land area

^{ix} This will be tested during the second round of NATP impact assessment survey and the estimation further refined.

^x IA survey failed to record the yield increase in case of AWD technology for boro paddy. As per DAE, CIG based demonstrations on AWD paddy have consistently recorded incremental yield of 0.8 t/ha (average of 2008/09 to 2011/12) apart from 32% savings in irrigation water used. This is taken care of during the second round of NATP impact assessment survey.

^{xi} Annual Progress Report, 2011/12, Ministry of Agriculture (MOA), DAE, NATP Phase-1, PIU, Dhaka

^{xii} From the IA, it was observed that on an average, control farmers are having two cycles for beef fattening as compared to three being practiced by the technology adopters in the project area.

^{xiii} No systematic data on multiple adoptions of technologies by CIGs is compiled by the project unit. This is also missed in the first round of IA survey and now planned to capture in the second round survey.

BANGLADESH NATIONAL AGRICULTURAL TECHNOLOGY PROGRAM – PHASE 2 PROJÉT

PROJECT DISTRICTS:

- 1st GENERATION DISTRICTS (ALREADY COVERED UNDER NATP-1)
- 2nd GENERATION DISTRICTS (NEWLY COVERED UNDER NATP-2)



- ⊙ DISTRICT HEADQUARTERS
- ⦿ DIVISION HEADQUARTERS
- ★ NATIONAL CAPITAL
- DISTRICT BOUNDARIES
- DIVISION BOUNDARIES
- INTERNATIONAL BOUNDARIES

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JUNE 2015

IBRD 41672