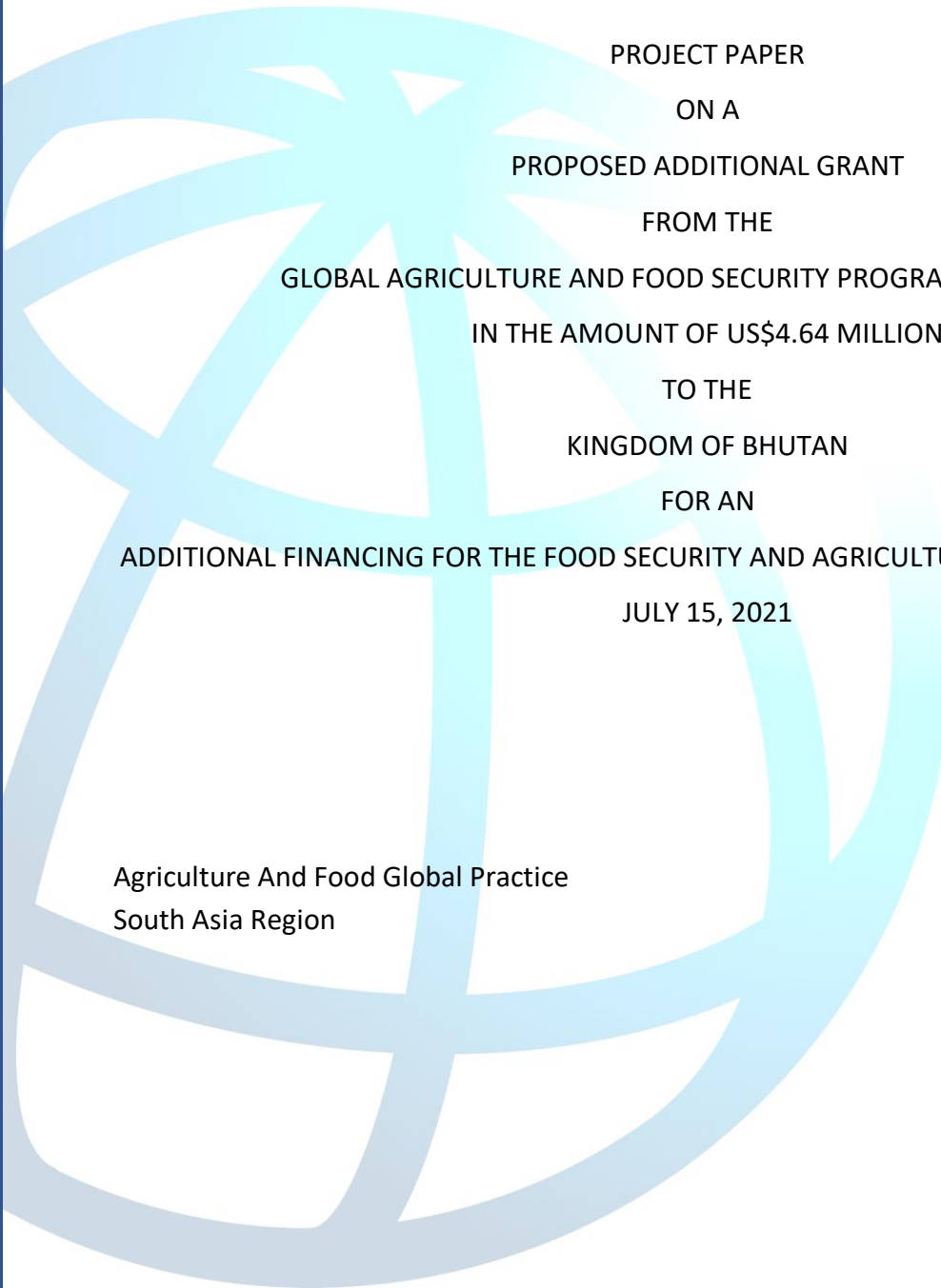


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Report No: PAD4387

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT



PROJECT PAPER  
ON A  
PROPOSED ADDITIONAL GRANT  
FROM THE  
GLOBAL AGRICULTURE AND FOOD SECURITY PROGRAM TRUST FUND  
IN THE AMOUNT OF US\$4.64 MILLION  
TO THE  
KINGDOM OF BHUTAN  
FOR AN  
ADDITIONAL FINANCING FOR THE FOOD SECURITY AND AGRICULTURE PRODUCTIVITY PROJECT  
JULY 15, 2021

Agriculture And Food Global Practice  
South Asia Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective May 31, 2021)

Currency Unit = Bhutanese Ngultrum (BTN)

BTN 72.41 = US\$1

FISCAL YEAR

July 1 – June 30

Regional Vice President: Hartwig Schafer

Country Director: Mercy Miyang Tembon

Regional Director: John A. Roome

Practice Manager: Loraine Ronchi

Task Team Leader(s): Felipe F. Dizon, Valens Mwumvaneza

## ABBREVIATIONS AND ACRONYMS

AF	Additional Financing
ARDCs	Agriculture Research and Development Centers
BBP	Build Bhutan Project
BCC	Behavior Change and Communications
BCR	Benefit Cost Ratio
CMU	Country Management Unit
CPF	Country Partnership Framework
CRP	Community Resource Person
CSA	Climate Smart Agriculture
DAMC	Department of Agriculture Marketing and Cooperatives
DoA	Department of Agriculture
ECP	Economic Contingency Plan
EFA	Economic and Financial Analysis
EIRR	Economic Internal Rate of Return
ESMF	Environment and Social Management Framework
FG	Farmer Group
FM	Financial Management
FSAPP	Food Security and Agriculture Productivity Project
FY	Fiscal Year
GAFSP	Global Agriculture and Food Security Program
GHG	Greenhouse Gas
GRM	Grievance Redress Mechanism
IRIs	Intermediate Results Indicators
IUFRs	Interim Unaudited Financial Reports
MoAF	Ministry of Agriculture and Forests
MoH	Ministry of Health
MoLHR	Ministry of Labor and Human Resources
MTR	Midterm Review
NPV	Net Present Value
PDO	Project Development Objective
PG	Producer Group
PIUs	Project Implementation Units
PMU	Project Management Unit
PP	Procurement Plan
PSTs	Project Support Teams
RNR	Renewable and Natural Resources
RGoB	Royal Government of Bhutan
SOEs	State Owned Enterprises
WUAs	Water Users Associations

The Kingdom of Bhutan

Additional Financing for Food Security and Agriculture Productivity Project

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**BASIC INFORMATION – PARENT (Food Security and Agriculture Productivity Project - P155513)**

Country Bhutan	Product Line Recipient Executed Activities	Team Leader(s) Felipe Jr Fadullon Dizon		
Project ID P155513	Financing Instrument Investment Project Financing	Resp CC SSAA1 (9243)	Req CC SACBT (7031)	Practice Area (Lead) Agriculture and Food

Implementing Agency: Ministry of Agriculture and Forests

Is this a regionally tagged project?  No	
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Bank/IFC Collaboration  No
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Approval Date 27-Apr-2017	Closing Date 30-Dec-2022	Expected Guarantee Expiration Date	Original Environmental Assessment Category Partial Assessment (B)	Current EA Category Partial Assessment (B)
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**Financing & Implementation Modalities**

<input type="checkbox"/> Multiphase Programmatic Approach [MPA]	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a Non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Expanded Implementation Support (HEIS)

**Development Objective(s)**

The Project Development Objective (PDO) is to increase agricultural productivity and enhance access to markets for farmers in selected gewogs in south-west Bhutan.

**Ratings (from Parent ISR)**

	Implementation					Latest ISR
	01-May-2018	19-Dec-2018	12-Apr-2019	23-Oct-2019	19-May-2020	06-Jan-2021
Progress towards achievement of PDO	S	S	S	S	S	S
Overall Implementation Progress (IP)	S	S	S	S	S	S
Overall Safeguards Rating	S	S	S	S	S	MS
Overall Risk	M	M	M	M	M	M

**BASIC INFORMATION – ADDITIONAL FINANCING (Additional Financing for Food Security and Agriculture Productivity Project - P175717)**

Project ID P175717	Project Name Additional Financing for Food Security and Agriculture Productivity Project	Additional Financing Type Scale Up	Urgent Need or Capacity Constraints Yes
Financing instrument Investment Project Financing	Product line Recipient Executed Activities	Approval Date 20-Jul-2021	
Projected Date of Full Disbursement	Bank/IFC Collaboration		



30-Dec-2024	No		
Is this a regionally tagged project?			
No			

**Financing & Implementation Modalities**

<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input checked="" type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a Non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Expanded Implementation Support (HEIS)
<input type="checkbox"/> Contingent Emergency Response Component (CERC)	

**Disbursement Summary (from Parent ISR)**

Source of Funds	Net Commitments	Total Disbursed	Remaining Balance	Disbursed
Grants	8.00	7.41	0.59	93 %

**PROJECT FINANCING DATA – ADDITIONAL FINANCING (Additional Financing for Food Security and Agriculture Productivity Project - P175717)**

**FINANCING DATA (US\$, Millions)**

**SUMMARY (Total Financing)**

	Current Financing	Proposed Additional Financing	Total Proposed Financing
<b>Total Project Cost</b>	9.33	5.54	14.87
<b>Total Financing</b>	9.33	5.54	14.87
<b>Financing Gap</b>	0.00	0.00	0.00



**DETAILS - Additional Financing**

**Non-World Bank Group Financing**

Counterpart Funding	0.90
Borrower/Recipient	0.41
Local Beneficiaries	0.49
Trust Funds	4.64
Global Agriculture and Food Security Program	4.64

**COMPLIANCE**

**Policy**

Does the project depart from the CPF in content or in other significant respects?

Yes  No

Does the project require any other Policy waiver(s)?

Yes  No

Explanation

Waiver of: The Environmental and Social Framework, the Environmental and Social Directive for Investment Project Financing, and the Directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups.

Has the waiver(s) been endorsed or approved by Bank Management?

Approved by Management       Endorsed by Management for Board Approval       No

Explanation

The waiver of the ESF was granted by OPCS VP on March 19, 2021. Concurrences were received from the RVP, RD, CD, PM, E&S PMs, and Country Lawyer.

**INSTITUTIONAL DATA**

**Practice Area (Lead)**

Agriculture and Food



**Contributing Practice Areas****PROJECT TEAM****Bank Staff**

<b>Name</b>	<b>Role</b>	<b>Specialization</b>	<b>Unit</b>
Felipe Jr Fadullon Dizon	Team Leader (ADM Responsible)		SAGGL
Valens Mwumvaneza	Team Leader		SSAA1
Sangeeta Patel	Procurement Specialist (ADM Responsible)		ESARU
Ahsan Ali	Procurement Specialist		ESARU
Rinzin Dorji	Financial Management Specialist (ADM Responsible)		ESAG2
Savinay Grover	Financial Management Specialist		ESAG1
Md Istiak Sobhan	Environmental Specialist (ADM Responsible)		SSAEN
Sabah Moyeen	Social Specialist (ADM Responsible)		SSAS1
Christine Heumesser	Team Member		SSAA1
David Tuchsneider	Team Member		SSAA1
John Prakash Badda	Team Member		SSAA1
Pamela Patrick	Procurement Team		SACIN
Purna Bahadur Chhetri	Team Member		SSAA1
Shabbir Ahsan	Team Member		SSAS1

**Extended Team**

<b>Name</b>	<b>Title</b>	<b>Organization</b>	<b>Location</b>
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## I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

### A. Introduction, original objective, design, and scope

1. This Project Paper seeks the approval of the World Bank's Regional Vice President to provide a grant to the Kingdom of Bhutan in the amount of US\$4.64 million from the Global Agriculture and Food Security Program (GAFSP) Trust Fund for an additional financing (AF) to support the costs of expanding activities of the Bhutan Food Security and Agriculture Productivity Project (FSAPP). The parent project—FSAPP—was approved by the World Bank in April 2017. It is fully financed by a grant of US\$8.0 million from the GAFSP, alongside a Royal Government of Bhutan (RGoB) contribution of US\$1.12 million and beneficiary contributions of US\$0.24 million. The PDO is *to increase agricultural productivity and enhance access to markets for farmers in selected gewogs in south-west Bhutan*. The project aims to reach 10,400 rural households (HHs) in 24 gewogs of five districts.
2. The project consists of four components:
  - (a) *Component 1: Strengthening Farmer and Producer Groups*. The objective of this component is to strengthen farmers' and producers' groups to better enable them to implement and sustain project interventions. It is designed to address weak farmers' groups which lack necessary and relevant skills, knowledge, practices, quality inputs and appropriate technologies. The current subcomponents include: 1.1) farmer group (FG) strengthening and formation; 1.2) strengthening producer groups (PGs); and 1.3) contributing to improved nutrition.
  - (b) *Component 2: Enhancing Farmer Productivity*. The objective of this component is to improve agricultural productivity for improving food security and nutrition. The component will promote climate smart agriculture (CSA) through productivity enhancement of select food crops and high value crops. The overall purpose is to expand cultivated areas, increase climate smart cropping intensity, and increase productivity and production for potential commercial surplus. The existing subcomponents include: 2.1) water use efficiency; 2.2) improved farm management and technical and institutional capacity building; and 2.3) improved agricultural inputs and technologies.
  - (c) *Component 3. Enhancing Access to Markets*. The component aims to promote value chains for select high value nutrient-rich crops and enhanced linkages to domestic and export markets. The primary focus will be to: i) reduce post-harvest losses; ii) strengthen nutrition sensitive value chains of selected crops; and iii) enhance producers' knowledge, bargaining power, and access to agri-markets. It will include strengthening local producer-consumer linkages and establishing productive relationships with public and private market players, school meal programs, and exporters. The existing subcomponents include: 3.1) post-harvest and market infrastructure support; and 3.2) linkages to domestic and export markets.
  - (d) *Component 4. Project Management*. Component 4 will support all aspects of project management including: i) management and coordination; ii) monitoring and evaluation; iii) technical assistance; and iv) a grievance redress system. The expected outcome of this component is an effective and transparent project management system.

### B. Current project performance

3. The project's progress towards achievement of the PDO and overall implementation progress have both consistently been rated satisfactory since commencement of implementation. A midterm review (MTR) was



carried out in October 2020, and confirmed major achievements over the initial three years of implementation. The project has disbursed US\$ 7.41 million (or 93 percent of the US\$ 8.0 million grant).

4. The project is demonstrating strong achievement in outcomes. FSAPP has reached 6,526 beneficiary HH (or 63 percent of its initially targeted HHs), with 29 percent of them being female. In the project areas, by midterm, productivity has increased by 20 percent, already meeting the end of project (EOP) target of 20 percent. Marketed volume has increased by 8 percent and market value by 17 percent (against the EOP target of 20 percent).
5. The project has made significant progress across all components. The project has formed and strengthened 89 farmer groups (FGs). The construction of all four major irrigation schemes has been completed, and distribution networks have been added. The project has already irrigated 2,191 acres against the targeted area of 1,596 acres. Some 2,708 beneficiary HHs have been provided with improved agricultural technologies. The project has exceeded its targets for market promotion activities and investments. It has provided 49 FGs with marketing infrastructure, provided 30 FGs with market information, and linked 20 FGs to school as buyers.
6. COVID-19 has had minimal impact on project implementation progress but substantive impact on the needs and well-being of its targeted beneficiaries. Construction works have experienced temporary delays due to labor constraints, but almost all of larger-scale infrastructure is now complete. Group-based capacity building activities have also experienced some delay due to restrictions on large gatherings. Alternative implementation modalities for these activities have been put in place.

### **C. Rationale for additional financing**

7. The sealing off of Bhutan's land borders and stringent local containment measures have ensured that Bhutan has had a limited number of cases of COVID-19 (1,620 cases and one death as of June 1, 2021). There have been two national lockdowns in Bhutan. The first imposed on August 10, 2020, and the second on December 23, 2020 after a then significant rise in cases and community transmission.
8. However, since the onset of the COVID-19 pandemic, Bhutan continues to face elevated risks of poverty and food insecurity due to pronounced local-level food supply disruptions, and its economy has experienced significant negative impact due to a standstill in the services sector. COVID-19 restrictions have led to food supply disruptions, exposing value chain weaknesses and resulting in decreased availability and affordability of food across the country. In February 2021, food price inflation of 17 percent (year-on-year) has driven overall inflation to 9.5 percent. In parallel, with fewer skilled foreign construction workers and tourists entering the country, both the construction and tourism subsectors have contracted. Due to the COVID-19 impacts on tourism, many have lost their jobs and experienced substantial decline in incomes. Some estimates indicate that, of those in tourism, one-third have been laid off and three-fourths experienced an over 50 percent decline in income.<sup>1</sup> Many of these laid off workers, both those in urban areas in tourism and those abroad, are migrating back to rural areas where their families reside in search of rural livelihood opportunities. They are returning to the rural gewogs in FSAPP districts, creating an onus on the project to provide livelihoods and income support to its target population.
9. FSAPP is by design a COVID-19 responsive project because of its focus on food security and livelihood creation. It has the capacity to scale up its interventions to contribute to the broader RGoB response to boost and

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<sup>1</sup> National Statistics Bureau and United Nations Development Programme, May 2020. Rapid Socio-Economic Impact Assessment of COVID-19 on Bhutan's Tourism Sector: An analysis of the vulnerability of individuals, households, and businesses engaged in the tourism sector.



diversify domestic agricultural production and food supply as embodied in the agriculture pillar of the Economic Contingency Plan (ECP).<sup>2</sup> This response pillar includes interventions across the value chain, including aggregation, cold storage, and other post-harvest infrastructure. In early April 2020, as the pandemic was unfolding, the Project Management Unit (PMU) and the Department of Agriculture (DoA) requested additional financing from the World Bank to leverage FSAPP to support in response to COVID-19. No financing was available for FSAPP at that time.

10. The GAFSP Steering Committee, which provided a competitive additional financing (AF) opportunity for COVID-19 recovery operations, awarded Bhutan an AF of US\$ 4.64 million in October 2020. It further granted an extension of the closing date of the grant from December 30, 2022 to December 30, 2024 to implement the expanded project activities.

## II. DESCRIPTION OF ADDITIONAL FINANCING

### A. Changes to objective, design, and scope

11. *There are no proposed changes to the PDO, to the PDO indicators, to the design of components and subcomponents, or to the implementation arrangements.* The proposed COVID-19 response activities fall under the existing project components of FSAPP.
12. The AF will be used to scale up existing project activities, which are focused on enhancing preparedness and protecting the gains made to enhance food security. The project currently targets 10,400 HHs in 24 gewogs of the 58 gewogs of the five project districts. The activities will be scaled to increase the interventions provided to existing beneficiaries and to expand coverage with one additional gewog in each existing project district, covering an additional 2,106 HHs (including new generation and existing farmers). Similar to the original 24 FSAPP gewogs, the project will cover *all* rural HHs in the additional five gewogs.<sup>3</sup> The project will also cover an additional 150 *beneficiaries* who have been displaced / laid-off due to COVID-19 and who have migrated back to the project districts.<sup>4</sup> In total, project coverage will increase from 10,400 HHs to 11,938 HHs.<sup>5</sup>
13. While the project is designed to cover all rural households in project gewogs, provision of immediate support will prioritize communities and households most affected by the economic impacts of the disruptions caused by the COVID-19 pandemic, and interventions will be frontloaded for those most affected. In addition, the project may cover more than the targeted 150 displaced / laid-off, and this adjustment will be made based on how many displaced individuals are identified in the project districts. While other districts may be more

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<sup>2</sup> The RGoB response includes the cash transfer program Druk Gyalpo's Relief Kidu (DGRK), interest payment relief, frontloading and reprioritization of the 12th Five Year Plan (FYP) activities, and the ECP. The ECP is focused on agriculture (via food self-sufficiency and nutrition security), construction (via the mobilization and reskilling of workers), and tourism (via improved tourism governance and infrastructure).

<sup>3</sup> The additional gewogs are Phuentsholing in Chhukha, Kartsho in Haa, Largyab in Dagana, Yoeseltse in Samtse, and Umling in Sarpang.

<sup>4</sup> The identification of these return migrants is done at the district-level in coordination with MoLHR and Tourism Council of Bhutan (TCB). A list of about 40 return migrants has been provided by Dagana and Sarpang districts. The displaced may come from all gewogs in the district, not just the 29 FSAPP gewogs.

<sup>5</sup> This is equal to the sum of the 2,256 additional HHs under the AF and 9,682 households. The initial target of 10,400 HHs was an incorrect estimation of the total population of rural HHs in the 24 gewogs. An updated census indicates that the rural HH population in the project area is 9,682 HHs.



affected than the five FSAPP districts, the project will not extend to other districts in order to maintain the same district-level implementation arrangement (with each district forming one PIU), and thereby mitigating the risk of involving new PIUs.

14. To frontload the COVID-19 response activities, an extension of the closing date of the project from December 30, 2022 to December 30, 2024 has already been approved by the GAFSP Steering Committee. Of the US\$ 4.64 million in additional financing, 93 percent is expected to be disbursed by the end of FY22 to ensure an urgent and timely response to the impacts of COVID-19. Cumulative disbursements for the total grant (initial grant and additional grant) is expected to be 95 percent by the end of FY23, and 98 percent by the end of FY24.
15. **Component 1: Strengthening Farmer and Producer Groups** (cost: US\$0.15 million; GAFSP: US\$0.15 million). The AF will be used to scale up the following activities:
  - (a) Under subcomponents 1.1 (FG strengthening and formation) and 1.2 (strengthening PGs): financial management, leadership, and CSA training for cooperatives and FGs (See Annex 3 for details on climate change and CSA interventions in FSAPP); and support to the formation and strengthening of FGs and producer groups (PGs).
  - (b) Under subcomponent 1.3 (contributing to improved nutrition): rollout of training for community resource persons (CRPs), nutrition awareness and sensitization activities (including the interaction of nutrition-sensitive and climate-smart practices), and support to the Food for Health Initiative of the MoAF, which includes audio-visual production to encourage consumption and production of nutrient-dense crops, development of nutrient fact sheets of selected crops, and post-harvest value-addition.
16. **Component 2: Enhancing Farmer Productivity** (cost: US\$3.3 million; GAFSP: US\$2.82 million). The response activities include micro irrigation and the provision of inputs, equipment, and capacity building for farmers, including new generation farmers, and Water Users Associations (WUAs). This will generate livelihoods and short-term jobs, in support of the COVID-19 response. The additional financing will be used to fund and scale the following activities:
  - (a) Under subcomponent 2.1 (water use efficiency): Technologies to enhance water use efficiency will be promoted, including drip irrigation sets for use in poly-houses, rain water harvest systems, smart irrigation and drains for increased surface run-off from extreme precipitation and flooding. Irrigation systems will be energy-efficient, thus contributing to climate mitigation.
  - (b) Under subcomponent 2.2 (improved farm management and technical and institutional capacity building): training on farm management, crop production, CSA practices, pest management, and record keeping; capacity building of agriculture extension agents and district officials on advanced technical skills and knowledge on targeted commodities, and sensitization on climate change, risk, and opportunities; demonstrations on crop production; integrated pest management.
  - (c) Under subcomponent 2.3 (improved agricultural inputs and technologies): farm inputs (i.e. improved seeds and seedlings including drought-tolerant, pest- and disease-resistant early-maturing seed varieties which support climate adaptation, drum seeders for direct paddy seeding, and weeding tools), plastic mulching, mini-tillers, support to organic farming (i.e. biodigester), poly-houses for protected agriculture, and electric fencing.



17. **Component 3. Enhancing Access to Markets** (cost: US\$1.42 million; GAFSP: US\$1.42 million). The response activities include construction of packhouses, improvement of transportation and storage infrastructure, and marketing support. The additional financing will be used to fund and scale the following activities:
- (a) Under subcomponent 3.1 (post-harvest and market infrastructure support): two multi-chamber and multi-commodity cold storages of 150 MT capacity each<sup>6</sup>; post-harvest and market infrastructure<sup>7</sup>, and various equipment (i.e. dryers, sealing and packing materials and tools, weighing balance, plastic crates, and refrigerators and deep freezers). For cold storage, the project will consider climate-smart and energy-efficient refrigeration technologies. Market infrastructure supported by this subcomponent will be climate-resilient.
  - (b) Under subcomponent 3.2 (linkages to domestic and export markets): support the pilot in Chukha district for the development, training, and implementation of online marketing applications (web and mobile). The pilot will be used as an example for later roll-out to other districts.
18. **Component 4. Project Management** (cost: 0.65 million; GAFSP: US\$0.243 million). The additional financing will be used to i) staff the PMU up to the extended closing date (including a procurement expert, an administrative assistant, and a marketing and value chain expert), ii) support the M&E by funding the annual outcomes survey, and iii) fund other operational costs including travel, vehicle maintenance, and Project Support Team (PST) and Project Steering Committee (PSC) meetings.
19. *A summary of costs and financing by component is provided below.* Beneficiary contributions are considered joint financing and come in through a cost-sharing basis in terms of monetary or in-kind (labor) contributions. The financing percentage would be as per the Operational Manual and tracked during implementation. The RGoB contributions will be used to fund salaries of RGoB civil servants, including civil servants working as PMU and PIU staff.

**Table 1. Summary of initial and additional financing, by components (in US\$ million)**

Component	Initial				AF				Post AF total	
	Grant	RGoB	Ben.	Total	Grant	RGoB	Ben.	Total	Grant	Total
Component 1	1.079	0.000	0.000	1.079	0.154	0.000	0.000	0.155	1.233	1.234
Component 2	5.209	0.000	0.147	5.356	2.824	0.000	0.493	3.317	8.033	8.673
Component 3	1.001	0.000	0.092	1.093	1.419	0.000	0.000	1.419	2.420	2.512
Component 4	0.711	1.120	0.000	1.831	0.243	0.405	0.000	0.648	0.954	2.479
<b>Total</b>	<b>8.000</b>	<b>1.120</b>	<b>0.239</b>	<b>9.359</b>	<b>4.640</b>	<b>0.405</b>	<b>0.493</b>	<b>5.538</b>	<b>12.640</b>	<b>14.897</b>

20. *The implementation arrangements will remain the same.* The project is managed by the PMU under the DoA, and consists of nine PIUs which includes the five district agriculture offices, three Agriculture Research and Development Centers (ARDCs), and the Department of Agriculture Marketing and Cooperatives (DAMC). Given the shorter timeframe available to disburse the AF, in particular, to respond to COVID-19 impacts, the

<sup>6</sup> One is a 160 MT-capacity cold store to be installed at Dagapela. Another is to be installed either in Chukha, Samtse, or Haa, based on the recommendations of the TA-FSAPP's Feasibility study of the establishment of cold storage and pack houses, to be completed by June 2021.

<sup>7</sup> This includes 15 pack houses, a roadside market facility in Chukha, and an extension of a weekend farmers' market in Samtse.



PMU and DoA will leverage partnerships across government and development partners. FSAPP currently has an existing technical assistance (TA) arrangement with the FAO.

## **B. Alignment with CPF**

21. FSAPP is well-aligned with the Bhutan Country Partnership Framework (CPF) for FY 2021-24. The PDO and the activities support both CPF Focus Areas 1 (Human Capital) and 2 (Resilience). Aligned to improving human capital (CPF Objective 1), FSAPP has cross-cutting nutrition activities to improve diets, including a behavior change and communications (BCC) campaign and enhancing the production and availability of nutritious and diverse foods in rural areas. Aligned to Focus Area 2, FSAPP supports the promotion of economic resilience (CPF Objective 2) through the creation of jobs and livelihoods in the agriculture sector, which is crucial to help Bhutan in recovering from economic shocks associated with COVID-19. The project further supports the promotion of environmental resilience (CPF Objective 3) by continuing to mainstream CSA practices.

## **C. Changes to the Results Framework**

22. *The results framework has been revised to reflect the scale-up of the project activities.* The PDO indicators remain the same, but targets have been scaled accordingly, and the PDO indicator definitions and M&E plan have been sharpened to enhance measurement and tracking. Intermediate Results Indicators (IRIs) have also been revised to enhance measurement and tracking based on the MTR discussions held among the PMU (and FAO-TA team), the Bank task team, and the GAFSP M&E team, and to reflect the scale increase in the AF.
23. *For the PDO indicators,* the targets for increase in productivity (PDO 1), marketed volume (PDO 2), and marketed value (PDO 3) are scaled up from a 20 percent increase by the EOP to a 25 percent increase. This enhanced productivity target is also being increased to 25 percent to match the overall portfolio objective for GAFSP. The number of beneficiary HHs (PDO 4) is increased from 10,400 HHs to 11,938 HHs, with an increase in the targeted female share of beneficiaries from 30 to 34 percent.
24. *For the IRIs under Component 1,* the targets are increased for beneficiary groups receiving training (IRI 1.1) and number of farmers which are members of a group (IRI 1.2). The indicator on the number of individuals receiving improved nutrition services (IRI 1.3) is unchanged, but the corresponding sub-indicators and their definitions (IRIs 1.31 and 1.3.2) are rephrased to align with project activities and to improve measurement and ease of tracking, as recommended by the MTR mission.
25. *For the IRIs under Component 2,* the targets are increased for both the targeted area provided with irrigation (IRI 2.1) and for the number of users with new/improved irrigation services (IRI 2.2). The targets for number of farmers with improved agriculture technology (IRI 2.3) and citrus and cardamom area (IRI 2.4) are also increased. A new gender-disaggregated indicator IRI 2.5 has been added 'Number of beneficiaries reached, who have been helped to cope with impact of climate change' (GAFSP Core Indicator # 1). This would help to measure the progress of the project in mainstreaming CSA practices.
26. *For the IRIs under Component 3,* the targets for number of groups supported with market infrastructure (IRI 3.1), provided with market information (IRI 3.2), and linked to schools (IRI 3.3) are all increased. Two new IRIs have been added under this component, and one deleted, as follows: (a) IRI 3.6 has been added: 'Number of post-harvest facilities constructed and or rehabilitated', an indicator which is part of the new GAFSP M&E framework; (b) IRI 3.5 has been added: 'Proportion of beneficiaries with medium or high Household Dietary Diversity Score', an indicator which replaces the deleted IRI 3.4: 'Number of children receiving the recommended 5 servings of fruits/vegetables per day'.



27. For the IRIs under Component 4, the target for number of learning notes/case studies (IRI 4.1) has been reduced to reflect the expected higher quality of these notes, while the target for beneficiary satisfaction (IRI 4.4) is now gender disaggregated.

**Table 2. Summary of results framework revisions to targets**

<i>Indicator Name</i>	2017 Base line	2021 MTR Actual	2022 Original EOP Target	2024 Revised EOP Target
PDO 1. Productivity of targeted crops increased by at least 25 percent in project areas (Percentage)	0	20	20	25
PDO 2. Increase in volume of produce marketed by at least 25 percent (Percentage)	0	8	20	25
PDO 3. Increase in value of produce marketed by at least 25 percent (Percentage)	0	17	20	25
PDO 4. Number of direct project beneficiaries (Number, HHs)	0	6,526	10,400	11,938
Female Beneficiaries (Percentage)	0	29	30	34
1.1 Number of beneficiary groups receiving technical trainings and other capacity building support (Number)	0	89	300	310
1.2 Number of farmers who are members of an association including producer groups, cooperatives etc. (disaggregated by gender) – GAFSP Core Indicator # 14 (Number)	0	4,498	10,400	11,788
Number of Female members of an association including producer groups, cooperatives etc (Number)	0	1,349		4,008
1.3 Number of people receiving improved nutrition services and products through the project - GAFSP Core Indicator # 11 (new GAFSP indicators) (Number)	0	1,207	6,000	6,000
1.3.1 Number of people who received nutrition counseling/education (Number)	0	738		2,000
1.3.2 Number of people receiving extension support for nutrition-relevant techniques (Number)	0	38		4,000
Number of Females beneficiaries receiving improved nutrition services and products through the project-GAFSP Core Indicator # 11 (new GAFSP indicators) (Number)	0	497		2,400
2.1 Targeted crop area provided with irrigation – GAFSP CI # 6 (Number)	0	2,191	1,596	2,244
Area covered by Flood Irrigation (Number)	0	1,914	1,346	1,914
Area covered by Micro Irrigation (Number)	0	277	250	330
2.2 Number of water users with new/improved irrigation services – GAFSP Core Indicator # 8 (Number)	0	975	4,065 (813 HHs)	2,767
New users with Flood Irrigation (Number)	0	744	-	744
New users with Micro Irrigation (Number)	0	231	-	2,023
2.3 Number of farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas (Number)	0	2,708	10,400	11,938
Number of Female farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas (Number)	0	1,120	-	4,059
2.4 Total land area under cultivation for citrus and cardamom increased by 5 percent (Percentage)	0	5.5	5	6
Cardamom- cultivated area (Number)	1,140	1,195	1,197	1,208
Citrus- cultivated area (Number)	3,744	3,958	3,931	3,968





<i>Indicator Name</i>	2017 Base line	2021 MTR Actual	2022 Original EOP Target	2024 Revised EOP Target
2.5 Number of beneficiaries reached, who have been helped to cope with impact of climate change; GAFSP Core Indicator # 1	0	--	NA	1,500
Number of female beneficiaries reached, who have been helped to cope with impact of climate change	0	--	NA	510
3.1 Number of beneficiaries of project supported market infrastructure (Number)	0	49	30	59
3.2 Number of producer groups receiving market information (Number)	0	30	30	40
3.3 Number of farmer groups linked to schools (Number)	0	20	10	25
3.5 Proportion of beneficiaries with medium or high (>7) Household Dietary Diversity Score (Percentage)	50		-	70
3.6 Number of post-harvest facilities constructed and or rehabilitated includes markets, agro-processing/storage/quality control facilities (Number)	0	13	-	32
4.1 Learning notes or case studies published and disseminated (Number)	0	0	5	4
4.2 Progress reports satisfactory (Text)	-	Accurate and timely reports		
4.3 Procurement satisfactory (Text)	-	Contracts awarded and completed on schedule		
4.4 Percentage of beneficiaries satisfied with services provided by the project. (Percentage)	0		50	50

### III. KEY RISKS

28. The Overall Risk, and the component risk categories, continue to be rated as Low-Moderate, and the mitigation strategies proposed for the original project remain relevant.

### IV. APPRAISAL SUMMARY

#### A. Economic and Financial Analysis

29. The appraisal economic and financial analysis (EFA) was updated to account for the original project and its AF using the same cost benefit analysis approach. The methodology of appraisal EFA was largely maintained as the project design remained unchanged and AF is intended for scaling up of original project interventions. When the GHG values are excluded, the project is estimated to generate economic NPV of US\$ 10.2 million at EIRR of 15.5 percent and a benefits-to-cost ratio (BCR) of 2.14. When the net GHG emissions at the low shadow carbon prices are added, the project EIRR will be 15.7 percent, economic NPV is US\$ 10.5 million and BCR is 1.17. When the net GHG emissions at the high shadow carbon prices are added, the project EIRR is estimated at 15.9 percent, economic NPV at US\$ 10.8 million and BCR at 1.2. The project returns were tested for sensitivity to various degrees of changes in benefits, cost, and implementation delays. Results of the sensitivity analyses demonstrate mostly robust project returns. The project demonstrates sensitivity to the two-year implementation delay and decline in projected benefits by 30 percent. Though the EIRRs remain at or above 6.9 percent, potential occurrences of such events need to be monitored.

#### B. Technical



30. Relative to other components, achievements under *Component 1* have been less impressive. As such, the project had instituted mid-course implementation improvements to untangle bottlenecks. An FG and PG capacity building and training plan spearheaded by the DAMC will be developed to ensure that the training activities are scaled-up, guided by a clear strategy and related targets. Following the MTR recommendations, the project will also integrate concrete market-led incentives to group formation for sustainability.
31. The implementation of the nutrition BCC interventions under *Component 1* is similarly being strengthened. All district-level PIUs are scaling up the training of CRPs as the main focal points for delivery of the BCC, and ensuring alignment of BCC interventions with nutrition-sensitive, production-focused interventions (under Component 2) such as the establishment of kitchen gardens and promotion of nutrient-dense crops. The project will also be supporting and leveraging the 'Food for Health Initiative' led by a focal officer from the DoA of the MoAF. This forms part of an inter-ministerial task force with the Ministry of Health (MoH) under the umbrella of the Prime Minister's 'Healthy Drukgyul Campaign' a social media campaign encouraging healthier dietary habits. Better dietary habits make the Bhutanese less vulnerable to the health impacts of COVID-19. Moreover, these demand shifts contribute to agriculture production diversification and the promotion of higher-value production activities. To ensure smooth implementation of the nutrition-focused activities, a Nutrition Education Coordinator joined the PMU in March 2021 hired via the FAO-TA.
32. Improving the equity of benefits and inclusion in FSAPP involves tailoring a set of activities for the excluded. There is a trade-off between selecting beneficiaries who have high potential for success (i.e. more proactive, appropriate agroecological conditions) and selecting beneficiaries who are excluded (i.e. poorer, remote, more marginal). For the latter group, inclusion can be achieved by reaching the most vulnerable, at least initially, with Component 1 activities on nutrition education. The PMU will also define its process for outreach in communities by detailing how it communicates to potential beneficiaries the available support from FSAPP. The Bank engagement in the Human Capital agenda will be leveraged to improve inclusion and targeting (including the P4R- P741399 and the PASA- P175646 being prepared).
33. Under *Component 2*, the original project investments centered around the construction and/or rehabilitation of four irrigation schemes. Strengthening the WUAs responsible for management of these irrigation schemes will form part of the capacity building plan being developed. Using a detailed M&E tracking system, the PMU is now more carefully tracking project coverage of beneficiaries and interventions. The project is further scaling up the provision of productivity-enhancing inputs which have proved to be very successful.
34. The project has exceeded its target in terms of the number of groups supported with market infrastructure and school linkages under *Component 3*. The PMU well-recognizes the need to ensure the quality and sustainability of these infrastructure and linkages. The PMU is developing profiles of the five Farmer's Sales Outlets (FSOs) already established in an effort to encourage better documentation of the market rationale for various infrastructure investments. Market assessments are currently being conducted for the proposed cold storage facilities and packhouses. Farmer linkages to school procurement remains to be the most viable market linkage opportunity in FSAPP areas, given its stability as a buyer and proximity to FSAPP farmers. The school linkages already established will undergo an assessment to gauge and enhance their sustainability. The PMU and PIUs deliberately align production-focused support under Component 2 to help FGs meet school procurement requirements under Component 3. Moreover, beneficiary group selection for the post-harvest/market infrastructure and school linkages under the AF will undergo a more transparent and competitive process to enhance equity and sustainability.
35. Cold storage facilities are deemed crucial to address the value chain weaknesses exposed by the COVID-19 pandemic. Beneficiary FGs will maintain ownership of these facilities, and the PMU will provide necessary



support to form and strengthen cooperatives and enhance capacity for operations and maintenance (O&M). This ensures that the benefits of the facilities better reach the beneficiaries and promotes sustainability and market-orientation. To ensure infrastructure resilience, the design criteria of the proposed cold storage facilities will incorporate wind load as part of the structural load calculation (in addition to dead, live and earthquake load).

### **C. Financial Management (FM)**

36. FSAPP is being implemented by MoAF using the country systems approach and the AF will be implemented by the same implementing agencies. The current FM performance rating of FSAPP is Moderately Satisfactory mainly due to pending internal audit of the Project and delay in submission of interim unaudited financial reports (IUFs). During appraisal, the Central Coordination Agency of Internal Audit of the Ministry of Finance had confirmed that FSAPP will receive priority, and that internal audit will be conducted and included as part of the internal control mechanism. There are no pending external audit reports. Accordingly, the AF project will also be implemented using the existing RGoB FM systems. These include budgeting, accounting, funds flow, internal control, reporting, and external audit. All project expenditure will be budgeted within the overall budget of the DoA, PMU, DAMC and ARDCs of MoAF and five districts under a separate Financing Item Code (FIC). The activity/sub-activity codes will allow for all project-related expenditures to be separately identified, accounted and reported in the electronic Public Expenditure Management System (ePEMS) reports which will be consolidated by the PMU while preparing the IUFs. Disbursement will be made on a half yearly basis based on IUFs providing expenditure for the last two quarters and forecast for the next two quarters to a new designated account (DA). The fund flow will take place through a government budget fund account (BFA) and the internal controls will be based on Financial Rules and Regulations (FRR) 2016. The internal auditor of MoAF will review project activities of each of the spending unit at least once every financial year. The Royal Audit Authority will carry out the external audit the project's consolidated annual financial statements each year in line with terms of reference agreed with the Bank.

### **D. Procurement**

37. Procurement under the AF will be carried out in accordance with the World Bank's Procurement Regulations for Borrowers for Goods, Works, Non-Consulting and Consulting Services dated July 1, 2016, revised November 2020 (hereafter referred to as "Regulations"). As in the original project, all contracts under the AF are of small value and a simple nature and the Procurement arrangements will remain the same as the original project. Goods under the AF will mainly include procurement of seeds, tools and equipment, while Works will include cold storages which will be procured through Request for Quotations or Request for Bids method (or where acceptable to the Bank using existing framework agreements established by the RGoB). Consultant services are expected to include development, training, and implementation studies, and staffing of the PMU. Firms will be selected through Quality and Cost Based Selection or Selection Based on Consultants Qualifications methods, while individual consultants will generally be selected through competitive procedures in accordance with the Bank's Regulations. The Procurement Plan (PP) and an updated Project Procurement Strategy for Development (PPSD) which reflects the AF and COVID-19 constraints have been finalized. The Systematic Tracking of Exchanges in Procurement (STEP) system will continue to be used for all procurement communications and record keeping.
38. The staff under the original project have received training and acquired experience in the Bank's procurement procedures. The same staff will continue to handle procurement under the AF, and they will continue to receive any requisite training and guidance from the Bank task team.



#### **E. Social (including Safeguards)**

39. The safeguard assessment of activities that would be financed with the AF takes into account risks and already instituted mitigation approaches in place, tailored to the operational environment under COVID-19. No additional safeguards policies are triggered under the proposed AF operation.
40. The project-level grievance redress mechanism (GRM), is fully operational and has been reviewed and improved, as necessary (including GRM to address COVID-19 related grievances). For stakeholder consultation, COVID-19 relevant Consultation Guidelines (Technical Note: *Public Consultations and Stakeholder Engagement in WB-supported operations*) will also be adopted. The Good Practice Note on *Addressing Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) in IPF and COVID-19 and Gender-Based Violence: Workplace Risks and Responses* will be referred to for the preparation of a guidance note for governing the conduct of all workers/laborers to ensure acceptable behavioral requirements with other workers and with nearby communities. A standalone Resettlement Framework was developed and disclosed on April 30, 2021. This has been adopted to address the unlikely issue of resettlement of squatters from project area who may be occupying public land.
41. To enhance participation of women, the project will conduct an assessment to identify the barriers that women farmers are facing that is limiting their participation, as well as to understand how they are participating. This assessment can be used to develop particular interventions that focus on getting more women in decision-making positions in producer groups, take up CSA practices, benefit from extension services, and other project activities.
42. The RF includes a community engagement related indicator on beneficiary satisfaction, disaggregated by gender. In addition, the project GRM will be reviewed and updated as necessary to make it more responsive to the requirements of the COVID-19 emergency. The project will adopt a robust consultation mechanism with the beneficiaries and relevant stakeholders that will continue through the project's duration.

#### **F. Environment (including Safeguards)**

43. Potential risks and impacts of AF activities, similar to the original project, are not assessed as significant. The Environmental Category remains B, as the AF activities will scale-up the original project activities.
44. The ESMF was updated based on the ESMF COVID-19 Response Template and disclosed on March 26, 2021. The ESMF includes: (i) sub-project screening guidelines, (ii) guidelines for preparing management plans, especially Environmental and Social Code of Practices, Gender Development Plan, Vulnerable Community Development Plan, and Resettlement Action Plan, where applicable, for all proposed interventions; (iii) M&E indicators and criteria for social assessment and performance, and (iv) public consultation guidelines. ESMPs will be revised accordingly to address the need for COVID-19 considerations and protocols.
45. To assess and manage potential social risks, the ESMF of the original project has already been updated (based on the ESMF COVID-19 Response template adopted by the Bank) considering the interventions of the AF including compliance with *World Bank Group Environmental Health and Safety Guidelines*, *World Health Organization's COVID-19 Occupational Health and Safety Guidelines*, *World Bank's and COVID-19 Considerations in Construction/Civil Works Projects* to prevent the potential risk of COVID-19 exposure related to minor rural infrastructural construction/repairing works.
46. Riparian notification under OP 7.50 was done for the original project because of investments in new irrigation schemes that use water from international waterways. However, since the AF does not invest in new schemes



and is focused on rehabilitation and modernization of schemes with CSA technology, no separate notification is required. As such, an exception to the notification requirement according to paragraph 7 (a) of the Policy was approved by the RVP on April 24, 2021.

## **V. WORLD BANK GRIEVANCE REDRESS**

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 <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit [www.inspectionpanel.org](http://www.inspectionpanel.org)

**VI. SUMMARY TABLE OF CHANGES**

	Changed	Not Changed
Results Framework	✓	
Components and Cost	✓	
Loan Closing Date(s)	✓	
Safeguard Policies Triggered	✓	
Implementing Agency		✓
Project's Development Objectives		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
Disbursements Arrangements		✓
EA category		✓
Legal Covenants		✓
Institutional Arrangements		✓
Financial Management		✓
Procurement		✓
Other Change(s)		✓

**VII. DETAILED CHANGE(S)****COMPONENTS**

Current Component Name	Current Cost (US\$, millions)	Action	Proposed Component Name	Proposed Cost (US\$, millions)
Component 1:Strengthening Farmer and Producer Groups	1.08	Revised	Component 1:Strengthening Farmer and Producer Groups	1.24
Component 2: Enhancing Farmer Productivity	5.21	Revised	Component 2: Enhancing Farmer Productivity	8.03



Component 3: Enhancing Access to Markets	1.00	Revised	Component 3: Enhancing Access to Markets	2.42
Component 4: Project Management	0.71	Revised	Component 4: Project Management	0.95
<b>TOTAL</b>	<b>8.00</b>			<b>12.64</b>

**LOAN CLOSING DATE(S)**

Ln/Cr/Tf	Status	Original Closing	Current Closing(s)	Proposed Closing	Proposed Deadline for Withdrawal Applications
TF-A4224	Effective	30-Dec-2022	30-Dec-2022	30-Dec-2024	30-Apr-2025

**Expected Disbursements (in US\$)**

Fiscal Year	Annual	Cumulative
2017	0.00	0.00
2018	2,097,811.40	2,097,811.40
2019	1,917,763.40	4,015,574.80
2020	2,730,165.30	6,745,740.10
2021	979,209.00	7,724,949.10
2022	3,539,000.00	11,263,949.10
2023	739,882.50	12,003,831.60
2024	375,155.70	12,378,987.30
2025	261,012.70	12,640,000.00

**SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)**

Risk Category	Latest ISR Rating	Current Rating
Political and Governance	● Low	● Low
Macroeconomic	● Low	● Low
Sector Strategies and Policies	● Moderate	● Moderate
Technical Design of Project or Program	● Moderate	● Moderate
Institutional Capacity for Implementation and	● Moderate	● Moderate



Sustainability		
Fiduciary	● Moderate	● Moderate
Environment and Social	● Moderate	● Moderate
Stakeholders	● Low	● Low
Other	● Low	● Low
Overall	● Moderate	● Moderate

**COMPLIANCE**

**Change in Safeguard Policies Triggered**

Yes

Safeguard Policies Triggered	Current	Proposed
Environmental Assessment OP/BP 4.01	Yes	Yes
Performance Standards for Private Sector Activities OP/BP 4.03	No	No
Natural Habitats OP/BP 4.04	No	No
Forests OP/BP 4.36	Yes	Yes
Pest Management OP 4.09	Yes	Yes
Physical Cultural Resources OP/BP 4.11	No	No
Indigenous Peoples OP/BP 4.10	No	No
Involuntary Resettlement OP/BP 4.12	Yes	Yes
Safety of Dams OP/BP 4.37	No	No
Projects on International Waterways OP/BP 7.50	Yes	Yes
Projects in Disputed Areas OP/BP 7.60	No	No





**LEGAL COVENANTS – Additional Financing for Food Security and Agriculture Productivity Project (P175717)**

**Sections and Description**

No information available

**Conditions**



### VIII. RESULTS FRAMEWORK AND MONITORING

#### Results Framework

COUNTRY: Bhutan

#### Additional Financing for Food Security and Agriculture Productivity Project

#### Project Development Objective(s)

The Project Development Objective (PDO) is to increase agricultural productivity and enhance access to markets for farmers in selected gewogs in south-west Bhutan.

#### Project Development Objective Indicators by Objectives/ Outcomes

Indicator Name	PBC	Baseline	End Target
<b>Enhance productivity and marketable surplus</b>			
Productivity of targeted crops increased by at least 25 percent in project areas (Percentage)		0.00	25.00
<i>Action: This indicator has been Revised</i>	<i>Rationale: The revised 25% target matches the GAFSP portfolio target on increased productivity.</i>		
Increase in volume of produce marketed by at least 25 percent (Percentage)		0.00	25.00
<i>Action: This indicator has been Revised</i>	<i>Rationale: The indicator is split in order to measure and monitor marketed volume and value increase separately, and the target is increased from 20% to 25%.</i>		
Increase in value of produce marketed by at least 25 percent (Percentage)		0.00	25.00



Indicator Name	PBC	Baseline	End Target
<i>Action: This indicator is New</i>		<i>Rationale: The indicator is split in order to measure and monitor marketed volume and value increase separately, and the target is increased from 20% to 25%.</i>	
Number of direct project beneficiaries (Number)		0.00	11,938.00
<i>Action: This indicator has been Revised</i>		<i>Rationale: For simplicity, the indicator is revised from individual beneficiaries, to counting household beneficiaries. The initial number of households targeted was 10,400 in 24 gewogs, later corrected to 9,682 households based on the new census. The target is now being increased to 11,938 households, covering 29 gewogs in the same five project dzongkhags. This increase include 2,106 beneficiaries from the five additional gewogs, and an additional 150 displaced/laid-off individuals due to the COVID-19 pandemic.</i>	
Female Beneficiaries (Percentage)		0.00	34.00
<i>Action: This indicator has been Revised</i>		<i>Rationale: The unit of measure is revised to percentage of parent indicator, and the revised target is 34 percent.</i>	

**Intermediate Results Indicators by Components**

Indicator Name	PBC	Baseline	End Target
<b>Strengthening farmers and producers groups</b>			
1.1 Number of beneficiary groups receiving technical trainings and other capacity building support (Number)		0.00	310.00



Indicator Name	PBC	Baseline	End Target
<i>Action: This indicator has been Revised</i>		<i>Rationale: The EOP is extended to December 2024, and the EOP target is increased from 300 to 310. Reflecting an additional 10 groups strengthened.</i>	
1.2 Number of farmers who are members of an association including producer groups, cooperatives etc. (disaggregated by gender) – GAFSP Core Indicator # 14 (Number)		0.00	11,788.00
<i>Action: This indicator has been Revised</i>		<i>Rationale: The target is increased from 10,400 to 11,788.</i>	
Number of Female members of an association including producer groups, cooperatives etc (Number)		0.00	4,008.00
<i>Action: This indicator has been Revised</i>		<i>Rationale: The EOP target was revised to 34% of the parent indicator.</i>	
1.3 Number of people receiving improved nutrition services and products through the project - GAFSP Core Indicator # 11 (new GAFSP indicators) (Number)		0.00	6,000.00
<i>Action: This indicator has been Revised</i>		<i>Rationale: The EOP is extended to December 2024. Information on definitions and the M&amp;E plan are added.</i>	
1.3.1 Number of people who received nutrition counseling/education (Number)		0.00	2,000.00
<i>Action: This indicator has been Revised</i>		<i>Rationale: The indicator is simplified to reflect the actual project interventions focused on nutrition education. The target was corrected to reflect what is indicated in the PAD.</i>	
1.3.2 Number of people receiving extension support for nutrition-relevant techniques (Number)		0.00	4,000.00



Indicator Name	PBC	Baseline	End Target
<i>Action: This indicator has been Revised</i>	<b>Rationale:</b> <i>The target was corrected to reflect what is indicated in the PAD.</i>		
Number of Females beneficiaries receiving improved nutrition services and products through the project-GAFSP Core Indicator # 11 (new GAFSP indicators) (Number)		0.00	2,400.00
<i>Action: This indicator has been Revised</i>	<b>Rationale:</b> <i>The EOP is extended to December 2024.</i>		
<b>Enhancing farmer productivity</b>			
2.1 Targeted crop area provided with irrigation – GAFSP CI # 6 (Number)		0.00	2,244.00
<i>Action: This indicator is New</i>	<b>Rationale:</b> <i>The EOP is extended to December 2024, and the EOP target is increased from 1,596 to 2,244 acres. This indicator is an existing indicator but is added as new to revise the incorrectly entered unit of measure.</i>		
Area covered by Flood Irrigation (Number)		0.00	1,914.00
<i>Action: This indicator is New</i>	<b>Rationale:</b> <i>An additional 568 acres was irrigated in existing schemes given the addition of distribution networks (total 1,914 acres).</i>		
Area covered by Micro Irrigation (Number)		0.00	330.00



Indicator Name	PBC	Baseline	End Target
<b>Action: This indicator is New</b>		<b>Rationale:</b> <b>An additional 53 acres is proposed for the AF operation, over the 277 acres already achieved under the original project.</b>	
2.1 Targeted crop area provided with irrigation – GAFSP Core Indicator # 6 (Amount(USD))		0.00	1,596.00
<b>Action: This indicator has been Marked for Deletion</b>		<b>Rationale:</b> <b>The EOP target is increased from 1,596 to 3,055 acres.</b>	
Area covered by Flood Irrigation (Number)		0.00	2,762.00
<b>Action: This indicator has been Marked for Deletion</b>		<b>Rationale:</b> <b>An additional 568 acres in existing schemes given the addition of distribution networks (total 1,914 ac). And an additional 848 acres covered by the new irrigation schemes (under the AF).</b>	
Area covered by Micro irrigation (Number)		0.00	293.00
<b>Action: This indicator has been Marked for Deletion</b>		<b>Rationale:</b> <b>An additional 16 acres over the 277 acres achieved at midterm (which exceeds the 250 acres initial target)</b>	
2.2 Number of water users with new/improved irrigation services – GAFSP Core Indicator # 8 (Number)		0.00	2,767.00
<b>Action: This indicator has been Revised</b>		<b>Rationale:</b> <b>The initial target was reported as individuals. The current target is revised to measure number of households. The initial target was 813 households, this is being increased to 2,767 households with an extension in the closing date.</b>	
New users with Flood Irrigation (Number)		0.00	744.00



Indicator Name	PBC	Baseline	End Target
<b>Action: This indicator is New</b>	<b>Rationale:</b> <i>The sub-indicator is added to report on beneficiaries of flood and micro irrigation separately. The initial number of beneficiaries is 744 households.</i>		
New users with Micro Irrigation (Number)		0.00	2,023.00
<b>Action: This indicator is New</b>	<b>Rationale:</b> <i>The sub-indicator is added to report on beneficiaries of flood and micro irrigation separately. The revised target is 2,023 households which reflects an increase of 1,792 beneficiaries above the midterm achievement of 231 households.</i>		
2.3 Number of farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas (Number)		0.00	11,938.00
<b>Action: This indicator has been Revised</b>	<b>Rationale:</b> <i>The initial number of households targeted was 10,400 in 24 gewogs, later corrected to 9,682 households based on the new census. The target is now being increased to 11,938 households, covering 29 gewogs in the same five project dzongkhags. This increase include 2,106 beneficiaries from the five additional gewogs, and an additional 150 displaced/laid-off individuals due to the COVID-19 pandemic.</i>		
Number of Female farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas (Number)		0.00	4,059.00
<b>Action: This indicator has been Revised</b>	<b>Rationale:</b> <i>The target is revised to equal 34 percent of the parent indicator.</i>		
2.4 Total land area under cultivation for citrus and cardamom increased by 6 percent (Percentage)		0.00	6.00
<b>Action: This indicator has been Revised</b>	<b>Rationale:</b> <i>Sub-indicators added to measure cardamom and citrus area separately</i>		



Indicator Name	PBC	Baseline	End Target
Cardamom- cultivated area (Number)		1,140.00	1,208.00
<b>Action: This indicator is New</b>			
Citrus- cultivated area (Number)		3,744.00	3,968.00
<b>Action: This indicator is New</b>			
2.5 Number of beneficiaries reached, who have been helped to cope with impact of climate change; GAFSP Core Indicator # 1 (Number)		0.00	1,500.00
<b>Action: This indicator is New</b>	<b>Rationale:</b> <i>This new indicator measures number of beneficiaries who receive climate awareness training, or capacity building, or benefit from promotion of climate-smart agriculture practices.</i>		
Number of female beneficiaries reached, who have been helped to cope with impact of climate change (Number)		0.00	510.00
<b>Action: This indicator is New</b>			
<b>Enhancing access to markets</b>			
3.1 Number of beneficiaries of project supported market infrastructure (Number)		0.00	59.00
<b>Action: This indicator has been Revised</b>	<b>Rationale:</b> <i>The target is increased from 30 groups to 59 groups. An additional 10 groups over the midterm achievement of 49 groups due to AF.</i>		





Indicator Name	PBC	Baseline	End Target
3.2 Number of producer groups receiving market information (Number)		0.00	40.00
<b>Action: This indicator has been Revised</b>		<b>Rationale:</b> <i>The target is increased from 30 groups to 40 groups. An additional 10 groups from the midterm achievement of 30 groups due to AF.</i>	
3.3 Number of farmer groups linked to schools (Number)		0.00	25.00
<b>Action: This indicator has been Revised</b>		<b>Rationale:</b> <i>The target is increased from 10 groups to 25 groups. An additional 5 groups from the midterm achievement of 20 groups due to AF.</i>	
3.4 Number of children receiving the recommended 5 servings of fruits/vegetables per day (Number)		0.00	2,100.00
<b>Action: This indicator has been Marked for Deletion</b>		<b>Rationale:</b> <i>This indicator is being removed given the lack of project interventions to change school menus and influence diets of children in schools. Indicator 3.6 below is added to replace this indicator, which better reflects project interventions to increase dietary diversity at the household level.</i>	
3.5 Proportion of beneficiaries with medium or high (>7) Household Dietary Diversity Score (Percentage)		50.00	70.00
<b>Action: This indicator is New</b>		<b>Rationale:</b> <i>This indicator is added to replace the indicator on child diets in schools. The HDDS better reflects project interventions aimed at increasing dietary diversity at the household level.</i>	
3.6 Number of post-harvest facilities constructed and or rehabilitated includes markets, agro-processing/storage/quality control facilities (Number)		0.00	32.00



Indicator Name	PBC	Baseline	End Target
<i>Action: This indicator is New</i>		<b>Rationale:</b> <i>This indicator is added to track post-harvest facilities under this project, and is part of the GAFSP core indicators (GAFSP Tier 2 indicator #8). The achievement at midterm is 13, and an additional 19 is expected post-midterm. This includes 2 multi-chamber cold stores, 15 pack houses, one roadside market facility, and one weekend farmers' market.</i>	
<b>Project Management</b>			
4.1 Learning notes or case studies published and disseminated (Number)		0.00	4.00
<i>Action: This indicator has been Revised</i>		<b>Rationale:</b> <i>The target is reduced from 5 to 4, to reflect the higher quality notes to be produced.</i>	
4.2 Progress reports satisfactory (Text)		reports prepared	Accurate and timely reports
<i>Action: This indicator has been Revised</i>		<b>Rationale:</b> <i>The EOP is extended to December 2024, and the indicator name was shortened.</i>	
4.3 Procurement satisfactory (Text)		reports prepared	Contracts awarded and completed on schedule.
<i>Action: This indicator has been Revised</i>		<b>Rationale:</b> <i>The EOP is extended to December 2024, and the indicator name was shortened.</i>	
4.4 Percentage of beneficiaries satisfied with services provided by the project. (Percentage)		0.00	50.00
<i>Action: This indicator has been Revised</i>		<b>Rationale:</b> <i>The gender disaggregation of the beneficiary satisfaction indicator is added.</i>	



**Monitoring & Evaluation Plan: PDO Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Productivity of targeted crops increased by at least 25 percent in project areas	This is the average productivity increase (in kg/ha) for seven focus crop groups: rice, vegetables, potatoes, large cardamom, citrus, quinoa, and ginger. For vegetables, productivity is the average increase of 10 target vegetables: chili, cauliflower, cabbage, beans, tomato, onion, broccoli, carrot, pea, and green leaves. This will be calculated as the increase in the 29 project gewogs (24 gewogs pre-restructuring) minus the increase in non-project gewogs located in the same five project dzongkhags.	Annual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Increase in volume of produce marketed by at least 25 percent	This is the average increase in marketed volume for the seven crop groups among beneficiary producers: rice, vegetables, potatoes, large	Annual	The annual outcomes household survey (AOS) is used, with	The annual outcomes household survey (AOS) is used, with AOS 2018 as the proxy for baseline. Household	PMU, PST, RDCs, dzongkhag and gewog administrations



	cardamom, citrus, quinoa, and ginger.		AOS 2018 as the proxy for baseline. Household weights are used to average across crops.	weights are used to average across crops.	
Increase in value of produce marketed by at least 25 percent	This is the average increase in marketed value for the seven crop groups among beneficiary producers: rice, vegetables, potatoes, large cardamom, citrus, quinoa, and ginger.	Annual	The annual outcomes household survey (AOS) is used, with AOS 2018 as the proxy for baseline. Household weights are used to average across crops.	The annual outcomes household survey (AOS) is used, with AOS 2018 as the proxy for baseline. Household weights are used to average across crops.	PMU, PST, RDCs, dzongkhag and gewog administrations
Number of direct project beneficiaries	This is the total number of project beneficiary households, which covers all rural households in the 29 project gewogs.	Annual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Female Beneficiaries					



**Monitoring & Evaluation Plan: Intermediate Results Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
1.1 Number of beneficiary groups receiving technical trainings and other capacity building support	This includes any farmer group formed/strengthened (including WUAs and producer group). Strengthened is defined as receiving at least one training or capacity building activity. This is measured as number of groups.	Quarterly	Project Progress Reports	Project Progress Reports	PMU, PST, RDCs, dzongkhag and gewog administrations
1.2 Number of farmers who are members of an association including producer groups, cooperatives etc. (disaggregated by gender) – GAFSP Core Indicator # 14	This includes membership in farmer groups, producer groups, or WUAs.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Number of Female members of an association including producer groups, cooperatives etc					
1.3 Number of people receiving improved nutrition services and products through the project - GAFSP Core Indicator # 11 (new GAFSP indicators)	This indicates the number of beneficiaries who received improved nutrition services or products through the	Biannual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations



	project.				
1.3.1 Number of people who received nutrition counseling/education	This is calculated as the number of beneficiaries who benefited from counselling sessions on nutrition and/or from nutrition education/sensitizations activities.	Annual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
1.3.2 Number of people receiving extension support for nutrition-relevant techniques	This is calculated as the number of beneficiaries who benefited from trainings on agriculture-nutrition linkages and/or beneficiaries who were trained in the production of nutrient-rich crops through kitchen gardens.	Annual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Number of Females beneficiaries receiving improved nutrition services and products through the project-GAFSP Core Indicator # 11 (new GAFSP indicators)					
2.1 Targeted crop area provided with irrigation – GAFSP CI # 6	This measures the total area (in acres) provided with flood or micro irrigation.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Area covered by Flood Irrigation	This measures the total	Biannual	Project	Project Progress	PMU, PST, RDCs,



	area provided with flood irrigation.		Progress Reports, RNR Statistics, Third Party Assessments	Reports, RNR Statistics, Third Party Assessments	dzongkhag and gewog administrations
Area covered by Micro Irrigation	This measures the total area (in acres) provided with micro irrigation.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
2.1 Targeted crop area provided with irrigation – GAFSP Core Indicator # 6					
Area covered by Flood Irrigation	This measures the total area provided with flood irrigation.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Area covered by Micro irrigation	This measures the total area provided with micro irrigation.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
2.2 Number of water users with new/improved irrigation services – GAFSP Core Indicator # 8	This measures the total number of beneficiary households who benefit	Biannual	Project Progress Reports, RNR	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations



	from flood or micro irrigation.		Statistics, Third Party Assessments		
New users with Flood Irrigation	This measures the total number of beneficiary households who benefit from flood irrigation.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
New users with Micro Irrigation	This measures the total number of beneficiary households who benefit from micro irrigation.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
2.3 Number of farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas	This measures the total number of beneficiary households who benefit from improved agricultural technologies, including agricultural technologies supporting targeted nutrient-rich value chains - high efficiency irrigation, disease-free seeds and saplings, soil conservation, farm machinery, electric fencing, greenhouses, and any other technology	Biannual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations





	provided by the project.				
Number of Female farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas					
2.4 Total land area under cultivation for citrus and cardamom increased by 6 percent	This measures the total land area increase under cultivation for citrus and cardamom in the project gewogs.	Biannual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Cardamom- cultivated area	Cultivated area (in acres)				
Citrus- cultivated area	Cultivated area (in acres)				
2.5 Number of beneficiaries reached, who have been helped to cope with impact of climate change; GAFSP Core Indicator # 1	The indicator measures number of beneficiaries, disaggregated by gender, who receive climate awareness training, or capacity building, or benefit from promotion of climate-smart agriculture practices.	Annual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
Number of female beneficiaries reached, who have been helped to cope with impact of climate change					
3.1 Number of beneficiaries of project supported market infrastructure	This measures the number of beneficiaries supported with market infrastructure, including but not limited	Biannual	Project Progress Reports, RNR Statistics,	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations



	to, improved handling equipment (crates, tarpaulin sheets), collection/packing center, small market sheds, improved storage structures e.g., zero energy cool chambers for vegetables/fruits and machines and materials for packaging and weighing, farm shops.		Third Party Assessments		
3.2 Number of producer groups receiving market information	This measures the number of beneficiaries receiving market information, including information on market prices, knowledge of markets present, and cost of market access.	Biannual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
3.3 Number of farmer groups linked to schools	This measures the number of farmer groups linked to schools. A farmer group is considered linked to school if it has a current purchase agreement/contract which with the school.	Biannual	Project Progress Reports, Third Party Assessments	Project Progress Reports, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
3.4 Number of children receiving the recommended 5 servings of fruits/vegetables per day					
3.5 Proportion of beneficiaries with medium or high (>7) Household Dietary Diversity Score	This indicator measures dietary quality, it measures how many food groups out	Annual	Annual Outcomes Survey	Annual Outcomes Survey	PMU, PST, RDCs, dzongkhag and gewog administrations



	of 12 a beneficiary household consumed. This indicator measures the proportion of beneficiary households which have high to medium HDDS, or an HDDS greater than or equal to 7.				
3.6 Number of post-harvest facilities constructed and or rehabilitated includes markets, agro-processing/storage/quality control facilities	This indicator measures the number of facilities developed by the GAFSP-supported project that support activities such as (1) improved storage/improved packaging house technologies, (2) warranty contracts, (3) investments to comply with sanitary/phytosanitary and other food safety standards, (4) temperature and humidity control, (5) improved quality control technologies and practices, such as for sorting and grading; and (6) decay and insect control.	Annual	Project Progress Reports, RNR Statistics, Third Party Assessments	Project Progress Reports, RNR Statistics, Third Party Assessments	PMU, PST, RDCs, dzongkhag and gewog administrations
4.1 Learning notes or case studies published and disseminated	This indicator measures the number of learning notes and case studies published and disseminated.	Biannual	Published Reports	Published Reports	PMU, PST, RDCs, dzongkhag and gewog administrations



4.2 Progress reports satisfactory	This measures whether progress reports are prepared and submitted on biannual basis and are of satisfactory quality, defined by its accuracy and timeliness.	Biannual	Biannual Project Progress Reports	Biannual Project Progress Reports	PMU, PST, RDCs, dzongkhag and gewog administrations
4.3 Procurement satisfactory	This measures whether procurement of goods and works under this project is completed according to schedule, and contracts awarded and completed on schedule.	Ongoing	Project Progress Reports, Procurement reviews	Project Progress Reports, Procurement reviews	PMU, PST, RDCs
4.4 Percentage of beneficiaries satisfied with services provided by the project.	This measures the percentage of beneficiaries satisfied with any intervention provided under the project.	Mid and End of Project	Beneficiary Satisfaction Surveys	Beneficiary Satisfaction Surveys	PMU



## ANNEX 1. ECONOMIC AND FINANCIAL ANALYSIS AND CLIMATE CO-BENEFITS

### Economic and Financial Analysis

1. The appraisal economic and financial analysis (EFA) was updated to account for the original project and its additional financing (AF) using the same cost benefit analysis approach. The methodology of the appraisal EFA was largely maintained as the project design remained unchanged and the AF is intended for scaling up of appraisal interventions. Costs and benefits were updated to reflect actual and projected costs and benefits, and revised targets for IRIs and PDO indicators. Several modifications to the methodology were introduced. These are: inclusion of economic values of net GHG emissions which were estimated at the appraisal but were not accounted in the EFA; revision of productivity assumptions in alignment with appraisal and AF targets; estimating project level financial indicators which were omitted in the appraisal EFA; and revising the discount rates as per the 2016 World Bank guidance note.
2. Potential quantifiable benefits expected from the project investments are: (i) improved agricultural productivity (grains, spices, vegetables, mandarin, apple) through adoption of improved agricultural technologies and farm management practices and improved access to irrigation; (ii) incremental production through intensification and expansion of production areas as a result of investments in modernization of existing and development of new irrigation schemes, adoption of small scale agricultural machineries, micro-irrigation and protected farming technologies (greenhouse, poly-houses); (iii) reduction in production costs and improved labor efficiency through mechanization of farm operations; (iv) reduction in production and post-production losses (wildlife, pests and disease, frosts, hails, water security) through investments in electric fencing, protected farming technology, and storage infrastructure; (v) increased agricultural incomes through diversification from subsistence to commercial production of export oriented spices, fruits and off-season vegetables and post-harvest value addition and market infrastructures; (vi) nutritional benefits derived from increased availability of nutritious produce through investments in storage infrastructure, adoption of food preservation technologies, and development of supply linkages between farmers and schools; (vii) creation of employment opportunities, particularly in farm machinery services and at post-harvest and market infrastructure centers; and (viii) reduced net GHG emissions per unit of output through improved productivity, decreased losses, adoption of CSA, water management, and energy efficient technologies and practices. Additionally, at the macro level improved agricultural production, commercialization and exports will contribute to (ix) improved food security and nutrition, positive trade balance, and poverty reduction efforts. Of these, the benefits (vi), (vii) and (ix) are not accounted for in the appraisal EFA or in the current analysis due to the unavailability of required data.
3. Potential benefits were estimated through representative 16 production models, two irrigation infrastructure (flood and micro) models, and two storage and processing infrastructure models. Economic values of net GHG emissions were measured through high and low prices for carbon as indicated in the relevant guidance note of World Bank from September 2017. The overall project returns are calculated by aggregating returns to all models and net GHG benefits over a period of 20 years, which corresponds to the technical lifespan of irrigation and agricultural infrastructure if adequately operated and maintained and which is exclusive of the project implementation timeframe. Returns were calculated at the 2016 appraisal financial prices, discount rates of 5 percent (economic) and 8 percent (financial), and 60 percent adoption rates. Economic indicators are presented in three scenarios: (i) a base case without values of net GHG emissions; (ii) a base case inclusive



of the value of net GHG emissions at the low shadow prices for carbon; and (iii) a base case inclusive of the value of net GHG emissions at the high shadow prices for carbon.

4. Results of financial analysis indicate that the project investments will generate incremental net margins in the range of: (a) technology adoption at USD 140 per acre of grains to USD 1310 per acre of orchards; (b) irrigation improvement and technology adoption at USD 330 per acre; (c) electric fencing investments at USD 21 per acre; and (d) post-harvest infrastructure investments at USD 2675 per ginger processing model and USD 9470 per cold storage. At the project level, the project investments are estimated to generate financial net present values (NPV) at USD 6.6 million with financial rate of return (IRR) at 16.1 percent and benefit-to-cost ratio (BCR) of 1.74.
5. When the GHG values are excluded, the project is estimated to generate economic NPV of USD 10.2 million at EIRR of 15.5 percent and the BCR of 2.14. When the net GHG emissions at the low shadow carbon prices are added, the project ERR is estimated at 15.7 percent, ENPV is USD10.5 million and BCR is 1.17. When the net GHG emissions at the high shadow carbon prices are added, the project ERR is estimated at 15.9 percent, ENPV is USD 10.8 million, and BCR is 1.20.
6. The project returns are tested for three sensitivity variables at various degrees of changes: benefits, costs and implementation delays. Results suggest that the project returns are negligibly sensitive to cost variability and moderately sensitive to benefit variability and implementation delays. The base EIRR without GHG emission values stays well above 10 percent under all scenarios except two. When the benefits decline above 30 percent or the benefit accumulation is delayed by two years, then the base EIRR drops to 6.9 percent and 8.6 percent respectively. While the reduced EIRR rates under these scenarios remain above the 5 percent economic discount rate, the project would still need to monitor occurrence of these potential events, and to take adequate measures to avoid them or mitigate their estimated impacts.

### **GHG Accounting**

7. The World Bank has adopted a corporate mandate to conduct greenhouse gas (GHG) emissions accounting for investment lending. The quantification of GHG emission is an important step in managing and ultimately reducing emissions. The World Bank has adopted the Ex-Ante Carbon-balance Tool (EX-ACT), developed by FAO,<sup>8</sup> to assess a project's net carbon-balance, i.e., the net balance of tons of carbon dioxide equivalent (tCO<sub>2</sub>e) emissions that were emitted or carbon sequestered as a result of project implementation compared to a "without project" scenario.
8. Data for the analysis was received from project team and is in line with the assumptions in the economic analysis. As for the economic analysis, activities implemented in the original project and AF project are considered. Information was received from the PMU and from an unpublished assessment conducted by FAO: GHG Accounting of the FSAPP project in 2020.
9. On average, Bhutan, has a cool temperate climate regime, and moist moisture regime. About 60 percent of the project area is located in the warm temperate moist climate regime. The dominant soil type is High activity Clay. We use Tier 1 coefficients for the analysis and the dynamics of change are assumed to be linear. Project implementation period is 5 years and 15 years capitalization period. We assume that the without project scenario is the same as the current scenario.

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<sup>8</sup> <http://www.fao.org/tc/exact/ex-act-home/en/>



10. The project aims to increase agricultural productivity, by introducing irrigation systems and climate-smart agricultural (CSA) practices for a variety of crops such as rice, vegetables, pulses, potatoes, as well as high value commodities such as cardamom or citrus for the local and export market.
11. It is expected that beneficiaries adopt improved climate-smart technologies and management practices without irrigation, on total 1,973 acres, for cereal and vegetable cultivation. Cultivation of perennials, such as cardamom, citrus and apples takes place on 618 acres; for which the area was converted from grassland. Flood irrigation systems will be or have been improved on 1,914 acres agricultural land and drip/micro irrigation will be introduced on 330 acres. With new and improved irrigation systems, beneficiaries are expected to adopt improved water management practices. The project will promote small farm machinery and equipment and other agricultural infrastructure will be funded on a demand-driven basis. Input assumptions are detailed in Table 3.

**Table 3. Input assumptions to EX-ACT**

Activity	Current/without project scenario	With project scenario
Introducing CSA practices for rainfed crops	1,973 acres agricultural land under traditional management; residues retained	1,973 acres under improved agronomic practices (for ginger, vegetables, maize); Residues retained
Introducing perennials	618 acres grassland	57 acres under cardamom, 215 acres under citrus production on previously grassland, 346 acres under apple production <sup>(a, b)</sup>
Introducing improved irrigation systems and management practices	1,914 acres under irrigated rice: non-flooded pre-season > 180 days; Irrigated – continuously flooded 90% of land; Rainfed and deep water – regular rainfed on 10% during monsoon season Organic amendment: farmyard manure; Cultivation days: 135 yield 2.6 ton/ha/yr	1,914 acres equipped with improved flood irrigation systems, of which 90% (1,723 acres) will be cultivated with paddy rice: 135 cultivation days; irrigated intermittently flooded, multiple aeration, non-flooded pre-season > 180 days and 50% straw exported and 50% green manure. <sup>(c)</sup> The remaining 10 percent will be cultivated with irrigation practices as in the “without project” scenario.
	330 acres under rainfed, traditional crop management	330 acres of new trickle/drip irrigation systems with improved nutrient management and improved water management and improved agronomic practices
Fertilizer use	25 tons urea/year	76 tons of urea/year
Agricultural buildings	No agricultural buildings	15 packhouses, 2 cold storage facilities, 19 processing facilities and 19 storage facilities (100 m2 each) and 10 market outlets, 3 sales counters and curing sheds (10 m2 each) will be constructed, Total: 5,630 m2; Building material concrete is assumed

(a) Tier 2 values for SOC applied - GSOC value used as reference (93.34) - 2019 IPCC methodology applied for changes in the SOC following conversion; (b) Apple was promoted under the original project, not the AF; (c) Winter maize will be produced in the off-season. Crop rotation in irrigated rice cannot be accounted for the in the EX-ACT irrigated rice module. (d) Assumptions about fertilizer amount are in line with the EFA. The project does not procure or promote the use of fertilizers by the farmers. The here



presented assumptions reflect an expected adjustment in farming behavior as a consequence of improved irrigation infrastructure.

12. The project is a net carbon sink of 10,012 tCO<sub>2</sub>e emissions over 20 years, and -501 tCO<sub>2</sub>e per year. Gross emissions in the with project scenario are 72,003 tCO<sub>2</sub>e emissions.<sup>9</sup> Due to the adoption of CSA practices in annual crops (-9,520 tCO<sub>2</sub>e) and improved water management in paddy rice (-22,576 tCO<sub>2</sub>e) and growing of biomass of perennials (-9,155 tCO<sub>2</sub>e), the project achieves a carbon sink of -41,251 tCO<sub>2</sub>e emissions over 20 years. In contrast, the conversion of grassland to perennials (22,923 tCO<sub>2</sub>e) and the construction of agricultural infrastructure and increased fertilizer use (8,317 tCO<sub>2</sub>e) result in a net carbon source of (31,240 tCO<sub>2</sub>e). The project arrives at an annual net carbon sink of 501 tCO<sub>2</sub>e emissions.

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<sup>9</sup> Thereof, 64,949 tCO<sub>2</sub>e are considered scope 1 emissions as they are controlled by the project; Increased fertilizer use is not promoted by the project and results in 7,054 tCO<sub>2</sub>e emissions which are considered scope 3 emissions.





## ANNEX 2. CLIMATE CHANGE AND CLIMATE-SMART AGRICULTURE

1. Bhutan is exposed to a diversity of natural hazards, including floods, landslides, cloudbursts, windstorms, cyclones, river erosion, earthquakes, glacial lake outburst flood (GLOF), wildfire and droughts. Between 1994 and 2016, some 87,000 people were affected and over 380 deaths occurred due to natural disasters in Bhutan. In 2009, Cyclone Aila brought unprecedented rainfall and floods, affecting farmland and infrastructure with damages of approximately US\$17 million. In 2010, landslides and flash floods damaged more than 2,000 acres of agricultural land and farm roads and irrigation channels, damaged and washed away 40 acres of pastureland with a loss of over a thousand livestock, and affected more than 4,100 households.<sup>10</sup> In 2009 and 2011, Bhutan was struck by two high-magnitude earthquakes with a damage and loss of US\$52.6 million<sup>11</sup> and US\$24.5 million<sup>12</sup> respectively. The majority of the country's infrastructure is located along drainage basins that are highly vulnerable to flooding, particularly riverine flooding caused by heavy monsoon rains and glacial melt. The country's urban areas are vulnerable to urban flooding, and extreme heat in the south. According to historical data, flooding occurs most frequently and is responsible for the largest percentage of mortality.<sup>13</sup> Climate models estimate that the average annual temperature will increase by 1.9°C by 2040-2059 and 3.94°C by the end of the century. The number of projected summer days (temperatures above 25°C) will increase by 40-86 days and tropical nights (temperatures above 20°C) will increase by 42-73 days by the end of the century.<sup>14</sup> The maximum number of consecutive dry days<sup>15</sup> is an important metric for rain-fed agriculture as it directly impacts soil moisture, and thus crop growth. The trend toward more consecutive dry days and higher temperatures will increase evaporation and add stress to limited water resources, affecting irrigation and other water uses. Long periods of consecutive days with little or no precipitation also can lead to drought.
2. Over the past years, Bhutan has experienced rapid changes in average temperatures, precipitation patterns. Climate change impact modeling shows that climate change can have mixed effects on agricultural production, potentially contributing to the increase in yields and land area for some crops and decreases for others. However, the agriculture sector experiences an increased risks of climate hazards, including excessive rains, flash floods, windstorms, hailstorms, and droughts, causing massive losses and damage to farming households. Tambe et al (2012) claims "Due to the impacts of climate change on precipitation patterns such as rise in rainfall intensity, reduction in its temporal spread, and a marked decline in winter rain, coupled with other anthropogenic causes, the problem of drying springs is being increasingly felt across this region." Most farmers are entirely dependent on the monsoons for irrigation. The late arrival of the monsoon can lead to drought, while excessive monsoon rains cause natural disasters, such as landslides and floods. Such climatic events also put rural communities at higher risks, as many remain isolated due to inadequate and damaged infrastructure. However, farmers' awareness of CSA and the associated opportunities and challenges is poor;

<sup>10</sup> World Bank Climate Change Knowledge Portal – Bhutan Country Brief.

<sup>11</sup> RGOB, World Bank, and UN. 2009. *Bhutan Earthquake September 21, 2009: Joint Rapid Assessment for Recovery, Reconstruction and Risk Reduction*.

<sup>12</sup> RGOB, World Bank, and UN. 2011. *Bhutan Earthquake September 18, 2011: Joint Rapid Assessment for Recovery, Reconstruction and Risk Reduction*.

<sup>13</sup> <https://www.preventionweb.net/>

<sup>14</sup> <https://climateknowledgeportal.worldbank.org/country/bhutan/climate-data-projections>

<sup>15</sup> A "dry day" is a day without any agriculturally meaningful rainfall, which is generally defined by a threshold of 0.1 mm/day.



the availability of CSA technologies is limited; and farmers do not have any safety nets or alternative sources of livelihoods if investment activities fail.<sup>16</sup>

3. Regarding water resources, many of the critical Watershed Management Plans developed by the Watershed Management Division (WMD), report the drying-up of water sources in seven major and minor river basins across the country. WMD is one of the key Agencies mandated to sustainably manage watersheds and be equipped with multidisciplinary technical professionals. However, it currently lacks adequate technical capacity to address climate-induced drinking and irrigation water shortages.
4. The AF continues to address these challenges and continues to support the adoption of CSA practices and climate-resilience building measures. The promotion of CSA practices and technologies is a core activity in *Subcomponent 1.1. and 1.2*, strengthening farmer and producer groups; *Subcomponent 1.3*, where nutrition-sensitive and climate-smart agriculture practices are integrated; and *Subcomponent 2.2* which strengthens improved farm management. The current estimated share of Climate Co-benefits for the project is 46 percent (i.e. the share of project finance which supports climate adaptation and mitigation activities).<sup>17</sup>
5. The proposed training and promotion of CSA practices will cover climate change, risks and opportunities and resilience-building. CSA practices and water management practices will be taught, which include improved planting and crop management (e.g., use of drought-tolerant, pest- and disease-resistant, early-maturing seed varieties), crop intensification techniques (e.g. maize intercropping with legumes), soil conservation and nutrient management (use of manure, biochar, bokashi and bio-gas slurry, terracing, and no-till/direct sowing), improved water and irrigation management (via use of water efficient technologies; ridge system planting for potatoes; alternate wetting and drying for paddy and upland rice cultivation). CSA practices contribute to climate mitigation; they increase soil carbon sequestration (e.g., no tillage, conservation agriculture, agroforestry, intercropping) and increase existing carbon pools, and reduce greenhouse gas emissions due to reduced and more efficient nutrient use, or improved water management practices in irrigated rice cultivation. The project supports planting of perennials, such as citrus and cardamom which will increase carbon sequestration.
6. The promotion of CSA practices in *Subcomponent 1.3* is a part of the nutrition awareness and sensitization activities for CRPs, including the interaction of nutrition-sensitive and climate-smart practices, and focuses on intercropping and crop rotation with legumes, which has increased potential for soil carbon sequestration and nutrient-dense horticulture crops, respectively. Promotion of CSA practices will also include soil management practices that control soil erosion, nutrient loss, and improve the water regime in the soil profile (e.g. minimum tillage).
7. Under *Subcomponent 2.1 (water use efficiency)*: Farmers will receive training on improved water management, to strengthen climate-resilience building and adaptation. In addition, the project will consider strengthening climate-resilience in the sustainable management of targeted watershed and water sources in the context of climate induced water shortages.
8. *Component 3 Enhancing Access to Markets*. The project will consider climate-smart and energy-efficient refrigeration technologies to reduce energy consumption in operation. Market infrastructure supported by

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<sup>16</sup> CIAT/World Bank (2017): Bhutan Climate-Smart Agriculture Country profile

<sup>17</sup> Climate Co-benefits were assessed by the task team according to the MDB Methodology for Climate Finance available under: <https://publications.iadb.org/publications/english/document/2019-Joint-Report-on-Multilateral-Development-Banks-Climate-Finance.pdf>, last accessed June 2021.



this subcomponent will be climate-resilient and feature a superstructure and/or an elevated platform, when applicable, to withstand the impact of high wind, heavy precipitation and flooding.