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Report No: PAD5330

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT PAPER

ON A

PROPOSED ADDITIONAL CREDIT  
IN THE AMOUNT OF EUR 139.9 MILLION (US\$150 MILLION EQUIVALENT)

OF WHICH

EUR 51.3 MILLION (US\$55 MILLION EQUIVALENT)  
IS FROM THE SCALE-UP WINDOW SHORTER MATURITY LOAN (SUW-SML)

TO THE

REPUBLIC OF BENIN

FOR THE

AGRICULTURAL COMPETITIVENESS AND EXPORT DIVERSIFICATION PROJECT

May 23, 2024

Agriculture and Food Global Practice  
Western and Central Africa Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2024)

Currency Unit = CFAF (CFA Franc)

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CFAF 612.0 = US\$1.00

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US\$1.00 = EUR 0.93

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## FISCAL YEAR

January 1 – December 31

Regional Vice President: Ousmane Diagana

Country Director: Marie-Chantal Uwanyiligira

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## ABBREVIATIONS AND ACRONYMS

|        |   |
|--------|---|
| ABSSA  | <i>Agence Béninoise pour la Sécurité Sanitaire des Aliments</i> (Benin Agency for Food Safety)                      |
| AF     | Additional Financing  |
| AfDB   | African Development Bank  |
| AM     | Accountability Mechanism  |
| APIEx  | <i>Agence de Promotion des Investissements et des Exportations</i> (Agency for Promotion of Investment and Exports) |
| ATDA   | <i>Agence Territoriale de Développement Agricole</i> (Territorial Agency for Agricultural Development)              |
| CBA    | Cost-Benefit Analysis   |
| CC     | Climate Change  |
| CCB    | Climate Co-Benefits   |
| CCDR   | Country Climate Development Report  |
| CFAF   | Francophone Africa Community – Franc  |
| COSO   | Gulf of Guinea Social Cohesion Project  |
| CPF    | Country Partnership Framework   |
| CRI    | Corporate Results Indicator   |
| CSA    | Climate-Smart Agriculture   |
| DGR    | <i>Direction du Génie Rural</i> (Rural Engineering Directorate)   |
| DPV    | <i>Direction de la Production Végétale</i> (Crops Service Directorate)  |
| DSA    | Debt Sustainability Analysis  |
| ECF    | Enhanced Credit Facility  |
| ECOWAS | Economic Community of West African States   |
| EFA    | Economic and Financial Analysis   |
| EIRR   | Economic Internal Rate of Return  |
| E&S    | Environmental and Social  |
| ESCP   | Environmental and Social Commitment Plan  |
| ESIA   | Environmental and Social Impact Assessment  |
| ESMF   | Environmental and Social Management Framework   |
| ESMP   | Environmental and Social Management Plan  |
| ESRC   | Environmental and Social Risk Classification  |
| ESS    | Environmental and Social Standard   |
| FAO    | Food and Agriculture Organization of the United Nations   |
| FM     | Financial Management  |
| GAP    | Good Agricultural Practices   |
| GBV    | Gender-Based Violence   |
| GHG    | Green House Gas   |
| GoB    | Government of Benin   |
| GRM    | Grievance Redress Mechanism   |
| GRS    | Grievance Redress Services  |
| HSE    | Health, Safety, and Environment   |
| IBRD   | International Bank for Reconstruction and Development   |
| IDA    | International Development Association   |
| IMF    | International Monetary Fund   |
| INRAB  | <i>Institut National des Recherches Agricoles du Bénin</i> (National Institute for Agricultural Research)           |
| IPC    | Integrated Food Security Phase Classification   |
| IPCC   | Intergovernmental Panel on Climate Change   |
| IPF    | Investment Project Financing  |
| IPM    | Integrated Pest Management  |
| LMP    | Labor Management Procedures   |
| M&E    | Monitoring and Evaluation   |

|          |   |
|----------|---|
| MAEP     | <i>Ministère de l'Agriculture, de l'Élevage et de la Pêche</i> (Ministry of Agriculture, Livestock, and Fisheries)  |
| MDG      | Millennium Development Goal   |
| MFD      | Maximizing Finance for Development  |
| MSME     | Micro Small and Medium Enterprises  |
| NAP      | National Climate Change Adaptation Plan   |
| NBA      | Niger Basin Authority   |
| NDC      | Nationally Determined Contribution  |
| NPF      | New Procurement Framework   |
| NGGI     | National Greenhouse Gas Inventories   |
| NGO      | Non-Governmental Organization   |
| NPV      | Net Present Value   |
| OCP      | <i>Office Chérifien des Phosphates</i> (Morrocan Fertilizer Company)  |
| OHS      | Occupational Health and Safety  |
| PACOFIDE | <i>Project d'Appui à la Compétitivité des Filières et à la Diversification des Exportations</i> (Agricultural Competitiveness and Export Diversification Project) |
| PADEFA   | <i>Project d'Appui au Développement des Filières Agricoles</i> (Agricultural Value Chains Development Project)  |
| PCE      | Private Capital Enabled   |
| PCM      | Private Capital Mobilized   |
| PDO      | Project Development Objective   |
| PIM      | Project Implementation Manual   |
| PMP      | Pest Management Plan  |
| PMU      | Project Management Unit   |
| PNDF     | <i>Plan National de Développement des Filières</i> (National Plan for Value Chain Development)  |
| PNIASAN  | <i>Plan National D'Investissement et de Sécurité Alimentaire et Nutritionnelle</i> (National Agricultural Investment and Food and Nutritional Security Plan)      |
| PP       | Productive Partnership  |
| PPP      | Public-Private Partnership  |
| PPSD     | Project Procurement Strategy for Development  |
| PRA      | Prevention and Resilience Allocation  |
| PRIMA    | Regional Programme for the Integration of Agricultural Markets  |
| PSDSA    | <i>Plan Stratégique de Développement du Secteur Agricole</i> (Strategic Development Plan of the Agricultural Sector)  |
| PREP     | Prevention and Resilience Program   |
| RAP      | Resettlement Action Plan  |
| RPF      | Resettlement Policy Framework   |
| RRA      | Resilience and Risk Assessment  |
| SEA      | Sexual Exploitation and Abuse   |
| SEIDP    | Stakeholders Engagement and Information Disclosed Plan  |
| SEP      | Stakeholder Engagement Plan   |
| SESA     | Sectoral Strategic Environmental and Social Assessments   |
| SH       | Sexual Harassment   |
| SME      | Small and Medium Enterprise   |
| SMP      | Security Management Plan  |
| SoBAA    | <i>Société Béninoise des Aménagements Agricoles</i> (Irrigation Development Company)  |
| SoDeSep  | <i>Société de Développement des Plants et Semences</i> (Seed and Plantlet Development Company)  |
| SONAMA   | <i>Société Nationale de Mécanisation Agricole</i> (Agricultural Mechanization Company)  |
| SRI      | System for Rice Intensification   |
| SUW-SML  | Scale Up Window – Shorter Maturity Loan   |
| VC       | Value Chain   |

|     |                          |
|-----|--------------------------|
| VfM | Value for Money          |
| WBG | World Bank Group         |
| WDR | World Development Report |
| WFP | World Food Program       |
| WOP | Without Project          |
| WP  | With Project             |

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**BASIC INFORMATION – PARENT (AGRICULTURAL COMPETITIVENESS AND EXPORT DIVERSIFICATION PROJECT - P168132)**

|            |                              |                                |              |                      |
|------------|------------------------------|--------------------------------|--------------|----------------------|
| Country    | Product Line                 | Team Leader(s)                 |              |                      |
| Benin      | IBRD/IDA                     | Senou Idrissou Nazaire Houssou |              |                      |
| Project ID | Financing Instrument         | Resp CC                        | Req CC       | Practice Area (Lead) |
| P168132    | Investment Project Financing | SAWA4 (10130)                  | AWCF2 (6551) | Agriculture and Food |

Implementing Agency: Ministere de l'Agriculture, de l'Elevage et de la Peche

|                                      |   |                                    |  |  |
|--------------------------------------|---|------------------------------------|--|--|
| Is this a regionally tagged project? |   |                                    |  |  |
| No                                   |   |                                    |  |  |
| Bank/IFC Collaboration               | Joint Level   |                                    |  |  |
| Yes                                  | Complementary or Interdependent project requiring active coordination |                                    |  |  |
| Approval Date                        | Closing Date  | Expected Guarantee Expiration Date | Environmental and Social Risk Classification |  |
| 02-Jun-2020                          | 30-Nov-2026   |                                    | Substantial                                  |  |

**Financing & Implementation Modalities**

|   |  |
|---|--|
| <input type="checkbox"/> Multiphase Programmatic Approach [MPA]   | <input checked="" 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 checked="" 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 productivity and market access for selected agri-food value chains in Benin.

### Ratings (from Parent ISR)

|                                      | Implementation |             |             |             |             | Latest ISR  |
|--------------------------------------|----------------|-------------|-------------|-------------|-------------|-------------|
|                                      | 08-Oct-2021    | 12-Apr-2022 | 14-Oct-2022 | 27-Mar-2023 | 25-Sep-2023 | 15-Dec-2023 |
| Progress towards achievement of PDO  | S              | S           | S           | S           | S           | S           |
| Overall Implementation Progress (IP) | S              | MS          | MS          | MS          | MS          | MS          |
| Overall ESS Performance              | MS             | MS          | MS          | MS          | MS          | MS          |
| Overall Risk                         | M              | M           | M           | M           | M           | S           |
| Financial Management                 | S              | MS          | MS          | MS          | MS          | MS          |
| Project Management                   | S              | MS          | MS          | MS          | MS          | MS          |
| Procurement                          | S              | MS          | MS          | MS          | MU          | MS          |
| Monitoring and Evaluation            | S              | S           | S           | S           | S           | S           |

### BASIC INFORMATION – ADDITIONAL FINANCING (Additional Financing for Benin Agricultural Competitiveness and Export Diversification Project - P180505)

|            |  |                           |                                     |
|------------|--|---------------------------|-------------------------------------|
| Project ID | Project Name   | Additional Financing Type | Urgent Need or Capacity Constraints |
| P180505    | Additional Financing for Benin Agricultural Competitiveness and Export Diversification Project | Scale Up                  | No                                  |





|  |                              |                              |  |
|--|------------------------------|------------------------------|--|
| Financing instrument<br>Investment Project Financing | Product line<br>IBRD/IDA     | Approval Date<br>14-Jun-2024 |  |
| Projected Date of Full Disbursement<br>30-Apr-2030   | Bank/IFC Collaboration<br>No |                              |  |
| Is this a regionally tagged project?<br>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 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 checked="" type="checkbox"/> Contingent Emergency Response Component (CERC) |  |

**Disbursement Summary (from Parent ISR)**

| Source of Funds | Net Commitments | Total Disbursed | Remaining Balance | Disbursed  |      |
|-----------------|-----------------|-----------------|-------------------|--|------|
| IBRD            |                 |                 |                   | <div style="width: 0%; height: 10px; background-color: #ccc;"></div>     | %    |
| IDA             | 160.00          | 111.75          | 47.00             | <div style="width: 70%; height: 10px; background-color: #4CAF50;"></div> | 70 % |
| Grants          |                 |                 |                   | <div style="width: 0%; height: 10px; background-color: #ccc;"></div>     | %    |

**PROJECT FINANCING DATA – ADDITIONAL FINANCING (Additional Financing for Benin Agricultural Competitiveness and Export Diversification Project - P180505)**

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

**SUMMARY (Total Financing)**

|                           | Current Financing | Proposed Additional Financing | Total Proposed Financing |
|---------------------------|-------------------|-------------------------------|--------------------------|
| <b>Total Project Cost</b> | 160.00            | 166.50                        | 326.50                   |
| <b>Total Financing</b>    | 160.00            | 166.50                        | 326.50                   |
| <b>of which IBRD/IDA</b>  | 160.00            | 150.00                        | 310.00                   |
| <b>Financing Gap</b>      | 0.00              | 0.00                          | 0.00                     |

#### DETAILS - Additional Financing

##### World Bank Group Financing

|   |        |
|---|--------|
| International Development Association (IDA) | 150.00 |
| IDA Credit                                  | 95.00  |
| IDA Shorter Maturity Loan (SML)             | 55.00  |

##### Non-World Bank Group Financing

|                                   |       |
|-----------------------------------|-------|
| Commercial Financing              | 16.50 |
| Unguaranteed Commercial Financing | 16.50 |

#### IDA Resources (in US\$, Millions)

|  | Credit Amount | Grant Amount | SML Amount   | Guarantee Amount | Total Amount  |
|--|---------------|--------------|--------------|------------------|---------------|
| <b>Benin</b>                                 | 95.00         | 0.00         | 55.00        | 0.00             | 150.00        |
| National Performance-Based Allocations (PBA) | 95.00         | 0.00         | 0.00         | 0.00             | 95.00         |
| Scale-Up Window (SUW)                        | 0.00          | 0.00         | 55.00        | 0.00             | 55.00         |
| <b>Total</b>                                 | <b>95.00</b>  | <b>0.00</b>  | <b>55.00</b> | <b>0.00</b>      | <b>150.00</b> |

#### 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

**Environmental and Social Standards Relevance Given its Context at the Time of Appraisal**

| E & S Standards   | Relevance              |
|---|------------------------|
| Assessment and Management of Environmental and Social Risks and Impacts                       | Relevant               |
| Stakeholder Engagement and Information Disclosure   | Relevant               |
| Labor and Working Conditions  | Relevant               |
| Resource Efficiency and Pollution Prevention and Management                                   | Relevant               |
| Community Health and Safety   | Relevant               |
| Land Acquisition, Restrictions on Land Use and Involuntary Resettlement                       | Relevant               |
| Biodiversity Conservation and Sustainable Management of Living Natural Resources              | Relevant               |
| Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities | Not Currently Relevant |
| Cultural Heritage   | Relevant               |
| Financial Intermediaries  | Not Currently Relevant |

**NOTE:** For further information regarding the World Bank’s due diligence assessment of the Project’s potential environmental and social risks and impacts, please refer to the Project’s Appraisal Environmental and Social Review Summary (ESRS).

**INSTITUTIONAL DATA**

**Practice Area (Lead)**

Agriculture and Food

**Contributing Practice Areas**

**Climate Change and Disaster Screening**

This operation has been screened for short and long-term climate change and disaster risks

## PROJECT TEAM

### Bank Staff

| Name                                | Role  | Specialization                         | Unit  |
|-------------------------------------|---|--|-------|
| Senou Idrissou Nazaire Houssou      | Team Leader (ADM Responsible)                     | Senior Agriculture Economist           | SAWA4 |
| Kaliza Karuretwa                    | Team Leader                                       | Senior Private Sector Specialist       | EAWF1 |
| Mekbib Gebretsadik Haile            | Team Leader                                       | Senior Agriculture Economist           | SAWA4 |
| Harouna Djibrilla Djimba            | Procurement Specialist (ADM Responsible)          | Senior Procurement Specialist          | EAWP1 |
| Josphine Kabura Kamau               | Financial Management Specialist (ADM Responsible) | Senior Financial Management Specialist | EAWG1 |
| Edichi Brigitte Andoh Epse Mobongol | Environmental Specialist (ADM Responsible)        | Senior Environmental Specialist        | SAWE1 |
| Gisele Belem                        | Social Specialist (ADM Responsible)               | Senior Social Development Specialist   | SAWS4 |
| Abdelaziz Lagnaoui                  | Environmental Specialist                          | Lead Environmental Specialist          | SAWE1 |
| Berengere P. C. Prince              | Team Member                                       | Lead Natural Resources Management      | SAWDR |
| Claudia Cardelli                    | Team Member                                       | Counsel                                | LEGAM |
| Colombe Blandine Yabo Allabi        | Procurement Team                                  | Team Assistant                         | AWMBJ |
| Ines Melissa Emma Attoua ETTY       | Team Member                                       | Finance Officer                        | WFACS |
| Kim Elvis Meme Ametonou             | Team Member                                       | Team Assistant                         | AWMBJ |
| Leissan Augustine Akpo              | Team Member                                       | Program Assistant                      | AWMBJ |
| Mariame Bamba                       | Team Member                                       | Program Analyst                        | SAWA4 |
| Modestine Victoire Bessan           | Environmental Specialist                          | Environmental Specialist               | SAWE1 |
| Moussibaou Tassou                   | Environmental Specialist                          | Environmental Specialist               | SAWE1 |
| Mynah Nassila                       | Team Member                                       | Operations Analyst                     | AWMBJ |
| Nikolai Alexei Sviedryš Wittich     | Procurement Team                                  | Procurement                            | EAWP2 |
| Tarak Yao Souhaliho Ouattara        | Team Member                                       | Finance Officer                        | WFACS |
| Victoria Ewura Ekuwa Wood           | Team Member                                       | Counsel                                | LEGAS |



**Extended Team**

| Name | Title | Organization | Location |
|------|-------|--------------|----------|
|------|-------|--------------|----------|

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## I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

### A. Introduction and status

1. **This Project Paper seeks the approval of the Executive Directors to provide an IDA credit in the amount of US\$150 million equivalent as additional financing (AF) to the Benin Agriculture Competitiveness and Export Diversification Project (PACOFIDE- P168132).** There would be revisions to project activities, indicators and indicator targets of the Parent Project, as well as an extension of the project's closing date by 48 months from November 30, 2026, to April 30, 2030, to allow for full implementation of the proposed AF activities. This would be the third restructuring of the project. The first restructuring, approved on April 12, 2023, sought to allow for the provision of US\$50 million in subsidies to farmers to acquire fertilizers in the 2023 cropping season through the Government of Benin's (GoB) fertilizer program as a mechanism to address the country's then worsening food security situation. In the second restructuring approved on April 22, 2024, new activities to support increased cashew, pineapple, and rice production were added to the project, some activities dropped, further support provided to the GoB fertilizer program, changes made to institutional and implementation arrangements, and revisions made to indicators.

2. **The proposed additional credit will primarily be used to scale-up already ongoing activities.** Among others, it will cover the costs associated with: (i) further expansion of pineapple and cashew nut production to meet the increasing demand by agro-industries for these raw inputs; (ii) expanding irrigation development and mechanization for increased production, productivity and resilience of rice and vegetable production<sup>1</sup>; (iii) provision of more agricultural inputs (seeds and fertilizers), production technology and advisory services targeting priority food security crops (rice and vegetables); and (iv) preparatory studies for future irrigation investments envisaged by GoB. In addition to increasing productivity and production for targeted value chains, these activities would enhance food security and food system resilience and expand economic and livelihood opportunities in fragile and at-risk areas, directly supporting the efforts to prevent fragility and conflict as enunciated in the country's Prevention and Resilience Program (PREP)<sup>2</sup>.

3. **Parent Project Description.** PACOFIDE was approved on June 2, 2020, and became effective on October 22, 2020. The project development objective (PDO) is to increase productivity and market access for selected agri-food value chains in Benin. The project has five components as summarized below:

a) **Component 1 - Strengthening the enabling environment and infrastructure for agri-food value chains development (US\$26.30 million equivalent):** Under this Component, financing goes towards supporting the Government's ability to provide an enabling environment for competitiveness enhancement through building the capacity of public institutions, supporting policy reforms and administrative frameworks related to agribusiness development, and investing in critical public infrastructure for agri-food sector development. Among others, the project finances export promotion activities, strengthening of food safety, quality control and enforcement of standards, and construction of produce handling infrastructure at the country's airport.

<sup>1</sup> Besides scaling up of the investments in cash crops (pineapple and cashew nut), the parent project envisaged investments in food crops such as rice and vegetables.

<sup>2</sup> Gouvernement du Bénin (2024): Programme de Résilience et de Prévention (PREP). Cotonou, Bénin.



- b) **Component 2 - Increasing productivity, value addition, and resilience (US\$107.90 million equivalent):** Support under this Component seeks to increase the productivity and competitiveness of priority value chains (pineapple, cashew nuts, and rice). The Component finances Climate-Smart Agricultural (CSA) practices to deliver the triple wins of increased productivity, enhanced adaptation, and resilience, and reduced GHG emissions. Among others, this includes irrigation development, provision of support to the GoB's fertilizer program; increased production of cashew, pineapple, and rice; and enhancing producer's technical and managerial capacity to boost adoption of key innovations.
- c) **Component 3 - Promoting private investments and access to finance (US\$14.60 million equivalent):** Support under this Component targets the promotion of private sector investment along prioritized value chains. This primarily includes providing matching grants to producers, processors, and other value chains actors for business development, both in the upstream and downstream segments of targeted value chains.
- d) **Component 4 - Project management (US\$11.20 million equivalent):** Support under this Component goes towards funding the operation of the Project Management Unit (PMU) so it can carry out its project management and coordination functions, including fiduciary aspects, implementation of safeguards policies, project monitoring and evaluation, and reporting and communication activities.
- e) **Component 5 - Contingency Emergency Response Component (US\$0):** This Component was designed as an ex-ante financing mechanism to allow rapid access to funds to respond to an eligible crisis or emergency (including disasters and health emergencies) in Benin.

4. **Parent Project Performance.** The project is on track to achieve its PDO. To-date, overall project implementation progress is rated moderately satisfactory (MS) and progress towards achievement of the PDO is rated satisfactory. The project has thus far:(i) increased the volumes of cashew and pineapple that are commercialized for supported beneficiaries by 36 percent and 20 percent, respectively relative to the baseline and against a target of 40 percent; (ii) increased the yield of cashew from 0.4 kg to 0.47 ton/ha against a target of 0.8 ton/ha and pineapple from 60 tons/ha to 68 tons/ha against a target of 70 tons/ha; (iii) established four public-private dialogue platforms to bring together all relevant stakeholders, to address specific challenges and facilitate the coordination in the cashew, pineapple, and vegetable value chains; (iv) supported the updating of two trade facilitation rules and regulations in line with international standards; (v) supported the construction of cold storage logistics centers for perishable agricultural exports at the Cotonou airport, including a transitory facility, which is completed and a final facility expected to be completed in August 2024; (vi) rehabilitated 83,811 ha of old cashew plantations and established 17,871 ha of such new plantations; (vii) rehabilitated 1,038 ha of pineapple plantations; and (viii) provided fertilizers to 299,464 beneficiaries in support of increased production in the 2023 cropping season. Work is underway to provide an estimated 200,000 farmers with fertilizers worth US\$30 million for the 2024 cropping season. Direct project beneficiaries reached are currently 334,976. Disbursement stands at US\$111.8 million (70.4 percent of the original credit). The project's financial management (FM), procurement, and safeguards compliance are all rated MS, and the project has fully complied with all legal covenants.

## B. Rationale for additional financing

5. **Despite the relatively high recent economic growth, Benin remains one of the poorest countries in the world.** A large share (37 percent) of the country's 13.7 million population still lives in poverty, lacks access to basic social services and depends on subsistence agriculture, which itself is increasingly



threatened by climate change, further endangering already fragile livelihoods. Although unemployment is estimated at about 1.4 percent, this masks the high levels of underemployment (72 percent) which lies at the core of economic fragility in the country.

6. **To compound this fragile situation, now, significant parts of the country, especially in the northern and border regions face a looming specter of instability, owing to a possible contagion effect of the spiraling insecurity in the Sahel.** This external threat to stability, combined with internal pressures, such as intercommunal conflicts and tensions between farmers and herders, high levels of youth unemployment and limited opportunities for economic progress, perceptions of economic exclusion among certain groups and the threats linked to climate change has elevated Benin's vulnerability, nudging the country closer to the edge of a precipice of fragility, conflict and violence with potential to roll back progress made in development over the last couple of decades. Proactively mitigating and reducing this vulnerability through an expansion of inclusive economic and livelihood opportunities including in agriculture<sup>3</sup> – the mainstay of the economy - will guarantee a more stable and prosperous Benin with greater capacity to withstand shocks.

7. **Additionally, food insecurity continues to be a pervasive and persistent challenge for Benin.** A food security and vulnerability analysis<sup>4</sup> conducted by the World Food Program (WFP) shows that the share of Benin's population affected by food insecurity rose from 10 percent in 2017 to 26 percent in 2022, with 2 percent of the population suffering from severe food insecurity. Demographic and health surveys reveal alarmingly high prevalence of stunting, wasting, and underweight in children under five years<sup>5</sup>. Now, even when food price inflation has moderated relative to last year, the Food Crisis Prevention Network still projects that because of floods and droughts, 0.3 million people are expected to face Integrated Food Security Phase Classification (IPC) Phase 3<sup>6</sup> (crisis) and an additional 1.3 million people are expected to face IPC Phase 2 (stressed) conditions in the June to August 2024 period<sup>7</sup>. As documented in a significant body of literature<sup>8</sup>, and observed in the vicious feedback loop between conflict and hunger currently playing out in many countries around the world, food insecurity is a fragility threat multiplier with the potential to undermine a country's stability and resilience. A stable Benin therefore also hinges on the ability of the state to provide food security for its citizens.

8. **The AF is proposed in the spirit of supporting Benin to proactively avoid descending into fragility by addressing two potential risk factors - limited economic opportunities as well as food insecurity for vulnerable segments of the population.** The urgency of creating more inclusive economic and livelihood opportunities and addressing food insecurity – key among the most hierarchically important potential drivers of fragility in Benin - as preventive mechanisms to contain and prevent further vulnerability to fragility, conflict and violence in Benin provide a justification for the proposed additional financing. The

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<sup>3</sup> Including in the on-farm and off-farm segments of agriculture value chains.

<sup>4</sup> *Programme Alimentaire Mondial (2022). Analyse Globale de la Vulnérabilité, de la Sécurité Alimentaire et de la Nutrition et Systèmes Alimentaires (AGVSAN-SA) au Bénin.*

<sup>5</sup> One-third of all children of 6 to 59 months suffer from stunting or chronic malnutrition.

<sup>6</sup> Some households are not consuming enough food and have high levels of malnutrition, while others are adopting irreversible coping strategies – such as selling assets that support their livelihoods – to support a limited diet.

<sup>7</sup> *Comité Inter-états de Lutte contre la Sécheresse au Sahel -CILSS (2024) : Cadre Harmonisé d'identification des zones à risque et d'estimation des populations vulnérables au Sahel et en Afrique de l'Ouest (CH3.0)*

<sup>8</sup> See Collier, P. 2007. "Post-Conflict Recovery: How Should Policies be Distinctive?" Centre for the Study of African Economies, Oxford University; Brinkman, H. J. and Hendrix, C. 2010. "Food Insecurity and Conflict: Applying the World Development Report (WDR) Framework." Background Paper for the WDR 2011. World Bank, Washington, D.C.; and World Food Program USA, 2017. *Winning the Peace: Hunger and Instability.* World Food Program USA. Washington, D.C.





AF will support Pillar 2 of the GoB's Prevention and Resilience Program<sup>9</sup> the objective of which is to address the structural causes of fragility in Benin. Specifically, the AF will be used to scale up the parent project's support to: (i) pineapple and cashew nut production, which is expected to generate more inclusive economic opportunities in the upstream and downstream segments of these value chains; (ii) irrigation development for improved food production, productivity and resilience, thereby tackling the country's food insecurity challenges; (iii) provision of agricultural inputs (e.g., seeds and fertilizers), production technology and advisory services targeting the increased production of priority food security crops; and (iv) increasing agriculture exports to contribute to more economic and livelihood opportunities through strengthening of quality standards as well as export promotion. In addition, the AF will finance the strengthening of the seed sector - expected to contribute to food and nutrition security through productivity growth and improved resilience - and preparatory studies for future irrigation development programs. The support will focus on and prioritize vulnerable and at-risk communities in the northern parts of the country. The AF complements support provided through other activities and initiatives towards helping Benin prevent falling into a fragility trap. Among others, these include the Gulf of Guinea Social Cohesion (COSO) project (P175043) and the Development Policy Finance (DPF- P178042), which offers a platform for substantive dialogue with the government on key reforms that would provide inclusive economic opportunities to the population in the north.

**9. The AF is fully consistent with the World Bank Group's (WBG) Country Partnership Framework (CPF Report No. 123031-BJ) for Benin (FY19-FY23).** The AF will support increased productivity in priority value chains and aligns with Objective 1 – “Fostering agricultural productivity” under Focus Area 1 – “Structural Transformation for Competitiveness and Productivity”. Besides increasing productivity, AF support to irrigation development is also provided with the objective of helping producers adapt to the increasing frequency of droughts in Benin because of climate change and is aligned with Objective 8 – “Reducing vulnerability to climate-related threats” under Focus Area 3 – “Increasing Resilience and Reducing Climate-Related Vulnerability”. By contributing to addressing the increasing risk of fragility, conflict, and violence through increased and more inclusive economic and livelihood opportunities and improved food security, the AF is aligned with the WBG fragility and violence strategy and the PRA strategy of ensuring equitable and sustainable access to public services and natural resources to strengthen social cohesion. The AF also dovetails with two of the six programmatic recommendations of the WBG Benin Resilience and Risk Assessment (RRA), i.e., boosting economic inclusion and employment and support for increased agricultural productivity in the north and other at-risks areas. Furthermore, the AF directly supports the GoB's strategy for preventing and managing the risks of conflict and violence – specifically the intervention areas focusing on strengthening economic development and creating more jobs in at-risk regions and strengthening community resilience.

**10. The AF is consistent with Benin's Nationally Determined Contribution (NDC)<sup>10</sup> and the National Climate Change Adaptation Plan (NAP)<sup>11</sup>.** While, the NDC emphasizes the need to improve the performance of Benin's agriculture to enable the sector to fulfill its role of ensuring sustainable food and nutrition security for all Beninese by 2025, as well as contribute to the achievement of Sustainable Development Goals 1, 2, 12 and 13, the NAP stresses the urgency of reducing vulnerability to the impacts of climate change by strengthening the adaptive capacity and resilience of local communities and their

<sup>9</sup> Pillar 1 - Strengthening social cohesion and socio-economic development at the grassroots level; Pillar 2: Food security and livelihoods; and Pillar 3 - Land reform.

<sup>10</sup> [https://unfccc.int/sites/default/files/NDC/2022-06/CDN\\_ACTUALISEE\\_BENIN2021.pdf](https://unfccc.int/sites/default/files/NDC/2022-06/CDN_ACTUALISEE_BENIN2021.pdf)

<sup>11</sup> [https://unfccc.int/sites/default/files/resource/PNA\\_BENIN\\_2022\\_0.pdf](https://unfccc.int/sites/default/files/resource/PNA_BENIN_2022_0.pdf)



livelihoods by 2030; and facilitating the integration of climate change adaptation into relevant policies, programs, and activities in a coherent manner

## II. DESCRIPTION OF ADDITIONAL FINANCING

11. **Scaling up livelihood and value chain support provided under the Parent Project with a focus on vulnerable communities.** The AF takes advantage of the parent project focus on promoting increased production, commercialization, and exports in the agri-food sector not only as an entry point for creating more and inclusive direct economic opportunities with the upstream and downstream segments of targeted value chains but also as having the potential to generate other indirect economic opportunities through multiplier effects on local economies. The overarching hypothesis is that expanding the scale of support will, *ceteris paribus*, generate more economic and livelihood opportunities within and outside the targeted value chains as well as support a larger number of vulnerable persons to secure their food security. In this context, the AF mainly entails scaling up of already ongoing activities but with greater focus on vulnerable communities. The paragraphs below summarize proposed changes to the parent project as part of the AF.

12. **Changes to activities and costs:** Under Component 1 (Strengthening the environment and infrastructure for agri-food value chains development), the proposal is to provide US\$1.5 million in AF resources to support a new activity - implementation of the National Seed Sector Strategy. As part of this new activity, the project will finance: (i) capacity strengthening of the new national seed company to enable it oversee and regulate the seed sector; (ii) improvements to seed demand estimation to inform government and private sector decisions on investment; (iii) promoting and strengthening private sector participation in the provision of seeds; and (iv) restructuring of the seed research, production, quality control, certification, and distribution systems. This support is expected to lead to improved access by farmers to improved and climate resilient seed for increased production and resilience to climate change. Another US\$0.5 million in AF resources is proposed to go towards supporting the implementation of the new National Agricultural Investment and Food and Nutritional Security Plan (PNIASAN), the preparation of which was partly financed through parent project support. Among others, the project will finance dissemination of the plan and enactment of reforms proposed to improve the governance of the agricultural sector under the plan (e.g., coordination of the sector, management of public procurement, promotion of integrity and fight against corruption).

13. The other change to Component 1 relates to increasing resource allocation to specific activities with the intention of scaling up project impact. This includes provision of: (i) an additional US\$1.5 million to APIEx to scale up its export promotion activities to further expand export market opportunities for additional volumes of cashew and pineapple products that are expected as a result of increased project support to these value chains; and (ii) US\$1 million to Benin Agency for Food Safety (*Agence Béninoise pour la Sécurité Sanitaire des Aliments*, ABSSA) to augment its capacity for quality control by setting up more testing facilities to take care of expanding industrial zones. All the above proposed changes under Component 1 relate to subcomponent 1.1 (enhancement of relevant public institutions and policy framework for export promotion).

14. Several new activities in support of increased pineapple, rice, and vegetables (tomato, onion, and chili) production are added to subcomponent 2.1 (enhancing the availability and access to quality inputs) under Component 2 (Increasing productivity, value addition, and resilience) of the project. In the specific case of the pineapple value chain, the proposal is to provide US\$3.5 million towards the construction of



an industrial in vitro plantlet production unit. This unit, with an estimated capacity to produce 13.5 million plantlets per year will help resolve availability of clean planting material, a binding constraint to rapidly expanding pineapple production in Benin. Additionally, US\$7 million would be provided towards demonstrating and supporting adoption of best practices for pineapple production and another US\$0.7 million towards supporting weed management, which typically accounts for a large share of production costs. In the case of rice and vegetables, US\$10 million is provided in support to mechanization - as a mechanism to increase productivity and production, while reducing drudgery, this also includes support to studies and reforms on agricultural mechanization and institutional support to the Agricultural Mechanization Company (*Société Nationale de Mécanisation Agricole*, SONAMA); and US\$4 million is provided to increase farmer access to high-yielding and resilient seeds to support increased production for improved food and nutrition security. The seeds, to be provided at a discount rate, will be procured by the project, and distributed to eligible beneficiary's farmers through the territorial agencies for agricultural development.

15. Additionally, a new activity on soil health and fertility is proposed to be added to subcomponent 2.2 (Improving farmers' access to knowledge for CSA, quality enhancement and value addition). This activity, estimated to cost US\$3 million, includes mapping of soils for better targeting of fertilizer application, the establishment of agricultural service centers meant to serve as sources of knowledge and information on various aspects of agriculture and agribusiness, and the creation of digital farming schools to promote youth and women entrepreneurship in agriculture. This support is in line with the memorandum of understanding signed between the GoB and OCP<sup>12</sup> on the implementation of the Fertilizers and Soil-Health Roadmap for West Africa and the Sahel by the Economic Community of West African States (ECOWAS) countries. Also, a new activity to support preparatory studies for future irrigation development programs on national river basins<sup>13</sup>, estimated at US\$4 million is added to subcomponent 2.3 (Support for irrigation development). These activities would contribute to climate change adaptation through buffering crop production against drought through irrigation.

16. Other changes to Component 2 target already ongoing activities and entail the provision of additional resources to scale up these activities. This includes the provision of an additional US\$3.1 million towards the rehabilitation of 34,000 ha of cashew orchards, US\$5.2 million for the establishment of 7,000 ha of new cashew orchards, including the provision of specific productivity-enhancing inputs, and US\$20 million in further support to the government fertilizer program for the 2025/2026 cropping season - all under subcomponent 2.1; US\$1 million in support for agricultural advisory services under subcomponent 2.2; and US\$82 million to support the development of irrigation in Malanville and Karimama targeting rice and vegetable production under subcomponent 2.3, including support for technical studies, environmental and social (E&S) studies, and institutional support to the Irrigation Development Company (*Société Béninoise des Aménagements Agricoles*, SOBAA). The proposed level of support to the fertilizer program for the 2025/2026 is congruent with the government strategy of gradually reducing and finally phasing out the provision of fertilizer subsidies to farmers by 2026<sup>14</sup>.

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<sup>12</sup> Office Chérifien des Phosphates.

<sup>13</sup> These preparatory studies will not be undertaken for irrigation programs related to international waterways as defined by the World Bank under OP7.50.

<sup>14</sup> In 2023, the Bank provided US\$50 million to the program which was reduced to US\$30 million in 2024.



17. Finally, the cost of Component (Project Management) is increased by an additional US\$4 million to offset the costs associated with implementing AF activities. Table 1 below summarizes the revised project costs by component.

**Table 1. Revised project costs (US\$ million)**

| Components/subcomponents  | Current Allocation | With AF       |
|---|--------------------|---------------|
| <b>Strengthening the enabling environment and infrastructure for agri-food value chains development</b>                     | 26.30              | 30.80         |
| <i>SC 1.1. Enhancement of relevant public institutions and policy framework for export promotion</i>                        | 14.30              | 18.80         |
| <i>SC 1.2. Development of critical infrastructure and market information systems</i>  | 12.00              | 12.00         |
| <b>Increasing productivity, value addition, and resilience</b>  | 107.90             | 249.40        |
| <i>SC2.1. Enhancing the availability and access to quality inputs</i>   | 93.00              | 144.50        |
| <i>SC2.2. Improving farmers’ access to knowledge for climate-smart agriculture, quality enhancement, and value addition</i> | 0.90               | 4.90          |
| <i>SC2.3. Support for irrigation development</i>  | 14.00              | 100.00        |
| <b>Promoting private investments and access to finance</b>  | 14.60              | 14.60         |
| <b>Project management</b>   | 11.20              | 15.20         |
| <b>Contingency emergency response component</b>   | 0.00               | 0.00          |
| <b>Total</b>  | <b>160.00</b>      | <b>310.00</b> |

18. **Under the AF, special attention would be accorded to building the capacity of implementing entities, with a view to ensure the long-term sustainability of investments and outcomes.** Among others, Benin’s Food Safety Agency (ABSSA) will be strengthened to perform product testing to ensure quality standards, quality control and certification of export products; the National Institute for Agricultural Research (*Institut National des Recherches Agricoles du Bénin*, INRAB) will be strengthened on adaptative research on improved technologies and pilot trials and on production of foundation seeds; the Seed and Plantlet Development Company (*Société de Développement des Plants et Semences*, SoDeSeP) will be strengthened in terms of training, equipment support and staff complement to enable it to promote the private sector participation in the seed sector development, establish a network of seed producers, improve the seed demand and distribution systems; the Irrigation Development Company (SoBAA) and Agricultural Mechanization Company (SONAMA) will be strengthened in terms of staff training, management and operational procedures, and equipment support; and the staff of Territorial Agency for Agricultural Development (*Agence Territoriale de Développement Agricole*, ATDA), Crops Service Directorate (*Direction de la Production Végétale*, DPV), and Rural Engineering Directorate (*Direction du Génie Rural*, DGR) will be trained on monitoring and evaluation, seed quality control and certification, and provided with relevant equipment to perform their roles. Farmers and producer organizations will be provided with technical assistance and training on good agricultural practices for crop production, quality management, post-harvest handling, and safety standards.

19. **Changes to indicators and indicator targets:** Current PDO level indicators remain unchanged as they are still relevant to assessing attainment of the PDO. However, to enable reporting on the new value chains (rice, tomatoes, onion, and chili), to be supported under the AF, the proposal is to add these value chains to the “breakdown” list under PDO indicator 1 (increase in volume of agri-food products commercialized by project supported beneficiaries in targeted value chains) and PDO indicator 2 (increase in yield of selected value chains). In addition, the targets for PDO indicator 1 have been increased for the

pineapple and cashew value chains to reflect the increased investment in these value chains as part of the AF. Furthermore, two new PDO level indicators - number of people with strengthened food and nutrition security and number of people with enhanced resilience to climate risks - are proposed in line with the *WBG's new scorecard and Corporate Results Indicators (CRI)*. Other changes to indicators and indicator targets are presented in Table 2 below.

**Table 2 Changes indicators and indicator targets**

| Indicator   |  | Current Target | Revised Target | Remarks        |
|---|--|----------------|----------------|----------------|
| <b>PDO level</b>  |  |                |                |                |
| Increase in volume of agri-food products commercialized by project supported beneficiaries in targeted value chains (%) | <i>Cashew</i>  | 128            | 160.00         | Revised target |
|   | <i>Pineapple</i>   | 104            | 124.00         | Revised target |
|   | <i>Rice</i>  | -              | 80.00          | New            |
| Increase in yield of selected value chains (t/ha)   | <i>Cashew</i>  | 0.80           | -              | No change      |
|   | <i>Pineapple</i>   | 75.00          | -              | No change      |
|   | <i>Irrigated rice</i>  | n/a            | 7.00           | New            |
|   | <i>Tomato</i>  | n/a            | 8.00           | New            |
|   | <i>Chili</i>   | n/a            | 6.00           | New            |
|   | <i>Onion</i>   | n/a            | 15.00          | New            |
| People with strengthened food and nutrition security  |  | n/a            | 100,000        | New            |
| People with enhanced resilience to climatic risks   |  | n/a            | 100,000        | New            |
| <b>Intermediate results level</b>   |  |                |                |                |
| Total number of beneficiaries   |  | 620,000        | 920,000        | Revised target |
|   | <i>Male</i>  | 434,000        | 644,000        | Revised target |
|   | <i>Female</i>  | 186,000        | 276,000        | Revised target |
| Number farmers adopting improved agricultural technology  |  | 40,000         | 73,000         | Revised target |
|   | <i>Male</i>  | 28,000         | 51,000         | Revised target |
|   | <i>Female</i>  | 12,000         | 22,000         | Revised target |
| Number of beneficiaries adopting climate smart technologies and practices   |  | 72,000         | 132,000        | Revised target |
|   | <i>Male</i>  | 50,400         | 88,000         | Revised target |
|   | <i>Female</i>  | 21,600         | 44,000         | Revised target |
| Producers receiving project-supported fertilizers   |  | 500,000        | 673,000        | Revised target |
| Total crop area established with project support (ha)   |  | 20,318         | 28,000         | Revised target |
| Total crop area rehabilitated with project support (ha)   |  | 141,387        | 175,387        | Revised target |
| Area provided with new/improved irrigation or drainage services (ha)  |  | n/a            | 3,400          | New            |
| Volume of private investments facilitated in targeted value chains through project support (US\$) of which:             |  | 62,000,000     | 100,000,000    | Revised target |
|   | <i>private investments mobilized PCM (US\$)</i>                        | 13,500,000     | 16,500,000     | New            |
|   | <i>private investments enabled PCE (US\$): baseline US\$30,000,000</i> | 48,500,000     | 83,500,000     | New            |

20. **Changes to the closing date:** The closing date of the original project is November 30, 2026. The proposal is to extend this by an additional four years to April 30, 2030, to allow the completion of newly



proposed activities under the AF, especially irrigation development which as demonstrated in other projects, requires adequate amounts of time to deliver. The new proposed closing date would also apply to the original credit.

21. **Geographic focus and beneficiaries:** While the parent project has a nationwide scope, the AF will focus on the areas at high risk of fragility, conflict, and violence in the lagging northern parts of the country, including the departments of Alibori and Borgou. Rural households engaged in targeted value chains are the primary project beneficiaries, including smallholder farmers, small-scale processors, and traders. A particular focus would be on youth, women, and farmers in at-risk and vulnerable communities of the north. The AF is expected to benefit an additional 300,000 people, thereby increasing the total number of beneficiary households by 48 percent, from 620,000 to 920,000. These additional beneficiaries included 100,000 people that will have their food security and nutrition improved and their resilience to climatic risks strengthened as a result of project support to access to improved seeds and irrigated farmlands for the production of rice and vegetables. Indirect beneficiaries of the AF include all other value chain stakeholders, communities, and institutions who will benefit from project spillover effects at both the national and local levels (largely from capacity building activities and infrastructure improvements and developments).

### III. KEY RISKS

22. **The overall risk rating of the proposed AF is assessed as moderate.** The main risks, along with mitigation strategies, are summarized below.

23. **Political and governance risk is considered moderate.** Political tensions in Benin eased after the participation of the opposition on the January 8, 2023 legislative elections. Some progress has been made on governance, but there are still sustained efforts needed to overcome persistent weaknesses and improve fiscal governance. Perception of corruption has declined but there are still areas vulnerable to corruption. The design of the project's fiduciary systems is meant to partly deal with some of the governance challenges that could affect achievement of the PDO.

24. **Macroeconomic risk is moderate.** Despite multiple shocks—including the closure of the border with Niger, policy changes in Nigeria that led to heightened inflationary pressures, and climate shocks—economic activity remained resilient, growing by 6.4 percent. Inflation doubled from 1.4 percent in 2022 to 2.8 percent in 2023 but it remained contained. The latest WB/IMF joint Debt Sustainability Analysis (DSA) from December 2023 suggests that Benin remains at moderate risk of external and overall debt distress, and the space to absorb shocks is limited. A further escalation in inflation would reduce the quantum of project benefits thus undermining achievement of the PDO.

25. **Institutional capacity for implementation and sustainability risk is assessed as moderate.** Proposed project implementing entities are constrained both in terms of infrastructural and human resource capacity. As part of the AF, resources will be provided to strengthen the capacity of key implementing entities (ATDA, DPV, DGR, SOBAA, and SONAMA, etc.) including through TA to execute the activities under their mandate.

26. **Fiduciary risk is substantial.** This is mainly attributed to potential delays in the procurement processes, resulting from poor quality submissions, and internal control issues as observed under the parent project, such as insufficient documentation of payments made to implementing partners and insufficient reporting. As a mitigation measure, the capacity of the procurement specialists and auditing



arrangements have been strengthened to control for those issues so that they do not impact the AF activities and ultimately achievement of the PDO.

27. **Environmental and social (E&S) risk is substantial.** The project will intervene in areas that have suffered from severe climate events, exclusion of the poor and vulnerable from project benefits, elite capture of development interventions, and terrorist attacks. There also are substantial risks of Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH). Mitigation: All new activities will build directly on the E&S standards and structures put in place under the parent project. The parent project's Environmental and Social Commitment Plan (ESCP), Stakeholder Engagement Plan (SEP) have been updated and disclosed on May 14, 2024. The Environmental and Social Management Framework (ESMF), Pest Management Plan (PMP), Resettlement Policy Framework (RPF), and Labor Management Procedures (LMP), will be updated to manage the E&S risks of the proposed AF activities, no later than one month after effectiveness. A Security Management Plan (SMP) also will be developed to manage risks in the northern regions of country.

28. **Stakeholder risk is moderate.** The challenges in Northern Benin that the project seeks to address have elicited interest from several stakeholders, including development partners, and the NGO community. Were other donors and partners to engage in this area, there will arise coordination challenges and the need for harmonized approaches if the project were to attain its PDO. A strong communication strategy along with stakeholder consultation and participation will be maintained throughout the project's lifespan to create awareness, elicit support, and ensure good working relationships among the various stakeholders. Part of the required coordination mechanisms are provided for in the PREP. The SEP was updated and disclosed as a part of mitigation stakeholder risk.

**Other risks:**

29. **Climate and disaster risks.** The Climate and Disaster-Risk Screening report shows that the project is moderately exposed to drought, extreme precipitation, flooding, and extreme temperatures. These climate hazards are likely to have moderate impacts on the project's crop interventions, and vulnerable groups, such as women, migrants, and displaced populations, are likely to be more seriously affected. Mitigation: To minimize climate and disaster risks in project areas and in agriculture more generally, the project is designed to facilitate more diversified and resilient agricultural production systems and value chains. The project will also mitigate these risks by: (i) building the capacity of implementing agencies at the county and district levels to identify and proactively address climate vulnerabilities; (ii) building capacity at the community level to address climate vulnerabilities; and (iii) identifying and investing in climate-resilience activities (productive investments).

30. **Security risk is moderate.** Some potential project intervention areas, especially the Northern regions are characterized by elevated security risks. Persistent insecurity could affect implementation and monitoring of project activities. As a mitigation measure, the project will prepare the security risks assessment and, thereafter, update, adopt, and implement the Security Management Plan (SMP), for the project, to manage the risks of recurring security incidents and threats under the AF and taking into account the context of the newly targeted communities.

31.

## IV. APPRAISAL SUMMARY

### A. Technical, Economic, and Financial Analysis



32. **The project's main quantifiable benefits will be derived from higher, stable income and assets of producers and processors.** In particular, through an integrated approach to value chain development, project activities are expected to generate three main benefit streams: (i) production benefits at farmers' level, such as improved access to input (including mechanization), increased crop production and productivity, and enhanced resilience to weather variability and climate change risks; (ii) benefits at the level of farmers' organizations and individual entrepreneurs' operating downstream to the value-chain, arising from improved processing, storage and marketing of products along with capacity development (quality standards of products); and (iii) environmental co-benefits, such as natural resource protection and reduced greenhouse gas (GHG) emissions through the adoption of climate-smart technologies.

33. **The AF will improve food and nutrition security and foster the resilience of the country's food system.** Increased production of rice and vegetables, improved access to markets as well as increased incomes and assets resulting from the project interventions will generate additional social benefits in the form of improved food security and nutrition, enhanced social and economic inclusion of vulnerable and at-risk groups, youth and women, and stronger resilience in fragile and conflict-affected areas of the country. The project is also expected to create other benefits (e.g., institutional strengthening) which cannot be quantified at this stage due to the difficulty of attributing them a monetary value.

34. **The cost-benefit analysis shows that all the financial models of the activities supported by the AF are profitable investments.** The production activities supported by the project generate positive additional benefits, ranging from US\$369/ha/year for cashew produced in a rehabilitated plantation to US\$5,269/ha/year for pineapple produced on a model farm. Similarly, processing and marketing investments, purchasing raw fresh product from the farms supported by the project, can generate net incremental incomes ranging from about US\$490,055 per year per enterprise for fresh pineapple export to US\$678,226 per year per enterprise for export of cashew nuts.

35. **The AF is economically justified.** The AF interventions generate a net present value (NPV) of about US\$296.39 million (at 6 percent discount rate) and an economic internal rate of return (EIRR) of 23.76 percent over a 20-year period, not accounting for the environmental externalities. These results are satisfying given that several other project benefits could not be quantified due to the difficulty of assigning a monetary value to them. In addition, the results are robust when testing several sensitivity scenarios, including delays in implementation, cost overruns and reductions in benefits (see Annex 3 for details).

## B. Greenhouse Gas (GHG) analysis

36. **The valuation of environmental externalities further enhances the economic justification of the AF.** The project is estimated to reduce net GHG emissions production by 175,409 tons of CO<sub>2</sub>e per year. As such, when evaluating these environmental benefits based on of the social price of carbon, the overall economic results of the project increase to NPVs of US\$420.64 million (and an EIRR of 32.17 percent), and US\$544.54 million (and an EIRR of 42.07 percent), based on the low and high range carbon pricing, respectively (see Annex 3).

## C. Paris Alignment





37. **The project is aligned with the Paris Agreement on both mitigation and adaptation.** The AF is aligned with the Benin Country Climate Development Report (CCDR)<sup>15</sup> on climate resilience and reducing GHG emissions. The CCDR highlights the dependency of Benin’s economy on agriculture, making its development pathway highly vulnerable to climate change without appropriate adaptation. The main climate and disaster risks likely to affect the project’s physical investments in storage and processing facilities, agricultural lands, and irrigation infrastructure, are extreme temperatures, strong winds, droughts, and extreme precipitation and flooding.

38. **On adaptation, the project design addresses climate risks such as droughts and extreme temperatures through irrigation development, improved climate-resilient seeds, promotion of CSA practices among beneficiaries, and policy reforms.** New infrastructure will be designed and constructed using climate-resilient and energy-efficient design standards to enhance resilience to climate change impacts. This will not only reduce the infrastructure’s vulnerability to extreme weather events, but it will also reduce food loss and waste, increase farmers’ incomes, and reduce GHG emissions. On mitigation, the project will invest in agricultural practices on soil health and soil fertility management that optimize fertilizer use and reduce non-CO2 GHG emissions. Investments in research on hydroelectric generation and irrigation development, rehabilitation and establishment of cashew trees, mechanized production, and capacity building on climate-smart agriculture to better understand climate risks and mitigation options will also contribute to climate change mitigation. The project activities are considered Universally Aligned under the categories of “Crop production using CSA approaches”, “Expansion and rehabilitation of water supply systems”, “Emergency food security response”, “Agri-food value chain”, and “Education and capacity building” In summary, the operation is Paris Aligned on both adaptation and mitigation as the activities adequately reduce the physical climate risks to the project outcomes and the operation is not at a material risk of having a negative impact on the country’s low-GHG-emissions development pathways.

#### D. Maximizing Finance for Development (MFD)

39. **The project recognizes that improving food security and preventing food crises can be best achieved through collaboration between the public and the private sectors.** Hence, the project will apply the MFD principles to attract both domestic and international private investments in the targeted food value chains. For example, efforts to remove binding constraints to private solutions, transaction costs and risks will help increase private sector activity and investments in the targeted value chains in ways that support inclusive business models and improve linkages among smallholders, SMEs, and larger firms. The AF will utilize the MFD approach to identify where (and how) public support and policies could crowd in private capital, including capitalizing on the investment plans produced for the targeted value chains and the multi-sector platforms created under the parent project to enhance direct collaborations and partnerships based on MFD.

40. **In addition to the US\$18.5 million mobilized under the parent project, the AF will enable at least US\$35 million in terms of Private Capital Enabled (PCE)** by: (i) supporting the design and implementation of adequate policy reforms in the seed sector under Component 1, subcomponent 1.1, including restructuring of the seed research, production, quality control, certification, and distribution systems, improvements to seed demand estimation to promote and strengthen private sector participation in the provision of seeds; (ii) scaling up export promotion activities under Component 1, subcomponent 1.1 through support to APIEX to further expand export market opportunities (through supporting actors

<sup>15</sup> <https://www.worldbank.org/en/country/benin/publication/benin-country-climate-and-development-report>



participation to trade fairs, market inspections, certification, and establishment of an information platform on the export market, among others) and attract investors in the cashew and pineapple value chains; (iii) augmenting the capacity of ABSSA for quality control by setting up more testing facilities under Component 1, subcomponent 1.1, to take care of expanding industrial zones and whereby enabling private investments; and (iv) supporting the irrigation development company (SOBAA) in defining the mandates and accountabilities for the operation, maintenance, and management of irrigation infrastructures, including the 3,000 ha of farmlands to be developed under Component 2, subcomponent 2.3, so as to attract private investments in irrigated agriculture in the country. The PCE is expected within three years of project closure, by April 30, 2033 and is captured through the Results Indicators - Volume of private investments mobilized in targeted value chains.

**41. Furthermore, the AF will leverage at least US\$3 million in terms of Private Capital Mobilization (PCM) to the agriculture sector.** This investment will be primarily in the form of beneficiary contributions in scaled up activities, including the additional rehabilitation of 34,000 ha of aging cashew plantations and the establishment of 7,000 ha of new cashew plantations under Component 2, subcomponent 2.1. The US\$3 million mobilized under the AF will complement the beneficiary contributions of US\$13.5 million mobilized under the parent project for the rehabilitation of cashew plantations and the matching grants scheme. Additionally, the AF will support targeted capacity-building and agricultural advisory services under Component 2, subcomponent 2.2, to enhance the performance of value chain actors, including public and private sector institutions. The outcomes of the PCE and PCM will be reported in the Implementation Completion and Results Report Review.

#### E. Gender

**42.** The AF will continue with the gender target strategy of the parent project and will address the gender gaps identified by relevant gender-in-agriculture studies in Benin, including lower access to agricultural assets and lower participation in decision-making. Women working in agriculture face many constraints, such as limited access to land, finance, markets, livelihood activities, and information, and legal and cultural restrictions on economic independence. Female-headed households are often excluded from decision-making on agricultural production, marketing, or access to relevant public and private services. The project will address these gender gaps by (i) facilitating women's access to improved agricultural inputs; and (ii) targeting women for capacity-building activities for improved production, processing, and commercialization. The AF would specifically support women-led or women-focused groups and women-led firms and smallholder farm households by setting eligibility criteria that favor women participation, such as reducing the acreage required to benefit from the AF support for the rehabilitation of aging cashew plantations and establishment of new plantations, exempting women from presenting land titles before being enrolled in relevant AF activities, lowering women contribution in subsidized seed and agricultural machinery schemes, allocating quotas to women in the attribution of irrigated plots. All these criteria will be detailed in the updated project implementation manual no later than 90 days after effectiveness. Gender-disaggregated indicators to assess the extent to which identified gender gaps are closed as a result of the AF efforts are included in the Results Framework.

#### F. Financial Management

**43. The AF activities will be implemented by the existing PMU.** The AF will use the financial management's arrangements in place for the parent project. The parent project's FM performance is rated moderately satisfactory, and the financial residual risk is rated substantial due to insufficient documentation of payments made to implementing partners and insufficient reporting. Auditing



arrangements have been strengthened, so has the capacity of implementing partners to mitigate this risk. The parent project Designated Accounts will be used for the AF. The AF’s expenses will be reported in the same IFR as the parent project. The financial statements of the parent project will include the financial information of the AF, with no need for a separate audit. The accounting software will be updated to include the AF activities.

44. **The overall FM’s residual risk rating for the project is assessed as substantial.** This considers the country context, the residual risk of the parent project, and capacity strengthening actions already undertaken.

**G. Procurement**

45. **The Borrower will carry out procurement in accordance with the World Bank’s “Procurement Regulations for IPF Borrowers”** (Procurement Regulations) dated July 2016 and revised in November 2017, August 2018, November 2020, and September 2023 under the “New Procurement Framework (NPF), and the “Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants”, dated July 1, 2016, and other provisions stipulated in the Financing Agreements. Procurement activities shall be carried out by the PMU. The PMU as well as bidders and service providers (such as suppliers, contractors, and consultants) will observe the highest standards of ethics during the procurement and execution of contracts financed under the project in accordance with paragraph 3.32 and Annex IV of the Procurement Regulations.

46. **The current procurement risk of the project is rated moderate.** The Borrower has updated the Project Procurement Strategy for Development (PPSD), which describes how procurement activities under the AF will support project operations for the achievement of project development objectives and deliver value for money. The procurement strategy is linked to the project implementation strategy and ensure proper sequencing of activities to be supported under the AF. It considers institutional arrangements for procurement, roles and responsibilities, thresholds, procurement methods, prior review, and the requirements for carrying out procurement. It also includes a detailed assessment and description of state government capacity for carrying out procurement and managing contract implementation, within an acceptable governance structure and accountability framework. Other issues considered include the behaviors, trends, and capabilities of the market to respond to the procurement plan.

**H. Legal Operational Policies**

|   | Triggered? |
|---|------------|
| Projects on International Waterways OP 7.50 | Yes        |
| Projects in Disputed Areas OP 7.60          | No         |

47. **The Project triggers OP 7.50 related to Projects on International Waterways.** This policy is triggered because the project will support small- and large-scale irrigation schemes along the Niger River, which is an international waterway. The project will rehabilitate or develop up to 3,000 ha of irrigated farmlands that may adversely affect the quantity and quality of water flows to other riparians. The GoB duly notified the Niger Basin Authority (NBA) on May 2, 2024. NBA provided a no objection to the proposed investments. The OP 7.50 memo was approved by the World Bank Management on May 13,



2024. The World Bank team will work closely with the GoB and the Niger basin authorities to ensure full compliance with the policy.

## I. Environmental and Social Impacts

48. **The potential E&S risks and impacts are expected to remain substantial**, the same as the parent project, including issues related to occupational health and safety, potential increase in use of agrochemicals, misuse of fertilizers and pesticides causing water pollution, soil erosion, waste management, disruption of habitats and ecosystem services, as well as potential water and energy misuse. In addition, supported AF activities will require land for the establishment of new plantations, irrigation development activities, storage facilities and the construction of an industrial in vitro pineapple plantlet production unit, which may lead to permanent or temporary land acquisition. The works will also require some workforce; while this may positively impact local employment opportunities, it may also cause influx with the associated risks for the surrounding communities related to pressure on local resources and competition for jobs, communicable diseases, and Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) risks. Potential of child labor on worksites and increased security risks are also anticipated risks.

49. Although the hydro-agricultural developments (1563 ha) envisaged under AF do not involve an associated facility, the construction of the flood barrier financed by the African Development Bank (AfDB) will require the GoB to establish a framework for collaboration between the Ministry of Agriculture (PMU), the AfDB team and the WB team to discuss and ensure that safety measures are properly considered and will be reflected in the ESIA to be prepared for the flood barrier construction under AfDB funding.

50. **Given the nature and scale of the activities, the E&S risk rating for the AF is substantial**, and the E&S standards applicable to the parent project except for the ESS 9 (Financial Intermediaries-FIs) will apply to the AF. Special attention will be given to addressing potential discrimination and exclusion of vulnerable communities (youth and migrants) and women during the distribution of subsidized seeds and fertilizers. The ESMF, PMP, RPF, and LMP will be updated to integrate adequate mitigation measures to manage E&S risks for both the parent project and the AF. The SEA/SH action plan will also be updated, and a Security Risk Assessment and a Security Management Plan (SMP) will be developed during project implementation, before start of activities in the targeted regions. In addition, all studies to be prepared under the project to support future activities, as well as all technical assistance, will be carried out in accordance with terms of reference consistent with the Environmental and Social Standards (ESSs) and acceptable to the Bank. The ESCP and the SEP have been updated and disclosed on the World Bank website on May 14, 2024<sup>16</sup>, and the remaining documents (ESMF, PMP, RPF, and LMP) will be updated and disclosed no later than one month after project effectiveness. The project is being implemented by a PMU comprising a dedicated environmental and a social and gender specialists full-time. They have been implementing E&S documentation, improving Health, Safety and Environment (HSE) compliance of construction companies, conducting screenings, providing reports, monitoring underage apprentices, and addressing grievances through the GRM. These practices will continue with the AF. However, the Bank has identified the need to reinforce this team regarding the parent project's workload and moreover with the additional financing requirements. The PMU will hire or appoint two additional full-time staff (one environmental specialist and Occupational Health and Safety (OHS) and social specialist with a

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<sup>16</sup> <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099051524082041441/p1805051fa06eb031b7471df9df976a17d>  
<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099051524082032976/p1805051fb469705d1b47511e54c891bdc5>



resettlement and gender profile) so that the parent project and the AF activities are appropriately implemented and monitored.

#### **J. Sexual Exploitation and Abuse and Sexual Harassment/Violence against children**

51. **The overall SEA/SH risk rating for the proposed AF is moderate.** The existing network of community liaison officers supporting the implementation and monitoring of the stakeholder engagement plan will be expanded to cover regions that are added to the project as part of the AF. Additional focal points will be identified and trained in registering SEA/SH complaints and referencing to services providers, including social protection services, as well as reporting child labor cases, if any. Increased awareness raising amongst communities will be undertaken and collaboration with labor inspectorate will be strengthened, to ensure adequate monitoring of working conditions onsite.

#### **K. Citizen Engagement**

52. The Stakeholders Engagement and Information Disclosed Plan (SEIDP) prepared under the parent project has been updated as part of the SEP for the AF. As with the parent project, the AF will develop a comprehensive consultation and participation strategy to ensure a full involvement and engagement of the citizen and local communities of the newly targeted regions in the identification, selection and implementation of any works under the AF. The PMU will develop a citizen mainstreaming action plan covering the AF activities to ensure that: (i) citizen's consultation and participation process in the AF activities is inclusive, effective, transparent and responsive to the needs of targeted communities; and (ii) citizens are really engaged in project implementation to strengthen their ownership of the AF activities and achievement of the project objectives. The CE indicators are also included in the Result Framework to track the feedback mechanism. The PMU will continue to ensure that the updated citizen engagement plan is properly implemented under the AF.

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

53. **Grievance Redress.** Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the Bank'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 complaints to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), please visit <http://www.worldbank.org/GRS>. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit <https://accountability.worldbank.org>.

**VI SUMMARY TABLE OF CHANGES**

|  | Changed | Not Changed |
|--|---------|-------------|
| Results Framework                            | ✓       |             |
| Components and Cost                          | ✓       |             |
| Loan Closing Date(s)                         | ✓       |             |
| Disbursements Arrangements                   | ✓       |             |
| Implementing Agency                          |         | ✓           |
| Project's Development Objectives             |         | ✓           |
| Cancellations Proposed                       |         | ✓           |
| Reallocation between Disbursement Categories |         | ✓           |
| 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 the enabling environment and infrastructure for agri-food value chains development | 35.00                         | Revised | Component 1: Strengthening the enabling environment and infrastructure for agri-food value chains development | 30.80                          |
| Component 2: Increasing productivity, connectivity, value addition and resilience                             | 65.00                         | Revised | Component 2: Increasing productivity, value addition and resilience   | 249.40                         |



|   |               |         |   |               |
|---|---------------|---------|---|---------------|
| Component 3: Promoting private investment and access to finance | 45.00         | Revised | Component 3: Promoting private investment and access to finance | 14.60         |
| Component 4: Project management                                 | 15.00         | Revised | Component 4: Project management                                 | 15.20         |
| Component 5: Contingent Emergency Response Component (CERC)     | 0.00          | Revised | Component 5: Contingent Emergency Response Component (CERC)     | 0.00          |
| <b>TOTAL</b>  | <b>160.00</b> |         |   | <b>310.00</b> |

**LOAN CLOSING DATE(S)**

| Ln/Cr/Tf  | Status    | Original Closing | Current Closing(s) | Proposed Closing | Proposed Deadline for Withdrawal Applications |
|-----------|-----------|------------------|--------------------|------------------|---|
| IDA-66630 | Effective | 30-Nov-2026      | 30-Nov-2026        | 30-Apr-2030      | 30-Aug-2030                                   |

**DISBURSEMENT ARRANGEMENTS**

Change in Disbursement Arrangements

Yes

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

| Fiscal Year | Annual        | Cumulative     |
|-------------|---------------|----------------|
| 2020        | 0.00          | 0.00           |
| 2021        | 7,000,000.00  | 7,000,000.00   |
| 2022        | 16,000,000.00 | 23,000,000.00  |
| 2023        | 60,000,000.00 | 83,000,000.00  |
| 2024        | 28,000,000.00 | 111,000,000.00 |
| 2025        | 30,000,000.00 | 141,000,000.00 |
| 2026        | 50,000,000.00 | 191,000,000.00 |
| 2027        | 50,000,000.00 | 241,000,000.00 |
| 2028        | 30,000,000.00 | 271,000,000.00 |



|      |               |                |
|------|---------------|----------------|
| 2029 | 25,000,000.00 | 296,000,000.00 |
| 2030 | 14,000,000.00 | 310,000,000.00 |

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

| Risk Category  | Latest ISR Rating | Current Rating |
|--|-------------------|----------------|
| Political and Governance                                     | ● Moderate        | ● Moderate     |
| Macroeconomic  | ● Moderate        | ● Moderate     |
| Sector Strategies and Policies                               | ● Moderate        | ● Moderate     |
| Technical Design of Project or Program                       | ● Moderate        | ● Moderate     |
| Institutional Capacity for Implementation and Sustainability | ● Substantial     | ● Moderate     |
| Fiduciary  | ● Moderate        | ● Substantial  |
| Environment and Social                                       | ● Substantial     | ● Substantial  |
| Stakeholders   | ● Moderate        | ● Moderate     |
| Other  | ● Moderate        | ● Moderate     |
| Overall  | ● Substantial     | ● Moderate     |

**LEGAL COVENANTS – Additional Financing for Benin Agricultural Competitiveness and Export Diversification Project (P180505)**

**Sections and Description**

The Project Implementation Manual, including the Subsidized Seed and Agricultural Machinery manuals will be updated by the Recipient no later than 90 days after project effectiveness in terms and content satisfactory to the Association.

The Environmental and Social Management Framework (ESMF), the Pest Management Plan (PMP), the Resettlement Framework (RF), the Labor Management Procedures (LMP), and the Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) action plan will be updated by the Recipient no later than 30 days after project effectiveness in terms and content satisfactory to the Association.

A Security Management Plan (SMP) will be prepared and adopted by the Recipient no later than 30 days after project effectiveness in terms and content satisfactory to the Association.

**Conditions**



## VIII. RESULTS FRAMEWORK AND MONITORING

### Results Framework

COUNTRY: Benin

Additional Financing for Benin Agricultural Competitiveness and Export Diversification Project

#### Project Development Objective(s)

The project development objective (PDO) is to increase productivity and market access for selected agri-food value chains in Benin.

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

| Indicator Name   | PBC | Baseline | Intermediate Targets |       |        |        | End Target |
|--|-----|----------|----------------------|-------|--------|--------|------------|
|  |     |          | 1                    | 2     | 3      | 4      |            |
| <b>Enabling environment for value chain development and market access</b>                          |     |          |                      |       |        |        |            |
| Increase in volume of cashew commercialized (%) by project supported beneficiaries (Percentage)    |     | 0.00     | 40.00                | 80.00 | 120.00 | 140.00 | 160.00     |
| <b>Action: This indicator has been Revised</b>   |     |          |                      |       |        |        |            |
| Increase in volume of pineapple commercialized (%) by project supported beneficiaries (Percentage) |     | 0.00     | 30.00                | 60.00 | 90.00  | 110.00 | 124.00     |
| <b>Action: This indicator is New</b>   |     |          |                      |       |        |        |            |
| Increase in volume of rice commercialized (%) by project supported beneficiaries                   |     | 0.00     | 0.00                 | 10.00 | 50.00  | 70.00  | 80.00      |

| Indicator Name   | PBC   | Baseline | Intermediate Targets |           |           |            | End Target |
|--|-------|----------|----------------------|-----------|-----------|------------|------------|
|  |       |          | 1                    | 2         | 3         | 4          |            |
| (Percentage)   |       |          |                      |           |           |            |            |
| <b>Action: This indicator is New</b>                                     |       |          |                      |           |           |            |            |
| People with strengthened food and nutrition security (Number)            | 0.00  | 0.00     | 10,000.00            | 60,000.00 | 80,000.00 | 100,000.00 |            |
| <b>Action: This indicator is New</b>                                     |       |          |                      |           |           |            |            |
| People with enhanced resilience to climatic risks (Number)               | 0.00  | 0.00     | 10,000.00            | 60,000.00 | 80,000.00 | 100,000.00 |            |
| <b>Action: This indicator is New</b>                                     |       |          |                      |           |           |            |            |
| <b>Increasing productivity</b>   |       |          |                      |           |           |            |            |
| Yield increase in pineapple in metric tons per hectare (Number)          | 40.00 | 68.00    | 72.00                | 73.00     | 74.00     | 75.00      |            |
| <b>Action: This indicator has been Revised</b>                           |       |          |                      |           |           |            |            |
| Yield increase in cashew in metric tons per hectare (Number)             | 0.40  | 0.50     | 0.75                 | 0.80      | 0.80      | 0.80       |            |
| <b>Action: This indicator has been Revised</b>                           |       |          |                      |           |           |            |            |
| Yield increase of irrigated rice in metric tons per hectare (Metric ton) | 4.00  | 4.00     | 5.00                 | 6.00      | 7.00      | 7.00       |            |
| <b>Action: This indicator is New</b>                                     |       |          |                      |           |           |            |            |

| Indicator Name   | PBC | Baseline | Intermediate Targets |       |       |       | End Target |
|--|-----|----------|----------------------|-------|-------|-------|------------|
|  |     |          | 1                    | 2     | 3     | 4     |            |
| Yield increase of tomato in metric tons per hectare (Metric ton) |     | 6.70     | 6.70                 | 7.00  | 7.50  | 8.00  | 8.00       |
| <i>Action: This indicator is New</i>                             |     |          |                      |       |       |       |            |
| Yield increase of chili in metric tons per hectare (Metric ton)  |     | 3.50     | 4.00                 | 4.50  | 5.50  | 6.00  | 6.00       |
| <i>Action: This indicator is New</i>                             |     |          |                      |       |       |       |            |
| Yield increase of onion in metric tons per hectare (Metric ton)  |     | 13.00    | 13.50                | 14.00 | 14.50 | 15.00 | 15.00      |
| <i>Action: This indicator is New</i>                             |     |          |                      |       |       |       |            |

### Intermediate Results Indicators by Components

| Indicator Name  | PBC | Baseline | Intermediate Targets |      |      |      | End Target |
|---|-----|----------|----------------------|------|------|------|------------|
|   |     |          | 1                    | 2    | 3    | 4    |            |
| <b>Strengthening the enabling environment and infrastructure for agri-food value chains development</b> |     |          |                      |      |      |      |            |
| Trade and business facilitation rules and regulations upgraded (Number)                                 |     | 0.00     | 2.00                 | 4.00 | 4.00 | 4.00 | 4.00       |
| <i>Action: This indicator has been Revised</i>  |     |          |                      |      |      |      |            |
| Public private dialogue (PPD) platforms established through CREs with action plans                      |     | 0.00     | 2.00                 | 4.00 | 6.00 | 6.00 | 6.00       |

| Indicator Name  | PBC  | Baseline  | Intermediate Targets |           |           |           | End Target |
|---|------|-----------|----------------------|-----------|-----------|-----------|------------|
|   |      |           | 1                    | 2         | 3         | 4         |            |
| validated (Number)  |      |           |                      |           |           |           |            |
| Cold storage freight terminal built and operating at airport (Yes/No)                                   | No   | No        | No                   | No        | No        | Yes       | Yes        |
| Transitory Cold Chain Facilities at Cotonou Airport (Yes/No)  | No   | No        | No                   | Yes       | Yes       | Yes       | Yes        |
| Permanent cold Storage freight terminal built at Cotonou Airport (Yes/No)                               | No   | No        | No                   | No        | No        | Yes       | Yes        |
| <b>Action: This indicator has been Revised</b>  |      |           |                      |           |           |           |            |
| <b>Increasing productivity, value addition and resilience (Action: This Component has been Revised)</b> |      |           |                      |           |           |           |            |
| Farmers adopting improved agricultural technology (CRI, Number)   | 0.00 | 35,000.00 | 50,000.00            | 60,000.00 | 70,000.00 | 73,000.00 |            |
| <b>Action: This indicator has been Revised</b>  |      |           |                      |           |           |           |            |
| Farmers adopting improved agricultural technology - Female (CRI, Number)                                | 0.00 | 10,500.00 | 15,000.00            | 18,000.00 | 20,000.00 | 22,000.00 |            |
| <b>Action: This indicator has been Revised</b>  |      |           |                      |           |           |           |            |
| Farmers adopting improved agricultural technology - male (CRI, Number)                                  | 0.00 | 30,000.00 | 40,000.00            | 45,000.00 | 48,000.00 | 51,000.00 |            |

| Indicator Name   | PBC | Baseline | Intermediate Targets |           |            |            | End Target |
|--|-----|----------|----------------------|-----------|------------|------------|------------|
|  |     |          | 1                    | 2         | 3          | 4          |            |
| <b>Action: This indicator has been Revised</b>   |     |          |                      |           |            |            |            |
| Percentage of production passing export quality standards (per selected value chains) (Percentage) |     | 93.00    | 95.00                | 98.00     | 98.00      | 100.00     | 100.00     |
| <b>Action: This indicator has been Revised</b>   |     |          |                      |           |            |            |            |
| Share of cashew samples tested by LCSSA which meet international standards (Percentage)            |     | 90.00    | 95.00                | 98.00     | 100.00     | 100.00     | 100.00     |
| <b>Action: This indicator has been Revised</b>   |     |          |                      |           |            |            |            |
| Share of pineapple samples tested by LCSSA which meet international standards (Percentage)         |     | 95.00    | 97.00                | 99.00     | 100.00     | 100.00     | 100.00     |
| <b>Action: This indicator has been Revised</b>   |     |          |                      |           |            |            |            |
| Beneficiaries adopting climate smart technologies and practices (Number)                           |     | 0.00     | 50,000.00            | 80,000.00 | 110,000.00 | 120,000.00 | 132,000.00 |
| <b>Action: This indicator has been Revised</b>   |     |          |                      |           |            |            |            |
| Male (Number)  |     | 0.00     | 30,000.00            | 60,000.00 | 70,000.00  | 80,000.00  | 88,000.00  |

| Indicator Name   | PBC | Baseline | Intermediate Targets |            |            |            | End Target |
|--|-----|----------|----------------------|------------|------------|------------|------------|
|  |     |          | 1                    | 2          | 3          | 4          |            |
| <i>Action: This indicator has been Revised</i>                                   |     |          |                      |            |            |            |            |
| Female (Number)  |     | 0.00     | 5,000.00             | 25,000.00  | 35,000.00  | 40,000.00  | 44,000.00  |
| <i>Action: This indicator has been Revised</i>                                   |     |          |                      |            |            |            |            |
| Roads rehabilitated (CRI, Kilometers)  |     | 0.00     | 400.00               | 800.00     | 1,200.00   | 1,200.00   | 1,200.00   |
| <i>Action: This indicator has been Marked for Deletion</i>                       |     |          |                      |            |            |            |            |
| Roads rehabilitated - rural (CRI, Kilometers)                                    |     | 0.00     |                      |            |            |            | 1,200.00   |
| <i>Action: This indicator has been Marked for Deletion</i>                       |     |          |                      |            |            |            |            |
| Roads rehabilitated - non-rural (CRI, Kilometers)                                |     | 0.00     |                      |            |            |            | 0.00       |
| <i>Action: This indicator has been Marked for Deletion</i>                       |     |          |                      |            |            |            |            |
| Total cashew and pineapple area established with project support (Hectare(Ha))   |     | 0.00     | 20,000.00            | 25,000.00  | 28,000.00  | 28,000.00  | 28,000.00  |
| <i>Action: This indicator has been Revised</i>                                   |     |          |                      |            |            |            |            |
| Total cashew and pineapple area rehabilitated with project support (Hectare(Ha)) |     | 0.00     | 85,000.00            | 160,000.00 | 175,387.00 | 175,387.00 | 175,387.00 |
| <i>Action: This indicator has been Revised</i>                                   |     |          |                      |            |            |            |            |

| Indicator Name   | PBC | Baseline | Intermediate Targets |        |          |          | End Target |
|--|-----|----------|----------------------|--------|----------|----------|------------|
|  |     |          | 1                    | 2      | 3        | 4        |            |
| Area provided with new/improved irrigation or drainage services (CRI, Hectare(Ha)) |     | 0.00     | 0.00                 | 400.00 | 3,400.00 | 3,400.00 | 3,400.00   |
| <b>Action: This indicator is New</b>   |     |          |                      |        |          |          |            |
| Area provided with new irrigation or drainage services (CRI, Hectare(Ha))          |     | 0.00     | 0.00                 | 500.00 | 1,563.00 | 1,563.00 | 1,563.00   |
| <b>Action: This indicator is New</b>   |     |          |                      |        |          |          |            |
| Area provided with improved irrigation or drainage services (CRI, Hectare(Ha))     |     | 0.00     | 0.00                 | 400.00 | 1,837.00 | 1,837.00 | 1,837.00   |
| <b>Action: This indicator is New</b>   |     |          |                      |        |          |          |            |
| <b>Promoting private investment and access to finance</b>                          |     |          |                      |        |          |          |            |
| Establishment of risk sharing and guarantee mechanisms under the project (Yes/No)  |     | No       | No                   | Yes    | Yes      | Yes      | Yes        |
| <b>Action: This indicator has been Marked for Deletion</b>                         |     |          |                      |        |          |          |            |
| Commercial guarantee mechanism established under the project (Yes/No)              |     | No       | No                   | Yes    | Yes      | Yes      | Yes        |

| Indicator Name   | PBC | Baseline      | Intermediate Targets |               |               |                | End Target     |
|--|-----|---------------|----------------------|---------------|---------------|----------------|----------------|
|  |     |               | 1                    | 2             | 3             | 4              |                |
| <b>Action: This indicator has been Marked for Deletion</b>   |     |               |                      |               |               |                |                |
| Guarantee Line established within FONAGA (Yes/No)  |     | No            | No                   | Yes           | Yes           | Yes            | Yes            |
| <b>Action: This indicator has been Marked for Deletion</b>   |     |               |                      |               |               |                |                |
| Volume of private investments in targeted value chains facilitated through project support (Amount(USD)) |     | 30,000,000.00 | 45,000,000.00        | 70,000,000.00 | 90,000,000.00 | 100,000,000.00 | 100,000,000.00 |
| <b>Action: This indicator has been Revised</b>   |     |               |                      |               |               |                |                |
| Volume of private investments enabled (PCE) through project support (US\$) (Amount(USD))                 |     | 0.00          | 13,500,000.00        | 14,500,000.00 | 15,500,000.00 | 16,500,000.00  | 16,500,000.00  |
| <b>Action: This indicator is New</b>   |     |               |                      |               |               |                |                |
| Volume of private investments mobilized (PCM) through project support (US\$) (Amount(USD))               |     | 30,000,000.00 | 48,500,000.00        | 58,000,000.00 | 68,000,000.00 | 80,000,000.00  | 83,500,000.00  |
| <b>Action: This indicator is New</b>   |     |               |                      |               |               |                |                |
| Number of SMEs receiving a loan or line of credit as a result of project support (Number)                |     | 0.00          | 250.00               | 500.00        | 800.00        | 1,100.00       | 1,250.00       |
| <b>Action: This indicator has been Marked for Deletion</b>   |     |               |                      |               |               |                |                |



| Indicator Name  | PBC  | Baseline | Intermediate Targets |            |            |            | End Target |
|---|------|----------|----------------------|------------|------------|------------|------------|
|   |      |          | 1                    | 2          | 3          | 4          |            |
| of which Youth-owned SMEs (Number)                            | 0.00 |          | 50.00                | 100.00     | 150.00     | 200.00     | 250.00     |
| <i>Action: This indicator has been Marked for Deletion</i>    |      |          |                      |            |            |            |            |
| of which Female-owned SMEs (Number)                           | 0.00 |          | 50.00                | 100.00     | 150.00     | 200.00     | 250.00     |
| <i>Action: This indicator has been Marked for Deletion</i>    |      |          |                      |            |            |            |            |
| Beneficiaries of matching grants (Number)                     | 0.00 |          | 100.00               | 200.00     | 250.00     | 300.00     | 364.00     |
| <i>Action: This indicator has been Revised</i>                |      |          |                      |            |            |            |            |
| Of which Youth beneficiaries (Number)                         | 0.00 |          | 50.00                | 70.00      | 90.00      | 100.00     | 127.00     |
| <i>Action: This indicator has been Revised</i>                |      |          |                      |            |            |            |            |
| of which Female beneficiaries (Number)                        | 0.00 |          | 50.00                | 70.00      | 90.00      | 100.00     | 131.00     |
| <i>Action: This indicator has been Revised</i>                |      |          |                      |            |            |            |            |
| <b>Project management</b>                                     |      |          |                      |            |            |            |            |
| Total number of beneficiaries (gender disaggregated) (Number) | 0.00 |          | 350,000.00           | 670,000.00 | 870,000.00 | 900,000.00 | 920,000.00 |
| <i>Action: This indicator has been Revised</i>                |      |          |                      |            |            |            |            |
| Male (Number)   | 0.00 |          | 320,000.00           | 480,000.00 | 550,000.00 | 630,000.00 | 644,000.00 |

| Indicator Name   | PBC | Baseline | Intermediate Targets |            |            |            | End Target |
|--|-----|----------|----------------------|------------|------------|------------|------------|
|  |     |          | 1                    | 2          | 3          | 4          |            |
| <i>Action: This indicator has been Revised</i>   |     |          |                      |            |            |            |            |
| Female (Number)  |     | 0.00     | 30,000.00            | 115,000.00 | 200,000.00 | 250,000.00 | 276,000.00 |
| <i>Action: This indicator has been Revised</i>   |     |          |                      |            |            |            |            |
| Producers receiving project-supported fertilizers (Number)   |     | 0.00     | 300,000.00           | 670,000.00 | 673,000.00 | 673,000.00 | 673,000.00 |
| <i>Action: This indicator is New</i>   |     |          |                      |            |            |            |            |
| Percentage of complaints addressed within the period specified in the Project Operations Manual (Percentage) |     | 0.00     | 90.00                | 95.00      | 100.00     | 100.00     | 100.00     |
| <i>Action: This indicator has been Revised</i>   |     |          |                      |            |            |            |            |
| Beneficiary satisfaction with assets and services provided by the project (Percentage)                       |     | 0.00     | 80.00                | 80.00      | 80.00      | 80.00      | 80.00      |
| <i>Action: This indicator has been Revised</i>   |     |          |                      |            |            |            |            |

#### Monitoring & Evaluation Plan: PDO Indicators

| Indicator Name   | Definition/Description                          | Frequency | Datasource     | Methodology for Data Collection    | Responsibility for Data Collection |
|--|---|-----------|----------------|------------------------------------|------------------------------------|
| Increase in volume of cashew commercialized (%) by project supported | Quantity of marketed agricultural and agri-food | Yearly.   | Monitoring and | Secondary data and market surveys. | M&E function of PMU                |

|   |   |        |                         |   |  |
|---|---|--------|-------------------------|---|--|
| beneficiaries   | products (for export or domestic markets) by project supported beneficiaries in targeted value chains |        | evaluation data system. |   |  |
| Increase in volume of pineapple commercialized (%) by project supported beneficiaries |   | Yearly | PMU progress reports    | Secondary data and market surveys   | M&E Unit of PMU                            |
| Increase in volume of rice commercialized (%) by project supported beneficiaries      |   | Yearly | PMU progress reports    | Secondary data and market surveys   | M&E Unit of PMU                            |
| People with strengthened food and nutrition security                                  |   | Yearly | PMU Progress reports    | Annual survey with inputs from all implementing partners  | M&E Unit of PMU                            |
| People with enhanced resilience to climatic risks                                     |   | Yearly | PMU Progress reports    | Annual survey with inputs from all implementing partners  | M&E Unit of PMU                            |
| Yield increase in pineapple in metric tons per hectare                                |   | Yearly | PMU progress report     | Yearly crop surveys administered with representative samples of targeted project beneficiaries and control group. | Monitoring and evaluation unit of the PMU  |
| Yield increase in cashew in metric tons per hectare                                   |   | Yearly | PMU progress reports    | Yearly crop surveys administered with representative sample of targeted project beneficiaries and control group.  | Monitoring and evaluation unit of the PMU. |

|   |  |        |                      |   |                 |
|---|--|--------|----------------------|---|-----------------|
|   |  |        |                      |   |                 |
| Yield increase of irrigated rice in metric tons per hectare |  | Yearly | PMU progress reports | Yearly crop surveys administered with representative sample of targeted project beneficiaries | M&E Unit of PMU |
| Yield increase of tomato in metric tons per hectare         |  | Yearly | PMU progress reports | Yearly crop surveys administered with representative sample of targeted project beneficiaries | M&E Unit of PMU |
| Yield increase of chili in metric tons per hectare          |  | Yearly | PMU progress reports | Yearly crop surveys administered with representative sample of targeted project beneficiaries | M&E Unit of PMU |
| Yield increase of onion in metric tons per hectare          |  | Yearly | PMU progress reports | Yearly crop surveys administered with representative sample of targeted project beneficiaries | M&E Unit of PMU |

| Monitoring & Evaluation Plan: Intermediate Results Indicators                                |                        |              |   |  |                                    |
|--|------------------------|--------------|---|--|------------------------------------|
| Indicator Name   | Definition/Description | Frequency    | Datasource  | Methodology for Data Collection                    | Responsibility for Data Collection |
| Trade and business facilitation rules and regulations upgraded                               |                        | Yearly       | PMU progress reports  | Monitoring and evaluation data system              | M&E Unit of PMU                    |
| Public private dialogue (PPD) platforms established through CREs with action plans validated |                        | Yearly       | PMU Progress reports  | Monitoring and evaluation data system              | M&E Unit of PMU                    |
| Cold storage freight terminal built and operating at airport                                 |                        | Twice a year | Monitoring and evaluation data system. Data collected by the PMU at locations where the infrastructure is built with the support of Minister of transport, APIEx and control firms. | Data collected by PMU from implementing agencies . | M & E Unit of PMU                  |
| Transitory Cold Chain Facilities at Cotonou Airport  |                        | Twice a year | Data collected by M & E Unit of the PMU at locations where the  | Data collected by PMU from implementing agencies.  | M&E Unit of the PMU                |

|   |   |              |   |  |                     |
|---|---|--------------|---|--|---------------------|
|   |   |              | infrastructure is being built   |  |                     |
| Permanent cold Storage freight terminal built at Cotonou Airport                      |   | Twice a year | Data collected by the M & E Unit of the PMU at locations where the infrastructure is being built. | Data collected by PMU from implementing agencies.              | M&E Unit of the PMU |
| Farmers adopting improved agricultural technology                                     | This indicator measures the number of farmers (of agricultural products) who have adopted an improved agricultural technology promoted by operations supported by the World Bank. | Yearly       | PMU Progress reports  | Field surveys  | M&E Unit of PMU     |
| Farmers adopting improved agricultural technology - Female                            |   | Yearly       | PMU Progress reports  | Field surveys among project beneficiaries                      | M&E Unit of the PMU |
| Farmers adopting improved agricultural technology - male                              |   | Yearly       | PMU progress reports  | Field surveys among project beneficiaries                      | M&E Unit of the PMU |
| Percentage of production passing export quality standards (per selected value chains) |   | Yearly       | PMU Progress reports  | Data collected by M&E Unit of PMU with inputs from ABSSA/LCSEA | M&E Unit of PMU     |
| Share of cashew samples tested by LCSEA which meet international                      |   | Yearly       | PMU progress reports  | Data collected by M&E Unit of PMU with inputs                  | M&E Unit of the PMU |

|   |  |              |                            |   |                     |
|---|--|--------------|----------------------------|---|---------------------|
| standards   |  |              |                            | from ABSSA/LCSSA  |                     |
| Share of pineapple samples tested by LCSSA which meet international standards |  | Yearly       | PMU progress reports       | M&E Unit of the PMU with inputs from ABSSA/LCSSA  | M&E Unit of the PMU |
| Beneficiaries adopting climate smart technologies and practices               |  | Yearly       | PMU progress reports       | Field Surveys   | M&E Unit of the PMU |
| Male  |  | Yearly       | PMU progress reports       | Field surveys   | M&E Unit of the PMU |
| Female  |  | Yearly       | PMU progress reports       | Field surveys   | M&E Unit of the PMU |
| Roads rehabilitated   |  | Twice a year | M&E data collection system | Physical measurement of km rehabilitated. Data collected from implementing agencies (DGR) | M&E Unit of the PMU |
| Roads rehabilitated - rural   |  | Twice a year | M&E data collection system | Physical measurement of km rehabilitated. Data collected from implementing agencies (DGR) | M&E Unit of the PMU |
| Roads rehabilitated - non-rural   |  |              |                            |   |                     |
| Total cashew and pineapple area established with project support              |  | Yearly       | PMU progress reports       | Annual Crop survey  | M & E Unit of PMU   |

|  |  |        |                      |                            |                     |
|--|--|--------|----------------------|----------------------------|---------------------|
| Total cashew and pineapple area rehabilitated with project support       |  | Yearly | PMU progress reports | Annual crop survey         | M&E Unit of the PMU |
| Area provided with new/improved irrigation or drainage services          | This indicator measures the total area of land provided with irrigation and drainage services under the project, including in (i) the area provided with new irrigation and drainage services, and (ii) the area provided with improved irrigation and drainage services, expressed in hectare (ha). | Yearly | PMU Progress reports | Annual crop surveys        | M&E Unit of PMU     |
| Area provided with new irrigation or drainage services                   | Measures in hectares the total area of land provided with new or improved irrigation or drainage services in operations supported by the World Bank.   | Yearly | PMU progress reports | Annual crops surveys       | M&E Unit of PMU     |
| Area provided with improved irrigation or drainage services              | Measures in hectares the total area of land provided with new or improved irrigation or drainage services in operations supported by the World Bank.   | Yearly | PMU Progress reports | Annual crops surveys       | M&E Unit of PMU     |
| Establishment of risk sharing and guarantee mechanisms under the project |  | Yearly | PMU Progress reports | M&E data collection system | M&E Unit of PMU     |



|  |  |              |  |   |                     |
|--|--|--------------|--|---|---------------------|
| Commercial guarantee mechanism established under the project                               |  | Yearly       | PMU progress reports   | M&E data collection system with inputs from APIEx | M&E Unit of the PMU |
| Guarantee Line established within FONAGA   |  | Yearly       | PMU Progress Reports   | M&E data collection system with inputs from APIEx | M&E Unit of PMU     |
| Volume of private investments in targeted value chains facilitated through project support |  | Twice a year | PMU Progress reports with inputs from APIEx Tracking Investment System | Monitoring and Evaluation Data Collection System  | M&E Unit of PMU     |
| Volume of private investments enabled (PCE) through project support (US\$)                 |  | Twice a year | PMU Progress reports with inputs from APIEx Tracking Investment System | Monitoring and Evaluation Data Collection System  | M&E Unit of PMU     |
| Volume of private investments mobilized (PCM) through project support (US\$)               |  | Twice a year | PMU Progress reports   | Monitoring and Evaluation Data Collection System  | M&E Unit of PMU     |
| Number of SMEs receiving a loan or line of credit as a result of project support           |  | Yearly       | PMU Progress Reports   | Yearly survey of project beneficiaries            | M&E Unit of PMU     |
| of which Youth-owned SMEs  |  | Yearly       | PMU progress reports   | Yearly survey of project beneficiaries            | M&E Unit of PMU     |

|  |  |        |                      |  |                         |
|--|--|--------|----------------------|--|-------------------------|
| of which Female-owned SMEs                           |  | Yearly | PMU progress reports | Annual survey of project beneficiaries                   | M&E Unit of PMU         |
| Beneficiaries of matching grants                     |  | Yearly | PMU progress reports | M&E data collection system with inputs from APIEx        | M&E Unit of the PMU     |
| Of which Youth beneficiaries                         |  | Yearly | PMU Progress reports | M&E data collection system with inputs from APIEx        | M&E Unit of the project |
| of which Female beneficiaries                        |  | Yearly | PMU Progress reports | M&E data collection system with inputs from APIEx        | M&E Unit of the PMU     |
| Total number of beneficiaries (gender disaggregated) |  | Yearly | PMU Progress reports | Annual survey with inputs from all implementing partners | M&E Unit of PMU         |
| Male   |  | Yearly | PMU progress report  | Annual survey with inputs from all implementing partners | M&E Unit of PMU         |
| Female   |  | Yearly | PMU Progress Reports | Survey with inputs from all implementing partners        | M&E Unit of PMU         |
| Producers receiving project-supported fertilizers    |  | Yearly | PMU Progress Reports | Annual survey with inputs from all implementing partners | M&E Unit of PMU         |

|   |  |  |                      |  |                 |
|---|--|--|----------------------|--|-----------------|
| Percentage of complaints addressed within the period specified in the Project Operations Manual |  | Quarterly                                  | Progress reports     | M&E data collection system   | M&E Unit of PMU |
| Beneficiary satisfaction with assets and services provided by the project                       |  | At mid-term and at the end of the project. | PMU progress reports | Survey of a representative sample of project beneficiaries and control group | M&E Unit of PMU |

## ANNEX 1: DETAILED ACTIVITIES AND IMPLEMENTATION PARTNERS

1. The AF mainly entails scaling up of already ongoing activities but with greater focus on vulnerable communities. The PMU will sign MOUs with implementing partners to support the implementation of different activities of the project. Key upstream activities will be planned and launched under the parent project well before the approval of the AF to shorten the time needed to complete those activities (e.g., the development of the irrigated lands). Partners will include the National Institute for Agricultural Research (INRAB), the Irrigation Development Company (SOBAA), the Seed and Plantlet Development Company (SoDeSeP), the Agricultural Mechanization Company (SONAMA), the Crops Service Directorate (DPV), the Agricultural Engineering Directorate (DGR), the Territorial Agency for Agricultural Development (ATDAs), and the Agency for the Promotion of Investment and Exports (APIEx), as well as farmers associations. The activities to be financed under the MOUs include the rehabilitation of facilities, capacity strengthening, technical assistance (TA), and staff increases (as needed), as well as specific project activities (see Table 1.1 for details). The MOUs will be reviewed and revised periodically to ensure that any new developments or best practices are integrated and capitalized upon.

**Table 1.1: Activities to be supported under each implementing partner**

| Partners              | Activities to be supported under the AF with the collaboration of partners   |
|-----------------------|--|
| ABSSA                 | Testing and quality control, certification of product samples, capacity strengthening  |
| APIEx                 | Export promotion activities, capacity strengthening  |
| INRAB                 | Testing and adaptative research on improved technologies (seeds and fertilizers) and crop husbandry practices, support for pilot trials of crop varieties, production of foundation seeds, training and capacity strengthening   |
| SoBAA                 | Support for the establishment of management and operating procedures, update of technical and feasibility studies, establishment and strengthening of water users' associations, creation of rules for water use, provision of specialized technical assistance for training and advisory services and exchange visits to other irrigation management entities abroad, supervision of works on irrigated lands, training and equipment support |
| SoDeSeP               | Capacity strengthening, support for the implementation of the seed sector strategy, establishment of a network of qualified seed producers, support for seed conservation and traceability, establishment of reliable seed demand system, among others   |
| SONAMA                | Capacity strengthening, studies, training, and technical assistance to farmers, agribusinesses, agricultural machinery spare part dealers, service providers, operators, and mechanics, management of the subsidized farm equipment distribution, monitoring of use, maintenance of the network of service providers, training and certification of operators, mechanics, and local manufacturers, and staff top up as needed                  |
| DGR                   | Support for the adoption of a framework for irrigated land management, overall governance of the irrigation subsector, monitoring of works on irrigated sites, training of existing staff and equipment support  |
| ATDA                  | Capacity strengthening, identification of beneficiaries, sensitization, farmers' training, equipment support, staff top up, monitoring of seed production and distribution to farmers, monitoring of infrastructure development works  |
| DPV                   | Equipment support, training of existing staff, seed quality control and certification, certification of seed producers, certification of fertilizers, breeder seed production.   |
| Farmer's Associations | Sensitization of farmers, monitoring, capacity strengthening   |

## ANNEX 2: SUMMARY OF ADAPTATION AND MITIGATION CO-BENEFITS

- 1. The AF builds on the parent project’s foundations of climate adaptation and mitigation Co-Benefits to further strengthen and scale up these initiatives while introducing new and complementary support for activities such as the implementation of national seed sector strategy and investment in soil health and fertility management.** Annex 2 outlines the climate vulnerability context using the three-step methodology to ensure compliance with the assignment of Adaptation CCBs. The table below summarizes the adaptation and mitigation Co-Benefits of activities financed through the AF (US\$150 million).
- 2. Benin is highly vulnerable to climate change, ranking 155 out of 185 countries in the ND-GAIN index (2024) for climate vulnerability and low readiness score to combat the impacts of climate change.**<sup>17</sup> Climate projections show an increased temperature, along with increased frequency and duration of heat waves. Rainfall will continue to be variable with late onsets, along with increased frequency and intensity of heavy rainfall events. Drought, late and intensive rains, and floods are notable climate risks affecting water resources, infrastructure, livelihoods, food security, and agri-food sector. Future dry and wet periods are likely to become more extreme, with more droughts and a higher risk of floods expected. Floods are already becoming increasingly severe and more destructive. Flooding following heavy rains in 2013, for example, led to losses of an estimated US\$20 million in crops and livestock. The negative consequences of intense and successive periods of drought and floods affect food security in Benin and are estimated to reduce food production by 6 percent by 2025 if no adaptive measures are taken. Climate change and the associated decline of precipitation is expected to result in a 40 to 60 percent reduction in the availability of water resources, further influencing Benin’s agri-food sector and capacity to produce food. Poor households in Benin are generally more exposed to the impacts of climate change and face growing income loss and food insecurity associated with weather and climate impacts.
- 3. The above-mentioned climate chronic forecasts will have adverse implications for Benin’s agri-food sector, hence for the economy.** Without any additional adaptation effort, average annual GDP losses are expected to increase over time and reach up to 19 percent of GDP by 2050.<sup>18</sup> Given that crop production is predominantly rainfed, yields highly depend on water availability from precipitation and are prone to climate-induced drought. At the same time, the length and intensity of the rainy season is becoming increasingly unpredictable, and the use of irrigation facilities remains limited, with less than 10 percent of the total cropland in Benin equipped for irrigation. While increased soil erosion and land degradation from heavy rainfall events, particularly following longer dry spells affect soil fertility and therefore the sector’s productivity. In addition, the major impacts of climate change will be on rain-fed seed crops that account for the greater share of cropland area whereby yields of heat and drought-sensitive crops are projected to decline. The negative consequences of intense and successive periods of drought and floods could reduce agricultural production by 3 to 18 percent by 2025 without adaptive measures such as improved irrigation adapted seeds. Climate change is also expected to introduce the emergence of new pests, changing the status of pest and disease development, and the evolution of new races of pests affecting pollination, length of seed-filling duration, seed setting, seed yield, and quality. Finally, climate change is likely to damage Benin’s roads and agriculture value chain infrastructure affecting agricultural investments, thereby reducing access to inputs and markets, and increasing postharvest losses. These will exacerbate existing vulnerabilities and inadequacies in the current capacity of national agencies and institutions to anticipate and prepare for such emerging threats.

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<sup>17</sup> <https://gain.nd.edu/our-work/country-index/rankings/>

<sup>18</sup> Benin’s CCDR.

4. **The AF will support the Government of Benin to reduce the vulnerability of country's agricultural systems to climate change risks.** The dissemination of climate-smart agricultural practices such as the use of improved seeds/planting materials or crop rotation enhancements, efficient water management and integrated management of soil and nutrient fertility will help strengthen the resilience of producers to the negative impact of climate change. The AF will promote other environmentally beneficial activities, such as reduced tillage practices, the use of combined livestock manure and agricultural waste as organic fertilizers, improved post-harvest handlings that will reduce the impact of diseases, pests, or spoilage. For all the value chains that the AF will support, climate-resilient and adaptation measures that would be implemented include: (i) use of climate-resilient seeds and varieties; (ii) adoption of agriculture practices that retain soil nutrients and prevent soil erosion; (iii) improved water management for extreme warm weather, (iv) flood-resilient design of production systems; and (v) efficient pest and disease management. By providing support to energy-efficient and solar powered-equipment on irrigated perimeters, the AF will help reduce GHG emissions, in addition to enabling producers to build resilience and hedge against the lack of and erratic pattern of rainfalls due to climate change. The establishment of perennial crops (cashew) will be a source of greater carbon sequestration in the project area.

**A2.1: Summary of adaptation and mitigation benefits of activities financed exclusively through the AF (US\$150 million)**

| Subcomponents & activities  | Climate Adaptation Benefits  | Climate Mitigation Benefits   |
|---|--|---|
| <b>Component 1: Strengthening the enabling environment and infrastructure for agri-food value chains development (US\$4.5 million)</b>  |  |   |
| <b>Subcomponent 1.1: <i>Enhancement of relevant public institutions and policy framework for export promotion (US\$4.5 million)</i></b>   |  |   |
| <p>Support to the Ministry of Agriculture, Livestock and Fisheries (MAEP) in implementing the National Agricultural Investment and Food and Nutritional Security Plan (PNIASAN, 3<sup>rd</sup> generation), including climate change considerations.</p> <p>Support to the seed research, production, quality control, certification, and distribution systems, including promotion of private players.</p> <p>Support to upstream and cross-cutting reforms to strengthen the production, processing, and marketing for the targeted value chains.</p> <p>Support a program of climate-smart activities aimed at creating and/or strengthening partnerships among public and private stakeholders.</p> | <p>The AF will support Benin’s policy framework towards mainstreaming climate change within the PNIASAN, 3<sup>rd</sup> generation as well as support the development of a proactive adaptation strategy for a climate-resilient seed system that will enhance farmers’ access to seeds adapted to drought conditions.</p> <p>The 3<sup>rd</sup> generation PNIASAN, includes climate change considerations, which will allow the country to align upfront its reforms and policies (seed research, production, quality control, certification, and distribution systems) and practices identifying key climate risks and impacts in the seed sector integrate appropriate adaptation measures and thereby increase its preparedness and resilience to extreme weather events.</p> <p>The seed sector strategy and distribution will focus entirely on climate resilient varieties focused on drought or heat resistance as well as resistant to climate-induced emerging pest and disease. Given a projected increase in climate-induced hotter and drier conditions as well as extreme heat events such as droughts, the AF will support seed research on drought-tolerant seed varieties.</p> <p>Trainings will be provided to create awareness of climate risks and impacts related to the seed sector</p> | <p>The support to seed research is expected to help farmers and seed producers choose products that can reduce emissions.</p> |

| Subcomponents & activities  | Climate Adaptation Benefits  | Climate Mitigation Benefits  |
|---|--|--|
|   | for public and private institutions, including scaling up of climate resilient seed systems through collaboration to improve the seed distribution system and enhance farmers' access to seeds adapted to drought and heat, while creating an incentive to the private sector through marketing of certified seeds.  |  |
| <b>Subcomponent 1.2: Development of critical infrastructure and market information</b>  |  |  |
| No additional activity by the AF project.   |  |  |
| <b>Component 2: Increasing productivity, connectivity, value addition, and resilience (US\$141.5 million)</b>   |  |  |
| <b>Subcomponent 2.1: Enhancing the availability and access to quality inputs (US\$51.5 million)</b>   |  |  |
| <ul style="list-style-type: none"> <li>• Enhancing access to stress-tolerant, high-yielding planting materials for targeted value chains as well as enhancing access to inputs (seeds for irrigated sites, biofertilizers)</li> <li>• Rehabilitation of existing ageing cashew plantations (34,000ha)</li> <li>• Enhancing the availability of quality planting materials for cashew and Creation of 7,000 ha of new cashew plantations and 20% replanting</li> <li>• Creation of a 1,000 ha model farm for pineapple production</li> <li>• Technical support for the national agricultural research and extension system for the development of high yielding climate-resilient, stress-tolerant varieties of targeted crops.</li> </ul> | <p>Given a projected increase in climate-induced hotter and drier conditions as well as extreme heat events such as droughts, the AF will specifically support and enhance access to stress-tolerant, high-yielding planting materials for targeted value chains (pineapple and cashew). The project will improve the availability of certified drought-tolerant seed varieties and planting materials that are able to withstand high temperatures and capacity to resist climate-induced pest and disease.</p> <p>Climate resilient varieties will be early maturing and stress tolerant that enhance productivity, foster adaptation and resilience, re-afforestation, conservation agriculture, and integrated soil fertility management. Specifically for pineapple, the project will enhance access to foundation and breeder seeds of climate-smart, high-yield, and wilt-resistant pineapple cultivars of the main local varieties; for cashew stress tolerant, climate-</p> | <p>Superior husbandry practices will enhance productivity and improve efficiency of production. Integrated soil fertility management, re-afforestation, and conservation agriculture will limit the degradation of soil and natural resources.</p> <p>Activities under this subcomponent are expected to enhance carbon capture and sequestration. Specifically, agroforestry practices for rehabilitation of old cashew plantations and creation of new cashew plantations (from perennial fallow) result in net GHG emissions reduction of 3,884,851 tons of CO<sub>2</sub>e. In addition, annual crops (horticultural crops) are expected to have net GHG emissions reduction. (This subcomponent is the major contributor for GHG emission reductions, see the GHG assessment for more).</p> |



| Subcomponents & activities  | Climate Adaptation Benefits  | Climate Mitigation Benefits |
|---|--|-----------------------------|
|   | <p>resilient cashew seedlings to replace aging cashew trees and establish new plantations.</p> <p>The AF will also support enhancing access to climate resilient seeds for irrigated sites (rice tomatoes, onions, and peppers) that will improve farmers’ access to adapted seeds.</p> <p>The AF will provide technical support and capacity building for scientists within national agricultural research and extension system, through specialized training as needed, especially in plant genetics, plant pathology, and plant protection to produce climate- resilient planting materials. Training will include climate risk and impacts on crop yield, adaptability, and seed quality.</p> <p>Enhancing access and dissemination of climate resilient technologies (seeds, planting materials), and husbandry practices will reduce climate-related crop losses. These activities will boost Benin’s food system resilience, increase food security, and reduce losses due to climate change-induced severe weather events.</p> |                             |
| <p><b>Subcomponent 2.2: <i>Improving farmers’ access to knowledge for climate-smart agriculture, quality enhancement and value addition (US\$4 million)</i></b></p> |  |                             |

| Subcomponents & activities  | Climate Adaptation Benefits  | Climate Mitigation Benefits   |
|---|--|---|
| <p>The AF will support the extension system for the adoption of improved technologies that foster the food system resilience, boost productivity, and improve food security and producers' incomes.</p> <p>boost farm productivity and incomes within targeted value chains by promoting the adoption of climate smart good agricultural practices (GAPs).</p> <p>promote the strengthening of producers' organizations.</p> <p>strengthen resilience by increasing the adoption of quality and food safety standards in post-harvest and processing activities.</p> <p>Improve soil health and fertility</p> | <p>Capacity strengthening, training and advisory services for producers will be provided on improved and climate smart technologies, innovations, and management practices. This will include training on access and use of climate-resilient, high-yielding seeds and scaling up soil health and fertility management practices.</p> <p>Access to critical knowledge will enhance the capacities of the extension system and farmers to anticipate and respond to climatic shocks, thereby building their resilience and enhancing the productive capacity of the natural resources. Adoption of CSA practices such as mixed cropping, vegetable and cereal rotation (crop rotation), and use of drought and flood-tolerant varieties such as rice and vegetable seeds) will help producers adapt to the impacts of extreme weather events.</p> | <p>The use of crop husbandry practices, such as use of mixed cropping, vegetable and rice rotation and use of drought and flood-tolerant varieties (rice and vegetables seeds), no tillage, minimum tillage, use of cover crops and organic fertilizer, such as manure and composts, and the promotion of agroforestry activities (use of woody perennials, such as trees, shrubs, palms, bamboos, etc.) and alley cropping) will contribute to reducing greenhouse gas emissions.</p> <p>The above-mentioned practices can also halt the degradation of natural resources and improve soil fertility in Benin's fragile ecologies.</p> |
| <p><b>Subcomponent 2.3: Support for irrigation development (US\$86 million)</b></p>   |  |   |
| <p>The AF will support the development of irrigation for rice and vegetable production.</p>   | <p>Benin relies heavily on rainfed agriculture, which constitutes nearly 90% of the total cropland use. This makes the rural economy vulnerable to changing climate, be it in terms of droughts or rainfall. Adaptation towards these climate risks is the key driver for the project's support to improved irrigation. Rainfed crops adaptation measures include the development of new irrigation infrastructure to address water stress.</p> <p>All irrigation infrastructure will incorporate climate considerations in their design, including water and energy-saving technologies.</p> <p>Capacity building efforts will provide farmers with resources and expertise to ensure effective management and routine maintenance of irrigated</p>   | <p>The use of energy and water saving irrigation infrastructure will contribute to reduce GHG emissions compared to a business as usual.</p>  |

| Subcomponents & activities   | Climate Adaptation Benefits   | Climate Mitigation Benefits |
|--|---|-----------------------------|
|  | areas and infrastructure. Notably, given high flooding risk, trainings will be provided on flood risk management, disaster risk response, and post-disaster maintenance of irrigation infrastructure. |                             |
| <b>Component 3: Promoting private investment and access to finance</b> |   |                             |
| No additional activity by the AF project.                              |   |                             |
| <b>Component 4 - Project Management (US\$4 million)</b>                |   |                             |

### ANNEX 3: ECONOMIC AND FINANCIAL ANALYSIS

1. **This annex presents the economic and financial analysis (EFA) for the proposed AF of the Agricultural Competitiveness and Export Diversification Project (PACOFIDE-AF) in Benin**, which aims to increase food production and enhance the resilience of the food system to future, especially in fragile/sensitive geographic areas of the country. The evaluation is built on the cost-benefit analysis (CBA) approach applied to the core project interventions, i.e., the Component 2 (increased productivity, value-addition and resilience), which absorbs about 95 percent of project resources. However, since the project is also investing in supporting export (e.g., through export promotion, capacity strengthening on compliance with quality and traceability standards (Component 1), such activities are also considered in this analysis by including two models on post-harvest activities along the targeted value chains.

2. The analysis focuses on main value chains targeted by the AF, that is, rice, horticulture, pineapple and cashew. Part I of this annex introduces the identification of benefit streams, followed by Part II, which describes the methodology and assumptions. Part III presents the results of the financial analysis. Finally, Part IV summarizes the assumptions of the economic analysis and its results, including a sensitivity analysis to test the results' robustness under different scenarios.

3. **Overall, the PACOFIDE-AF interventions are economically feasible, generating a net present value (NPV) of about US\$296.39 million (at 6 percent discount rate) and an economic internal rate of return (EIRR) of 23.76 percent over a 20-year period, not accounting for the environmental externalities.** Such results indicate that the project will be economically feasible (NPV is positive and EIRR above the opportunity cost of capital), also given that several other project benefits could not be quantified due to the difficulty of assigning a monetary value to them. In addition, these economic results are robust when testing several sensitivity scenarios, including delays in implementation, cost overruns and reductions in benefits. Moreover, the results are in line to those pertaining to the parent project.

4. **The valuation of environmental externalities further enhances the economic justification of the PACOFIDE-AF.** As described in Annex 4 on greenhouse gas (GHG) accounting, the project is estimated to be a carbon sink, as it would be capable to reduce net GHG emissions production by about 3.508 million tons CO<sub>2</sub>e over 20 years, corresponding to 175,409 tons of CO<sub>2</sub>e per year. As such, when evaluating these environmental benefits using the estimates of the social price of carbon, the overall economic results of the project increase to an NPV of US\$420.64 million and an EIRR of 32.17 percent (assuming the low range carbon pricing) and to an NPV of about US\$544.54 million and an EIRR of 42.07 percent (assuming the high range carbon pricing).

#### I. Identification of benefits

5. **In line with the parent project, PACOFIDE-AF's main quantifiable benefits will be derived from higher, stable income and assets of producers and processors.** In particular, through an integrated approach to value chain development, the activities of the PACOFIDE-AF are expected to generate three main benefit streams: (i) *production benefits at farmers' level*, such as improved access to inputs (including mechanization<sup>19</sup>), increased crop production and productivity, and enhanced resilience to weather variability and climate change risks; (ii) *benefits at the level of farmers' organizations and individual entrepreneurs' operating downstream the value-chain*, arising from improved processing, storage and marketing of products along with capacity development (quality standards of products); and (iii) *environmental co-benefits*, such as

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<sup>19</sup> The project will allow producers to access mechanization through three options: (i) Individual equipment; (ii) collective equipment; (iii) mechanization through service providers.

natural resources protection and reduced GHG emissions through the adoption of climate-smart technologies.

6. **As intangible benefits, improved incomes and assets will generate additional social benefits in the form of improved food security and nutrition, enhanced social and economic inclusion of youth and women and higher resilience of “fragile/sensitive” areas.** The project is also expected to create other benefits (e.g., as policy and institutional strengthening) which cannot be quantified at this stage due to the difficulty of attributing a monetary value to them.

## II. Methodology and assumptions

7. **This CBA analysis follows the standard methodology recommended by the World Bank, as described in Gittinger (1982), Belli et al. (2001) and is aligned with recent guidelines on economic and financial analysis.** The financial analysis was conducted to assess the profitability of the proposed project activities (with-project, WP) situation), modelled from the perspective of the target beneficiaries, and compared with the without-project (WOP) situation. Where data availability allowed, financial models related to the targeted value chains have been prepared with computed costs and benefits experienced by the beneficiaries, using market prices. A full description is provided below. Such models are representative of the investments likely to be developed by the project beneficiaries. They are also based on plausible assumptions arising from the recent experience of other World Bank funded projects in Benin and other comparable countries in the region, along with the consultations with stakeholders in the project area and agricultural statistics. Across the models, the analysis assumed a gradual uptake of improvements over 2 to 5 years. The opportunity cost of capital used is 8.5 percent in line with the parent project and World Bank guidelines.<sup>20</sup> Similarly to what has been assumed by the ex-ante EFA of the initial financing, the financial models for the present analysis are mostly developed over either a 10 or 20-year period, depending on the nature of the investment.<sup>21</sup>

8. **The economic analysis follows a similar approach, aggregating the targeted results at project level and from the society viewpoint.** It uses the incremental benefits aggregated across the expected total number of beneficiaries and assumes a different adoption rate depending on the activity.<sup>22</sup> The number of hectares for the agricultural production have been estimated based on the project targets and the crop production cycles. As some of the project costs are already integrated in the individual models, the total project economic costs have been adjusted by taking into account costs already included in the financial models to avoid double counting to determine the overall economic viability of the project. Economic prices are calculated using conversion factors reflecting prevailing taxes and subsidies. As for the parent project, the discount rate used for the economic analysis is 6 percent and is in line with the World Bank guidelines and the practice of recent projects. Given the nature of the investments, the analysis considers a project economic life of 20 years.

9. **Rice value chain.** The project will promote rice production through the development of about 3,000 hectares of newly irrigated perimeters. Based on this information and on consultations with stakeholders,

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<sup>20</sup> The financial discount rate (8.5 percent) is the average of the real interest rate of the deposits (5%) and the interest rate at which the beneficiaries have access to credit (12 percent).

<sup>21</sup> The model parameters were developed based on the guidance from the PADEFA's project document, PSDSA 2025 and PNDP and the technical meetings with potential project stakeholders.

<sup>22</sup> For instance, it is assumed an 80 percent adoption rate for the newly irrigated perimeters and the newly developed areas. However, for other crop production it has been assumed a more conservative rate, that is 70 percent. However, this is much higher than the adoption rate assumed for the parent project (on average 45 percent). Thus, possible reductions in the adoption rate are tested in the sensitivity analysis, examining the results' robustness under the reduction in the benefits' flow.

the present analysis develops two models concerning irrigated rice, for the newly-developed sites in the Karimama area (912 ha), Malanville area (525 ha) and Malanville II area (1,563 ha). As a result of the new investments, the yield of rice cultivated using new irrigation infrastructure is expected to increase to 7 t/ha, compared to the scenario in absence of the project (WOP yield of 2.5t/ha).<sup>23</sup> It has been assumed that the project interventions will allow having 3 (Karimama) and/or 2.5 (Malanville) cycles of rice production per year.<sup>24</sup> In addition, farmers will be able to have one cycle of horticulture production per year (details on yields below) in two irrigated perimeters (Malanville and Malanville II). Table A3.1 below shows the total number of hectares supported divided by models, considering the number of cycles and the number of years.

**Table A3.1 Distribution of hectares per rice model**

| Model                                    | Hectares       |
|--|----------------|
| Karimama- 3 cycles/year                  | 2,736.0        |
| Malanville- 2.5/cycles/year              | 1,312.5        |
| Malanville II- 2.5/cycles/year x 3 years | 3,907.5        |
| <b>Total</b>                             | <b>7,956.0</b> |

10. **Horticulture value chain.** The project will support vegetable production aimed at contributing to household food and nutrition security and at generating marketable surpluses in all project areas. Specifically, The PACOFIDE-AF will focus on tomato, pepper, and onion production in the irrigated areas of Malanville and Malanville II sites (with a cultivation intensity of 1 cycle per year, most likely in the second rice season). To estimate the financial returns, the present analysis develops one model of the associated cultivation of these three crops. Assumptions and technical coefficients are in line with other relevant initiatives in Benin.<sup>25</sup> The positive effects of the project interventions are reflected in the higher average yields obtained by the beneficiaries in the with-project situation (8.2t/ha, 6.2t/ha, and 15.2t/ha for tomato, pepper, and onion, per cycle respectively) compared to those in absence of the project (6.7t/h, 3.5t/ha, and 13.0t/ha per cycle).<sup>26</sup> Table A3.2 below shows the total number of hectares supported divided by model.

**Table A3.2 Distribution of hectares per horticulture model**

| Model\Hectares by culture    | Tomato     | Onion      | Pepper     | Total      |
|------------------------------|------------|------------|------------|------------|
| Malanville- 1 cycle/year*    | 42         | 74         | 42         | <b>158</b> |
| Malanville II- 1 cycle/year* | 125        | 220        | 125        | <b>469</b> |
| <b>Total</b>                 | <b>167</b> | <b>294</b> | <b>167</b> | <b>627</b> |

\* According to the preliminary design study for the Malanville irrigation study, 158 ha will be dedicated to horticulture once per year (most likely in the second rice season). It is assumed that farmers will grow the following crops: tomato (27% of the area), pepper (27% of the area), and onion (47% of the area).

<sup>23</sup> The detailed preliminary project report on the development of irrigation perimeters in the Niger Valley indicates higher yields, but based on consultations with the project experts, the analysis assumes a conservative stance on the yields obtained thanks to the project.

<sup>24</sup> For more details, see the preliminary design study for the new irrigation perimeters (Karimama and Malanville, batch 1).

<sup>25</sup> E.g., see the Regional Programme for the Integration of Agricultural Markets (PRIMA Benin)

<sup>26</sup> The detailed preliminary project report on the development of irrigation perimeters in the Niger Valley indicates higher yields, but based on consultations with the project experts, the analysis assumes a conservative stance on the yields obtained thanks to the project.

11. **Pineapple and cashew value chains.** The project will also support pineapple and cashew production, in line and continuation with the interventions foreseen under the parent project. The project will support: (i) rehabilitation of 34,000 ha of old cashew plantation; (ii) development of additional 7,000 ha of new cashew plantation; and (iii) the creation of a 1,000-ha model farm for pineapple plantation. It is expected that project interventions will generate productivity gains as follows: cashew yield in the rehabilitated sites will grow from 400 Kg/ha (WOP scenario) to 800 Kg/ha (WP scenario); cashew yield in the new plantation sites will reach 1,200 Kg/ha (WP scenario) as compared to 400 Kg/ha (WOP scenario); pineapple yield in the model farm (where the *Cayenne lisse* variety will be planted) will be around 75t/ha, as compared to 60t/ha (WOP scenario). Such yield increase (100 percent for cashew in the rehabilitated old plantations, 200 percent for cashew in the new site plantations, and 25 percent for pineapple) are comparable to what has been assumed in the economic and financial analysis conducted for the parent project, to ensure consistency. For farmers, the productivity gains and additional income generation are realized through the adoption of improved, resilient and modern practices.

12. Thanks to the awareness created by the project and increase in productions with, a certain number of producers organizations or individual entrepreneurs will engage in agribusiness activity aimed at processing and exporting fresh pineapple and cashew. Such business operations will buy fresh raw material from the production units described above, and will export to Europe, after processing and conditioning to ensure proper quality standards for the export market. Tables A3.3 and A3.4 present a simulation of the potential flow of pineapple and cashew nuts produced and exported, as results of project operations.

**Table A3.3. Quantity of pineapple produced/exported (at maturity of the investments)**

| Item                               | Unit of measure              |        |
|------------------------------------|------------------------------|--------|
| Average annual production          | Kg/ha                        | 35,000 |
| Total production of the model farm | Tons                         | 35,000 |
| Purchase of raw material/unit      | Ton/enterprise               | 4,389  |
| Total export capacity              | Number of export enterprises | 8.5    |

**Table A3.4. Quantity of cashew produced/exported (at maturity of the investments)**

| Item  | Unit of measure              |        |
|---|------------------------------|--------|
| Annual production from rehabilitated plantation | Tons                         | 27,200 |
| Annual production from new plantation           | Tons                         | 8,400  |
| Purchase of raw material/unit                   | Ton/enterprise               | 6,500  |
| Total export capacity                           | Number of export enterprises | 5.5    |

### III. Financial results

13. **Based on these parameters, all financial models demonstrate the profitability of the investments.** As concerns (annual and perennial) crop production, the project will generate net incremental benefits, with respect to the baseline, ranging from US\$369/ha/year for cashew produced in a rehabilitated plantation to

an average of US\$5,269/ha/year for pineapple produced in a model farm. Similarly, processing and marketing investments, purchasing raw fresh product from the farms supported by the project, can generate net incremental incomes ranging from about US\$490,055/year per enterprise for fresh pineapple export to US\$678,226/year per enterprise for export of cashew nuts. Looking at the 10 or 20-year net present value at a discount rate of 8.5 percent, the results are more than satisfactory (see Table A3.5).

**Table A3.5 Summary of financial returns for crop activities**

|   | Malanville area**     | Karimama area*** | Pineapple production | Cashew rehabilitated plantation | Cashew new plantation | Fresh pineapple export   | Raw cashew nut export |
|---|-----------------------|------------------|----------------------|---------------------------------|-----------------------|--------------------------|-----------------------|
|   | US\$/year per hectare |                  |                      |                                 |                       | US\$/year per enterprise |                       |
| <b>Net incremental income* (US\$/year)</b>              | 3,175                 | 2,882            | 5,269                | 369                             | 641                   | 490,055                  | 678,226               |
| <b>Net present value, (@8.5%, 10- or 20-year, US\$)</b> | 9,516                 | 4,364            | 35,021               | 2,100                           | 3,692                 | 4,105,340                | 5,490,906             |

\*At full realization of benefits \*\* Rice: 2.5 cycles/year and Horticulture: 0.3 cycle/year; 525 ha\*\*\* Rice: 3 cycles/year, 912 ha

#### IV. Economic results

14. **Overall, the economic results of the proposed project are positive**, generating a net present value (NPV, at 6 percent social discount rate) of the net incremental benefits of US\$296.39 million and an economic internal rate of return (EIRR) of 23.76 percent (over a 20-year period and for an IDA budget of US\$150 million), not accounting for environmental externalities. Such results indicate that the project will be economically feasible (NPV is positive and EIRR above the opportunity cost of capital), also given that several other project benefits could not be quantified due to the difficulty of assigning them a monetary value. Therefore, such results represent an underestimation of the potential economic impact of the project.

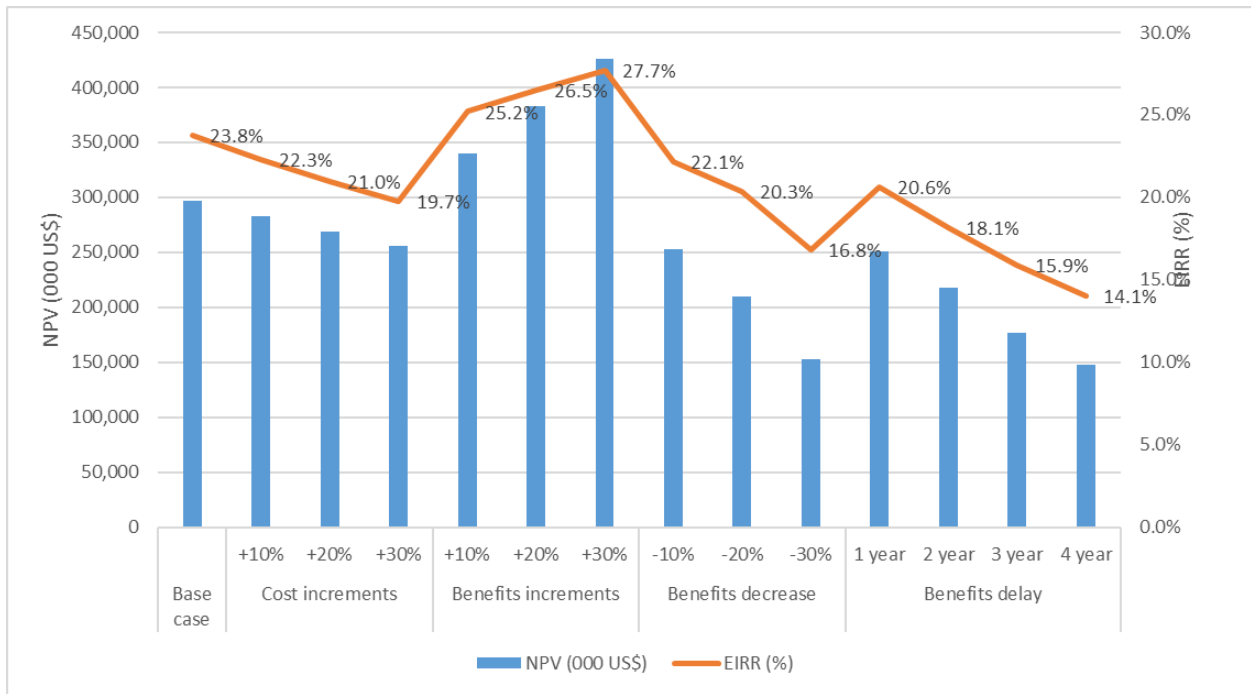
15. As described in Annex 4 (GHG Accounting), the project will also generate positive environmental externalities in the form of GHG mitigation. Indeed, the project will create a Carbon sink of about 3.508 million tCO<sub>2e</sub> over 20 years (net GHG emissions), or about 175,409 tCO<sub>2e</sub> per year). Using the World Bank's Guidance note on shadow price of carbon in economic analysis (2022 update), the social value of these environmental benefits has been also included in the overall economic results, using the low and high estimate range for the social price of carbon. As a result, the economic indicators improve, depending on carbon pricing scenario: assuming the low estimate range of carbon social price, the EIRR is 32.17 percent and the NPV is US\$124.24 million higher than in the base case; assuming the high estimate range, the EIRR becomes 42.07 percent and the NPV is US\$248.15 million higher than in the base case.

16. **Sensitivity analysis.** These economic results have been tested against several risk scenarios, delays in implementation, cost overruns, benefits decrease (e.g., due to reduced adoption rates). A summary of the



sensitivity analysis is presented in Figure A3.1. It indicates that the results of the CBA presented here are robust for small to moderate delays, cost overruns, and reduction in benefits. Yet, larger changes in these parameters can significantly affect the project’s economic justification. In all cases, however, the NPV is positive and the EIRR is above the opportunity cost of capital, confirming the economic feasibility of the project.

**Figure A3.1. Summary results of the economic analysis: base case and sensitivity analysis**



| Scenarios        |         | EIRR  | NPV (6%, 000 US\$) |
|------------------|---------|-------|--------------------|
| Base scenario    |         | 23.8% | 296,391            |
| Costs            | +10%    | 22.3% | 282,778            |
| Costs            | +20%    | 21.0% | 269,164            |
| Costs            | +30%    | 19.7% | 255,551            |
| Benefits         | -10%    | 22.1% | 339,644            |
| Benefits         | -20%    | 20.3% | 382,896            |
| Benefits         | -30%    | 16.8% | 426,149            |
| Benefits delayed | 1 year  | 20.6% | 253,139            |
| Benefits delayed | 2 years | 18.1% | 209,886            |
| Benefits delayed | 3 years | 15.9% | 153,020            |
| Benefits delayed | 4 years | 14.1% | 251,065            |



#### ANNEX 4: GREENHOUSE GAS (GHG) ACCOUNTING

- 1. Corporate mandate.** The World Bank has adopted, in its 2012 Environment Strategy, a corporate mandate to conduct GHG emissions accounting for investment lending in relevant sectors. The ex-ante quantification of GHG emissions is an important step in managing and ultimately reducing GHG emissions, and it is becoming a common practice for many international financial institutions. Such emissions are global environmental benefits or costs which are externalities-related and public in nature.
- 2. Annex 3 presents the preliminary greenhouse gas (GHG) accounting for the proposed Additional Financing of the Agricultural Competitiveness and Export Diversification Project (PACOFIDE-AF) in Benin.** In line with the World Bank's corporate guidelines, the present analysis is using the Ex-Ante Carbon-balance Tool (EX-ACT) version 9.4.1 developed and updated by FAO since 2010<sup>27</sup>, to assess a project's net carbon-balance. The carbon-balance is defined as the net balance from all GHGs expressed in CO<sub>2</sub> equivalents (CO<sub>2</sub>e) that are to be emitted or sequestered due to project implementation (under the 'with project' scenario - WP) as compared to a business-as-usual scenario ('without project' scenario -WOP). The carbon balance is selected as an indicator of the mitigation potential of the project.
- 3. EX-ACT estimates the carbon stock changes (emissions or sinks), expressed in equivalent tons of CO<sub>2</sub> per hectare and year.** It is a land-based accounting system, estimating CO<sub>2</sub>e stock changes (i.e., emissions or sinks of CO<sub>2</sub>) expressed in equivalent tons of CO<sub>2</sub> per hectare and year. The tool is built mostly using mostly data from the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (NGGI-IPCC, 2006) that furnishes EX-ACT with recognized default values for emission factors and carbon values in soils and biomass ("Tier 1" precision level).
- 4. Project boundary and key assumptions.** For the present project, the calculations have been based on main agro-ecological characteristics of the project area in Benin (tropical moist climatic conditions with low-activity clay – LAC soils), and on the parameters of land use and crop management practices aligned to the economic and financial analysis (EFA). The project implementation phase is 5 years of actual implementation, and the capitalization phase is assumed to be 15 years, resulting in a 20-year implementation period, which is common in the use of EX-ACT and aligned with the project period for the EFA.
- 5. Changes in cropland management are simulated in the 'cropland module' of the tool, and specifically in the annual, perennial, and flooded rice sub-modules.** Overall, it is assumed that, under the WP scenario, farmers will adopt Improved agronomy (i.e., sustainable rice intensification -SRI), better nutrient management and overall enhanced resilient practices. In the 'annual' sub-module, it is assumed that horticulture in the Malanville site (525 ha) will be managed without tillage, fertilized with high Carbon inputs, including use of manure and organic substance, and retaining crop residues. Similarly, pineapple production<sup>28</sup> in the model farm (1,000 ha) will be managed using a climate-smart approach (reduced tillage, use of high Carbon inputs with manure, and retaining crop residues in the field).
- 6. Rehabilitation of cashew plantation will happen on 34,000 ha (sub-module 'perennial crops').** In the WOP scenario, cashew is grown using traditional practices (full tillage, low Carbon input, residue/biomass burning), while under the WP scenario, climate-smart technologies are introduced (i.e., no tillage, high carbon input with manure, mulching/residue retention in the field). New cashew plantation will happen on 7,000 hectares (under improved management). It is assumed that such 7,000 hectares will be set-aside in the WOP scenario.
- 7. Irrigated rice under the WP scenario (Karimama and Malanville sites) is considered in the 'flooded rice' sub-module for an area of 7,956 ha.** Indeed, the total supported irrigated area for rice production is 3,000

<sup>27</sup> <http://www.fao.org/tc/exact/ex-act-home/en/>

<sup>28</sup> Pineapple production is realized in cycles of 2 years. However, for the purpose of this analysis, the crop is included in the 'annual' module and an average annual production is considered.



ha, but the project will allow to conduct multiple cycles on those hectares depending on the type of irrigation and the type of crops (e.g., 3 cycles per year on 912 hectares in Karimama and 2.5 cycles per year on 2,088 hectares in Malanville and Malanville II sites). Given that by default EX-ACT only considers 1 cycle per hectare per year, it has been inserted the number of irrigated hectares times the number of cycles per year on each hectare (total 7,956 hectares).

8. **Changes in the use of inputs are simulated in the ‘Inputs and investments’ module of the tool.** It is expected that, due to the enhanced intensity of crop production, the project will use an increased quantity of inputs. This is simulated in the ‘inputs’ sub-model. Also, the project will invest in the implementation of new irrigation systems. The GHG impact of such investment is simulated in the sub-module on ‘investments’. Table A4.1 presents the assumptions regarding changes in the use of inputs and for the development of irrigation infrastructure.

**Table A4.1. Changes in the use of inputs**

| <b>a) Annual agricultural inputs (in tons)</b> |                        |            |           |
|--|------------------------|------------|-----------|
|  | <b>Start</b>           | <b>WOP</b> | <b>WP</b> |
| Urea (N)                                       | 293                    | 293        | 299       |
| Synthetic fert (N)                             | 5.02                   | 5.02       | 328       |
| Phosphorus (P2O5)                              | 5.02                   | 5.02       | 328       |
| Potassium (K2O)                                | 5.02                   | 5.02       | 328       |
| N-fert in wet/irrigated areas                  | 750                    | 750        | 1,452     |
| Insecticides                                   | 251                    | 251        | 188       |
| <b>b) Irrigation</b>                           |                        |            |           |
| <b>Activity</b>                                | <b>System</b>          | <b>WOP</b> | <b>WP</b> |
|  | • Surface without IRRS | 0 ha       | 1,937 ha  |
| Development of irrigation infrastructure       | • Hand-moved sprinkler | 0 ha       | 500 ha    |

9. **Results.** The carbon balance results indicate that the project activities would generate - 9,751,486 tons CO<sub>2</sub>e (gross flux) over a period of 20 years. However, the net balance (obtained as the difference between the WP and the WOP scenario) is – 3,508,175 tons of CO<sub>2</sub>e (net flux). This represents a net carbon sink generated by the project over a period of 20 years<sup>29</sup> starting from project implementation. Per year, the mitigation potential is 175,409 tons of CO<sub>2</sub>e, or about 4.1 tons of CO<sub>2</sub>e per hectare and per year. Overall, the additional emissions generated by the increase in area and intensity of rice production and in input use are offset and surpassed by the reductions in emissions due to climate-smart annual (horticulture, pineapple) and perennial (cashew) crop production, ensuring the project’s carbon neutrality. The summary and detailed results are shown in Tables A4.2 and A4.3, respectively.

<sup>29</sup> Aligned to the EFA analysis period and assuming 5 years of implementation and 15 years of capitalization.



Table A4.2 Greenhouse Gas accounting: summary results from the EX-ACT Tool

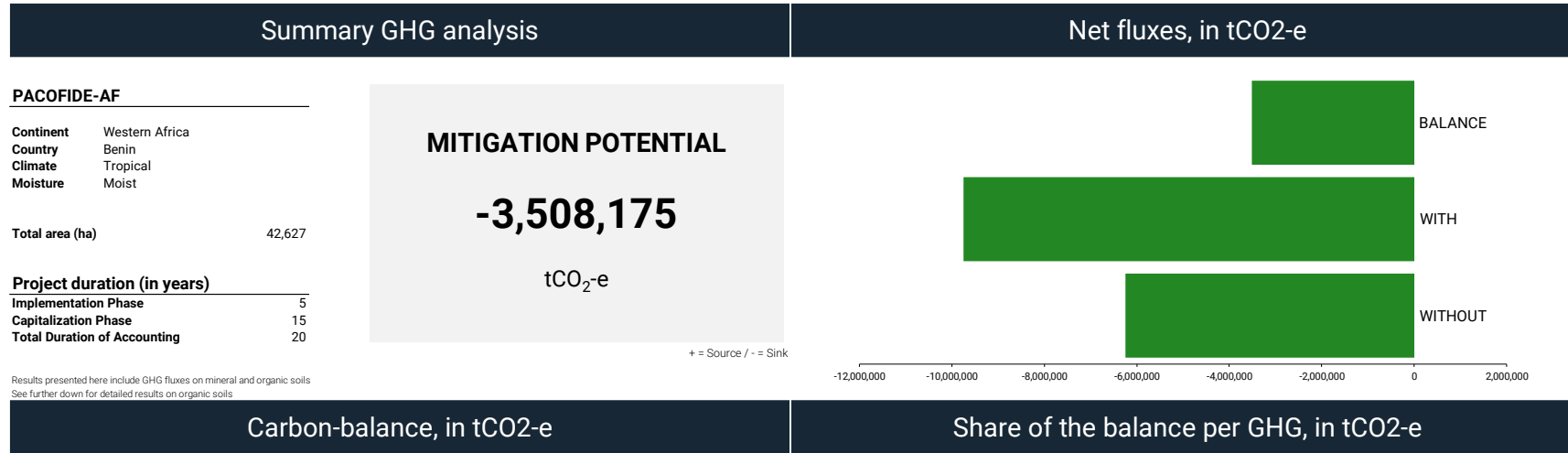




Table A4.3 Greenhouse Gas accounting: detailed results from the EX-ACT Tool

## DETAILED RESULTS

|                     |                |                                    |    |                        |        |                                 |     |
|---------------------|----------------|------------------------------------|----|------------------------|--------|---------------------------------|-----|
| <b>Project name</b> | PACOFIDE-AF    | <b>Project duration (in years)</b> |    | <b>Total area (ha)</b> | 42,627 | <b>Global warming potential</b> |     |
| <b>Continent</b>    | Western Africa | Implementation Phase               | 5  | Mineral soil           | 42,627 | CO <sub>2</sub>                 | 1   |
| <b>Country</b>      | Benin          | Capitalization Phase               | 15 | Organic soil           | 0      | CH <sub>4</sub>                 | 28  |
| <b>Climate</b>      | Tropical       | Total Duration of Accounting       | 20 | Waterbodies            | 0      | N <sub>2</sub> O                | 265 |
| <b>Moisture</b>     | Moist          |                                    |    |                        |        |                                 |     |

| GROSS FLUXES                             |                   |                   |                   | SHARE PER GHG OF THE BALANCE             |                   |                  |                 |                          | AVERAGE ANNUAL EMISSIONS |                 |                 |
|--|-------------------|-------------------|-------------------|--|-------------------|------------------|-----------------|--------------------------|--------------------------|-----------------|-----------------|
| In tCO2-e over the whole period analysis |                   |                   |                   | In tCO2-e over the whole period analysis |                   |                  |                 |                          | In tCO2-e/yr             |                 |                 |
| PROJECT COMPONENTS                       | WITHOUT           | WITH              | BALANCE           | CO2 BIOMASS                              | CO2 SOIL          | N <sub>2</sub> O | CH <sub>4</sub> | ALL NON-AFOLU EMISSIONS* | WITHOUT                  | WITH            | BALANCE         |
| Land use changes                         |                   |                   |                   |  |                   |                  |                 |                          |                          |                 |                 |
| Deforestation                            | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Afforestation                            | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Other land-use                           | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Annual                                   | 12,475            | -84,327           | -96,802           | 0  | -95,501           | 557              | -1,859          | 0                        | 624                      | -4,216          | -4,840          |
| Cropland                                 |                   |                   |                   |  |                   |                  |                 |                          |                          |                 |                 |
| Perennial                                | -6,591,318        | -10,476,169       | -3,884,851        | -733,536                                 | -2,960,062        | -96,356          | -94,896         | 0                        | -329,566                 | -523,808        | -194,243        |
| Flooded rice                             | 108,572           | 458,998           | 350,425           | 0  | 0                 | 0                | 350,425         | 0                        | 5,429                    | 22,950          | 17,521          |
| Grasslands & Livestock                   |                   |                   |                   |  |                   |                  |                 |                          |                          |                 |                 |
| Grasslands                               | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Livestock                                | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Forest mngt.                             | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Inland wetlands                          | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Coastal wetlands                         | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Fisheries and aquaculture                | 0                 | 0                 | 0                 | 0  | 0                 | 0                | 0               | 0                        | 0                        | 0               | 0               |
| Inputs & Invest.                         | 226,960           | 350,013           | 123,052           | 0  | 0                 | 50,508           | 0               | 72,545                   | 11,348                   | 17,501          | 6,153           |
| <b>Total emissions, tCO2-e</b>           | <b>-6,243,310</b> | <b>-9,751,486</b> | <b>-3,508,175</b> | <b>-733,536</b>                          | <b>-3,055,563</b> | <b>-45,291</b>   | <b>253,671</b>  | <b>72,545</b>            | <b>-312,166</b>          | <b>-487,574</b> | <b>-175,409</b> |
| <b>Total emissions, tCO2-e/ha</b>        | <b>-146.5</b>     | <b>-228.8</b>     | <b>-82.3</b>      | <b>-17.2</b>                             | <b>-71.7</b>      | <b>-1.1</b>      | <b>6.0</b>      | <b>1.7</b>               |                          |                 |                 |
| <b>Total emissions, tCO2-e/ha/yr</b>     | <b>-7.3</b>       | <b>-11.4</b>      | <b>-4.1</b>       | <b>-0.9</b>                              | <b>-3.6</b>       | <b>-0.1</b>      | <b>0.3</b>      | <b>0.1</b>               |                          |                 |                 |

+ = Source / - = Sink  
 Results presented here include GHG fluxes on mineral and organic soils  
 See further down for detailed results on organic soils  
 \* Includes fisheries, aquaculture and inputs & investments that are not included in the AFOLU definition.

| Uncertainty level | tCO2-e/yr | Percent |
|-------------------|-----------|---------|
| WITHOUT           | -312,166  | 34%     |
| WITH              | -487,574  | 38%     |
| BALANCE           | -175,409  | 46%     |