

Bhutan

Commercial Agriculture and Resilient Livelihoods Enhancement Programme Mid-term Review

Main report and appendices

Mission Dates: 24 November – 7 December 2018
Document Date: 16/02/2019
Project No. 1100001739
Report No. 4990-BT

Asia and the Pacific Division
Programme Management Department

Abbreviations and Acronyms

| | |
|----------------|--|
| AIT | Artificial Insemination Technician |
| AOS | Annual Outcome Survey |
| ARDC | Agricultural Research and Development Center |
| ASAP | Adaptation for Smallholder Agriculture Programme (IFAD) |
| AWPB | Annual Plan and Budget |
| BCR | Benefit Cost Ratio |
| BOQ | Bill of Quantities |
| BTN | Bhutanese Currency (Ngultrum) |
| C/B | Cost Benefit |
| CAHW | Community Animal Health Worker |
| CARLEP | Commercial Agriculture and Resilient Livelihoods Programme |
| CCA | Climate Change Adaptation |
| CoP | Community of Practice |
| COSTAB | Cost Tables |
| CPM | Country Programme Manager |
| CSV | Climate Smart Village |
| DA | Designated Account |
| DA | Designated Account |
| DAO | Dzongkhag Agriculture Officer |
| DFG | Dairy Farmers' Groups |
| DLO | Dzongkhag Livestock Officer |
| EFA | Economic and Financial Analysis |
| EIRR | Economic Internal Rate of Return |
| FA | Financing Agreement |
| FCBL | Food Corporation of Bhutan |
| FM | Financial Management |
| FO | Financial Officer |
| FY | Financial Year |
| FYM | Farmyard Manure |
| FYP | Five Year Plan |
| GAO | Gewog Extension Officer |
| GPS | Global Positioning System |
| HDPE | High Density Poly Ethaline |
| HH | Households |
| HVAP | High Value Agriculture Project |
| ICP | IFAD Client Portal |
| IFAD | International Fund for Agriculture Development |
| IRR | Internal Rate of Return |
| ISM | Implementation Support Mission |
| IU | Implementing Unit |
| KIL | Koufuku International Limited |
| KM | Knowledge Management |
| LED | Light Emitting Diode |
| LF | Lead Farmer |
| LUC | Land Use Certificate |
| M&E | Monitoring and Evaluation |
| MAGIP | Market Access and Growth Intensification Project |
| MIS | Management Information System |
| MoAF | Ministry of Agriculture and Forests |
| MoF | Ministry of Finance |
| MSP | Multi Stakeholder Platform |
| MTR | Mid Term Review |

| | |
|----------------|---|
| MYRB | Multi-Year Rolling Budgets System |
| NPD | National Programme Director |
| NPSC | National Programme Steering Committee |
| NPV | Net Present Value |
| NRM | Natural Resource Management |
| NSC | National Seed Center |
| O&M | Operation and Management |
| OCC | Opportunity Cost of Capital |
| OPM | Office of Programme Management |
| PDR | Project Design Report |
| PEMS | Public Expenditure Management System |
| PP | Procurement Plan |
| PPPD | Public Procurement Policy Division |
| PSO | Programme Support Officer |
| RAA | Royal Audit Authority |
| RAMCO | Regional Agricultural Marketing and Cooperatives Office |
| RGoB | Royal Government of Bhutan |
| RIMS | Results and Impact Management System |
| RLDC | Regional Livestock Development Center |
| RNR | Rural Natural Resources |
| RPIC | Regional Programme Implementation Committee |
| SBD | Standard Bidding Documents |
| SDR | Special Drawing Rights |
| SECAP | Social, Environmental and Climate Assessment Procedures |
| SLM | Sustainable Land Management |
| SOE | Statement of Expenditure |
| TA | Technical Assistance |
| THPP | Targeted Household Poverty Programme |
| TOR | Terms of Reference |
| TOT | Training of Trainers |
| USD | United States Dollar |
| VC | Value Chain |
| VFG | Vegetable Farmers' Groups |
| WP | With the Project |
| WA | Withdrawal Application |
| WOP | Without the Project |
| WUA | Water Users' Association |
| YG | Youth Groups |

Acronyms

| | |
|-----------------|-------------------|
| costab | Cost Tables |
| kg | Kilogram |
| logframe | Logical Framework |

Glossary

| | |
|------------------|---|
| Dzongkhag | District |
| Gewog | A sub-district in a District (consisting of several villages) |

A. Project Overview

| | | | |
|-------------------|--|------------------------------------|-------------------------------------|
| Region: | Asia and the Pacific Division | Project at Risk Status: | Not at risk |
| Country: | Bhutan | Environmental and Social Category: | B |
| Project Name: | Commercial Agriculture and Resilient Livelihoods Enhancement Programme | Climate Risk Classification: | 3 |
| Project Id: | 1100001739 | Executing Institution: | Ministry of Agriculture and Forests |
| Project Type: | Marketing/Storage/Processing | Implementing Institutions: | Food Corporation of Bhutan Ltd |
| CPM: | Louise C. McDonald | | |
| Project Director: | Dorji Wangchuk | | |
| Project Area: | | | |

| | | | |
|---------------------------------|-------------------|--------------------------|------------|
| Approval Date | 07/09/2015 | Last audit receipt | 03/01/2018 |
| Signing Date | 11/12/2015 | Date of Last SIS Mission | 07/12/2018 |
| Entry into Force Date | 11/12/2015 | Number of SIS Missions | 6 |
| Available for Disbursement Date | 01/03/2016 | Number of extensions | 0 |
| First Disbursement Date | 04/03/2016 | Effectiveness lag | 3 months |
| MTR Date | 24/11/2018 | | |
| Original Completion Date | 31/12/2022 | | |
| Current Completion Date | 31/12/2022 | | |
| Financial Closure | not available yet | | |

Project total financing

| | | |
|-------------------------------------|--------------------------------|---------------------|
| IFAD Financing breakdown | IFAD | \$11,281,031 |
| | ASAP Trust Fund | \$5,022,615 |
| | Asia and the Pacific Division | \$1,060,596 |
| | IFAD | \$8,273,429 |
| Domestic Financing breakdown | Beneficiaries | \$658,805 |
| | Food Corporation of Bhutan Ltd | \$4,802,410 |
| | National Government | \$5,773,849 |
| Co-financing breakdown, | To be determined | \$5,996,612 |
| Project total financing | | \$42,869,347 |

Current Mission

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|----------------------|--|
| Mission Dates: | 24 November – 7 December 2018 |
| Days in the field: | 11 days |
| Mission composition: | Mr Deep Joshi, Programme Management, Value Chains and Institutions Specialist, Ms Louise McDonald, CPM and Partnership, Mr A. Alam, Economist and EFA Specialist, Mr Emmanuel Jouvé, Climate Change and Environmental Specialist, Mr Carlo Marcello Spinello, Financial Management Consultant, Mr Michele Pirazzoli, Infrastructure Specialist, Ms Mehry Ismaili, M&E, MIS, KM, and Gender Specialist. Ms Rosana Hidalgo and Ms Elista Festa reward travel |
| Field sites visited: | Lhuentse, Mongar, Pergatshel, Samdrup Jongkhar, Trashiyangtse and Trashigang |

B. Overall Assessment

| Key SIS Indicator #1 | Ø | Rating | Key SIS Indicator #2 | Ø | Rating |
|---|---|--------|--|---|--------|
| Likelihood of Achieving the Development Objective | | 4 | Assessment of the Overall Implementation Performance | | 4 |

| | | | |
|--|----------|---|----------|
| Effectiveness and Developmental Focus | 4 | Project Management | 4 |
| Effectiveness | 4 | Quality of Project Management | 4 |
| Targeting and Outreach | 3 | Knowledge Management | 4 |
| Gender equality & women's participation | 4 | Value for Money | 3 |
| Agricultural Productivity | 4 | Coherence between AWPB and Implementation | 3 |
| Nutrition | | Performance of M&E System | 4 |
| Adaptation to Climate Change | 4 | Requirements of Social, Environmental and Climate Assessment Procedures (SECAP) | |

| | | | |
|---|----------|---|----------|
| Sustainability and Scaling-up | 4 | Financial Management and Execution | 4 |
| Institutions and Policy Engagement | 3 | Acceptable Disbursement Rate | 6 |
| Partnership-building | 4 | Quality of Financial Management | 4 |
| Human and Social Capital and Empowerment | 3 | Quality and Timeliness of Audit | 4 |
| Quality of Beneficiary Participation | 4 | Counterparts Funds | 4 |
| Responsiveness of Service Providers | 4 | Compliance with Loan Covenants | 4 |
| Environment and Natural Resource Management | 4 | Procurement | 4 |
| Exit Strategy | 3 | | |
| Potential for Scaling-up | 5 | | |

| | |
|------------------|----------|
| Relevance | 5 |
|------------------|----------|

C. Mission Objectives and Key Conclusions

Background and Main Objective of the Mission

IFAD fielded a Mid-Term review (MTR) mission from 24 November to 7 December 2018 to assess the overall progress of the programme and its achievements since its entry into force on 11 December 2015. The specific objectives of the mission were to (i) review component-wise progress of the programme; (ii) identify problems in implementation of work plans; (iii) address constraints being faced in programme management; (iv) assess the performance of partners; (v) review the fiduciary and accountability aspects of the Programme; and (vi) recommend modifications in the programme activities and corresponding Cost Tabs post-MTR.

The mission had a meeting with the Office of Project Management (OPM) team on 24 November 2018 at Somdrup Jongkhar, visited project villages in all the six programme Dzongkhags where it met with producers' groups engaged in vegetable and milk production and processing, lead farmers, youth groups (YG), Gewog Extension Officers and Dzongkhag Agriculture and Livestock Officers and saw various activities supported by the programme. The mission also met with the Dzongdas in Pemagashel, Trashiyangtse and Lhuentse, visited the Agriculture Research and Development Centre (ARDC), Regional Livestock Development Centre (RLDC), the National Seed Centre (NSC) at Trashiyangtse and the Koufuku International Ltd. (KIL) dairy processing unit in Trashigang. A preliminary wrap-up meeting was held during 2 to 3 December at OPM and RAMCO premises, respectively, with the OPM team and representatives of ARDC, RLDC, the Regional Agriculture Marketing and Cooperatives Office (RAMCO), KIL and Food Corporation of Bhutan Ltd (FCBL) to discuss and finalise revisions in project activities and budgets post-MTR. The mission met with Ms. Lhaden Lotay, Chief Programme Officer, Department of Macro-Economic Affairs, Ministry of Finance, Royal Government of Bhutan (RGoB). A final wrap-up meeting was held on 7 December 2018 at Paro, chaired by Dasho Rinzin Dorji, Secretary, Ministry of Agriculture and Forests (MoAF), RGoB and attended by members of the National Programme Steering Committee (NPSC) and OPM staff to discuss key findings and action points. The mission is grateful to the RGoB and all other partners for the courtesy and support extended to it.

Key Mission Agreements and Conclusions

The programme is operational in all six eastern Dzongkhags, including in remote villages deep in the rugged mountains. Though overall outreach is only about one-fifth of Project Design Report (PDR) targets, households organised into producer groups are active. A few youth groups have been formed and supported to set up processing enterprises. The dairy segment has made good progress and the marketing concerns highlighted in the previous supervision mission (SM) are getting addressed through market linkages with Koufuku International Ltd. The ban on cattle imports has been lifted for CARLEP as recommended by the previous SM. With the delineation of roles between FCBL and RAMCO, the latter is gearing up to facilitate vegetable marketing by groups, though a clear road map is yet to be developed and RAMCO has very limited staff (only four officers for the entire eastern region). Vegetable and dairy production has grown across all groups, as have incomes. However, there is high variance in average household production as well as incomes across groups within and across Dzongkhags, especially in case of vegetables.

Annual planning and implementation remains fragmented and Cost Tab driven, sans a clear strategic focus and with limited role for the OPM. Investment decisions are not backed by project documents and business plans, delineating costs, benefits, funding sources, linkages and expected incomes to households (HH); this also leads to under-reporting of local contribution as assets procured using the RGoB Block Grants to Dzongkhags/Gewogs may not be recorded as observed during field visits by the MTR mission.

The OPM should be strengthened by appointing Component Managers of the level of Dzongkhag Agriculture/ Livestock Officers (DAO/DLO) as per the PDR, addition of focal points for Project Management, Group Development and Marketing, respectively, and dedicated support from ARDC engineer and climate resilient agriculture expert. Each Dzongkhag should designate one CARLEP Focal Point from among the DAO and DLO. A systematic planning process should be introduced with clearly stated strategic objectives, business plans and sources of investments, integrated jointly by OPM and the Dzongkhag Focal Points. With KIL slated to replace FCBL in the Dairy Value Chain and RAMCO designated to facilitate market linkages for the vegetables, the MoU with FCBL should be amended and a MoU be signed with KIL to delineate their role in the Dairy Value Chain. With changes in the roles of FCBL and RAMCO, expansion in the southern and central Dzongkhags is less relevant now and these should be taken out of the operational area with Dzongkhags adjoining the six Eastern Dzongkhags included to meet the overall outreach targets without excessively increasing overheads. Accordingly, the physical targets and number of beneficiaries across Dzongkhags and Outputs should be spelt out afresh in line with the project goal to sustainably increase smallholder producers' incomes, keeping investment per household within acceptable limits to promote replication and sustainability of interventions.

Post-MTR CARLEP is to align with key 12th FYP priorities, i.e. crop intensification (market focused commodities), commercial vegetable production, entrepreneurship promotion (Youth enterprise development), irrigation (renovation, new construction and small scale technologies), land development, managing human wildlife conflict and organic farming. Components have been reorganised logically with built-in flexibility to facilitate outcome focused planning integrated with Dzongkhag plans.

The Financing Agreement will be revised to reflect reallocation of resources across components post-MTR.

D. Overview and Project Progress

Component 1: Market-led Sustainable Agricultural Production

Post-MTR, it has been agreed to reorganise outputs under this component as:

Output 1.1: Increased production resilience, diversification and innovation

Output 1.2: Vegetable production intensified and expanded

Output 1.3: Dairy production intensified and expanded

Output 1.4: Production-related infrastructure

The MTR assessment follows this structure.

Output 1.1: Increased production resilience, diversification and innovation

Crop diversification

New crops, such as spring maize, watermelon, quinoa and pulses were introduced on about 300 acres (1 183 HH). Post MTR the focus should be on crops with higher return to labour and proven market. Production clusters, based on a mapping exercise to identify production potential, will be promoted to reach volumes attractive to traders and activities with limited outreach and market channels may be dropped. While implementation performance is at 26 per cent of the target progress has been hindered by the current irrigation schemes that will be reviewed to meet context specific needs to increase opportunities.

Climate resilient agriculture

This was implemented in 6 climate smart villages (CSV). The vulnerability assessment process is adequate but the community does not have a copy of the results/maps. HHs in a CSV visited were unable to explain the assessment results and how resilient options were chosen. Activities seen by the mission, e.g. poly tunnels, new cattle pens, fodder cultivation were relevant and of good quality. Post MTR at least 36 CSVs (720 HH) should be taken (2/year/Dzongkhag).

Beneficiary participation in and ownership of assessment and planning process must be enhanced in the CSVs to strengthen local capacity. Sectoral interventions in CSVs are by nature interconnected and require coordination across Dzongkhag, research centers and the community so that options address vulnerabilities, needs and the capacity of HHs.

CSV implementation is proceeding at a good pace and quality although knowledge within the communities needs to be increased. The approach, following review and planning, has potential to be beneficial through increasing its application as the CARLEP moves forward with current and future agricultural opportunities.

Permaculture

Permaculture is not yet implemented at community level but 12 staff were trained and 17 nurseries for trees set up. Innovative options such as flexi biogas, solar dryers, etc. will continue to be supported in CSVs. Implementation has focussed training to farmers setting the framework for moving forward with full implementation. To date progress is satisfactory and should show good results over the next 12 months.

Output 1.2: Vegetable Production Intensified and Expanded

Support to vegetable farmers' groups (VFG)

So far 51 VFGs have been supported against PDR target of 420. Post MTR it was agreed to redefine Dzongkhag-wise targets, including YGs.

Marketing and production and post-harvest losses were cited as key constraints by VFGs. Post-MTR, support to VFGs will be based on simple business plans, spelling out their own opportunities and constraints in terms of production and marketing and a medium-term vision. Support should cover institutional strengthening of groups, including internal governance, financial management and oversight measures and adapted to the group's status based on the results of an assessment. Progress here is slow which is also limited by a lack of knowledge on the how side as government has always played the private sector roles and therefore no need for farmer groups and developing their capacity engage different traders/stakeholders.

Strengthening extension services and the Lead Farmer (LF) model

Training has been provided to Gewog extension staff in production, pest management, resilient agriculture, group development and market linkages. Gewog Agriculture Officers (GAO) met showed good technical capacity and insight into the potential and constraints in their area. More support and training is needed to enhance their capacity to solve technical issues on new crops (fertilisation, pests and disease management) and in institutional development and financial management in groups.

The LF model has proven potential to increase outreach and establish a viable non-state extension system. So far 49 LFs

have been supported. Post MTR 120 new LFs are to be supported jointly with ARDC and 720 via the Dzongkhags. These targets need to be spelt out Dzongkhag-wise.

The LF selection has been made participatory and is based on clear criteria involving the communities, GAO and DAO. CARLEP provides material and equipment to LFs to establish demonstrations on their farms. A LF farm visited had set up an integrated farming system including livestock (improved breed, cattle shed, chaff cutter, biogas) and crops (irrigated vegetable production with fruit trees). This will be continued post-MTR.

Some LFs also produce and sell seeds besides giving technical advice. So far 19 LFs have been supported to become certified seed producers to be linked with the National Seed Center (NSC). One of them met by the mission earns BTN 50,000 yearly by selling seeds and provides technical advice to 31 farmers. The LFs are also to be supported to enhance their extension and training skills.

The LF based extension model needs an embedded incentive system to be viable. Revenue from sale of seeds/inputs is a more realistic option than fees for technical advice. Contact details of LFs should be made public (through social media) to get them linked to other projects as trainers. Good progress has been made and focussing on the incentives approach further should further enhance implementation and support to farmer groups.

Support to research and seed centers

The NSC in Trashiyangtse visited by the mission produces vegetable and maize seeds. CARLEP supported it to raise production capacity and to process maize seed. As vegetable seeds are presently sent to NSC center at Paro to process and package, CARLEP will support this center to invest in equipment to process and package seeds collected from registered growers and distribute to farmers locally. Investment will be based on detailed plans with estimates of demand, production targets for vegetable seeds, investment needed, O&M costs and financial viability.

A mushroom spawn production unit will be supported at Agricultural Research and Development Sub-Center (ARDSC) at Khangma to supply mushroom spawn to producers. ARDSC is training 5 youth to set up enterprises to produce oyster mushroom spawn and grow mushrooms commercially. As with NSC, investment will be based on detailed plans. Progress in seed production is mainly around the foundations for moving forward however with two strong partners and opportunities to increase a rural economic base processing and packaging is a sound foundation to build on for sustainability.

Output 1.3: Dairy Production Intensified and Expanded

Support to dairy farmers groups (DFG)

Against the PDR target to develop 43 existing and 150 new DFGs, 5 existing and 11 new DFGs have been supported to construct 606 sheds, purchase improved breeds and produce fodder. Extension outreach through Community Animal Health Workers (CAHW) and Artificial Insemination Technicians (AIT) is also supported and 330 HHs in 22 DFGs were trained in clean milk production. These are generally of high quality but the project is well behind targets, e.g. 511 crossbreeds against a target of 2 000, 12 biogas units against 800.

DFGs have made impressive gains in productivity and HH incomes, confirming efficacy of the approach. Post MTR, these supports will continue but must be based on simple business planning.

Institutional strengthening support to DFGs is insufficient as in case of VFGs and similar inputs are needed. While targets met are low the results achieved for DFGs is impressive in both production and prices received which both increased. Having this as a base bodes well for increased implementation following the MTR.

Livestock extension

So far CARLEP has trained 44 CAHW and AIT. As with the LF, a viable incentive system is needed to sustain their interest. Experience shows the CAHW model cannot be sustained unless combined with the Artificial Insemination (AI) function as CAHW find it difficult to get fees for their service while AI is on paid-fee basis. So far 32 AI kits have been given to AITs and over 2 500 AI were done in 2017-18, up from about 1 700 a year before. Post MTR CAHW/AIT will also receive motorbikes for mobility besides AI kits. Good progress has been made on most of the activities. The key areas that need to be addressed are incentives and transport for CAHW to make it a sustainable approach.

Output 1.4: Production-related infrastructure

Irrigation channel rehabilitation

Coverage so far is 1 795 acres (1 100 HHs), including 504 acres (312 HHs) in FY 2017-18, representing 149% of PDR target for area and 28% for budget. Designs lack features to improve climate resilience or crop intensification and command area reported in technical documents differs from project output reports. While coverage has been very good is has focussed on rehabilitation and emergency repairs and not included the above factors which will now be addressed following the MTR.

Water efficient irrigation

Cumulative coverage is 551 acres, including 373 acres (549 HHs) in FY 2017-18. Sprinklers and hose-tank systems are

preferred though drippers would be more effective in the dry windy conditions in open-field cultivation in the region. Two piped networks for Land Use Certificate (LUC) areas have been installed. Design for piped schemes must include layouts and details of fittings. On- and off-farm investments and repairs need to be reported separately. Implementation progress here is very good although the reporting system is not capturing the different nature of investments to show the difference in efficiencies. Additionally there is a need to apply different technologies such as drip irrigation which to date is not widely known in Bhutan. The MTR has proposed a range of options for further improvement in this activity.

Pump irrigation

Feasibility study of 6 pump irrigation units has been done with criteria to prioritize investments. Aspects missing are pump sizing based on crop water requirement, costs (including distribution network and hydraulic structures), a scheme to recover O&M costs, incremental returns. Once these are addressed, detailed designs may be developed for priority schemes. The option of pumping schemes has a relatively wide degree of potential for scaling up, particularly at the valley bottoms nearby permanent streams and the feasibility study will be broadened to include the financial implications for farmers.

Capacity building for Engineers/WUAs

An IFAD ISM trained 15 Engineers (12 from Gewogs, 1 from Dzongkhag and 2 from ARDC) in irrigation design and an online sharing platform for technical references, etc. was established among them. Given the newness and complexity of pipe-based schemes and regular staff transfers, continued capacity building of Gewog engineers and close engagement of ARDC engineers is needed. The target reached exceeded that of the AWPB however as noted capacity building should be an on-going process in order to keep up with new technologies and issues.

Water Users' Associations (WUAs) are reported functional in rehabilitated schemes and were trained by Gewog and ARDC staff. As the schemes are small, producers' groups can manage them. The example of charging irrigation water fee by a VFG in Mongar is encouraging and should be explored as a model for sustainability. Piped schemes offer much scope to improve on-farm water management, e.g. drip irrigation, but need proper scheduling for which Dzongkhag and Gewog engineers need training. Implementation is proceeding well in 12 command areas and with the proposed exchange visits should further enhance the sustainability by applying water fees as a principle.

Issues on irrigation investments

Financial and economic analysis of investments is presently not done. Post MTR it should be an integral part of the information sheet to seek IFAD "no objection" for irrigation investments.

Irrigation works should have a two-year implementation period so that budgets are based on designs rather than generic estimates as at present. The approach should be harmonised across Dzongkhags with itemised costs properly documented. This would ensure that the results would support financially viable production increases enhancing returns to farmers.

Land development

HHs reported up to 50% labour savings from terrace widening piloted by CARLEP. RGoB has developed detailed guidelines for such works with beneficiary co-financing and a targeting mechanism with full support for poor HHs under the Targeted Household Poverty Programme (THPP). Good progress has been made and the results significant enough for land development to be included in the new 12th FYP.

Electric Fencing

Crop losses from wildlife were widely reported by farmers. ARDC has piloted solar electric fencing as a mitigation measure. While it is being refined, there is enough evidence of its effectiveness to upscale post MTR. Based on the successful pilots this is also included in the new 12th FYP.

Rural roads

Selected investments in farm roads upgradation and extension would also be considered post-MTR once RGoB finalises guidelines to harmonise investments across projects. Progress has been suspended until guidelines for Bhutan are completed by Government to ensure consistency and durability and thus these activities will resume post t=MTR.

Component 2: Value Chain (VC) Development and Marketing

It has been agreed to reorganise outputs and allocate resources for interventions with proven potential as below:

- Output 2.1: Vegetable commercialisation
- Output 2.2: Dairy commercialisation
- Output 2.3: Support to entrepreneurs

The MoU with FCBL will be amended as: i) FCBL is now mandated to focus on exports and bulk marketing with RAMCO facilitating local marketing; ii) vegetable exports are largely through traders; iii) expansion in southern and central Dzongkhags is to be dropped; iv) FCBL has not implemented VC activities; and v) KIL is supporting dairy VC. Implementation arrangements will be reviewed to shift the focus on supporting the role of the private sector to

commercialise agriculture.

Output 2.1: Vegetable commercialisation

Vegetable marketing so far is through government facilitation (e.g. to schools), unorganised retail channels in towns and itinerant traders rather than linkages systematically developed between VFGs and traders. VFGs visited mentioned market reliability as a key constraint. Project support is yet to lead to a market pull. Linking VFGs with schools has been a success but demand is limited, contracts negotiated yearly and prices are low.

Post MTR, the focus will be to stimulate larger and systematic private sector involvement using the multi stakeholder platform (MSP) approach developed under IFAD-funded HVAP in Nepal, introduced to the CARLEP stakeholders in 2017 via a 3-day workshop. Pilot MSPs will be facilitated by the proposed Business Development/ Marketing TA at OPM.

Vegetable marketing infrastructure (Gewog/village level)

Initiatives in post-harvest operations of vegetable products visited by the mission confirmed scaling-up potential. These will be co-financed based on business plans from VFGs.

Vegetable marketing infrastructure (Dzongkhag/urban level)

This will support RAMCO initiatives to upgrade the Dzongkhag level markets and introduce market information dissemination equipment as in the Mongar market.

Output 2.2: Dairy commercialisation

Milk collection and processing units

Support for dairy commercialisation has had some success and will be continued post MTR, including equipment to DFGs to set up milk chilling and processing units. This will enable the production to further increase as planned and still have a clear market. Good progress has been made in the dairy sector overall.

Support to KIL

CARLEP will enter into a formal partnership with KIL as recommended by previous SM, based on an investment proposal from KIL as discussed during the MTR. Any investments made will through the farmers groups and would be considered at a later point as their "share holding" in KIL.

Output 2.3: Support to entrepreneurs

The mission visited several small processing businesses supported by CARLEP and the Dzongkhags. The best examples were a dairy processing unit by young women's YG and a confectionary by men's YG at Mongar and a dairy processing unit at Lhuentse. It was agreed to intensify support to such initiatives by young entrepreneurs and YGs. CARLEP will provide support to business planning for a range of private stakeholders and award matching grants to co-finance these on a competitive basis. Progress has reached 50 per cent of target but has potential to be scaled up for YG and women.

Support for business planning

Support for business planning and financial management is a key missing dimension in group development. Groups are keen to get support in business planning to help them choose crops and cropping calendar as aligned to market demand. The region has comparative advantage to supply out of season vegetables to India to generate stable incomes if production is planned as per reliable market information. This would be a new area for implementation.

The proposed market facilitator at OPM will develop a simple format for VFGs to make business plans for CARLEP support and facilitate VFGs' access to finance.

Matching grant facility

A matching grant facility will support existing/ new enterprises. The selection process followed will include:

- wide dissemination of information on the facility
- assistance to prepare proposal
- independent review and evaluation of proposals
- award of matching grants with formal agreements and
- implementation and monitoring by the Dzongkhags supported by OPM component managers.

Potential private enterprises eligible for matching grant are:

- Post-harvest/processing
- Trading
- Agri-services
- LUCs

Component 3: Institutional Support

Besides installation of 2 LED screens, 2 digital display boards and a control room at Mongar market shed by RAMCO (using a small part of the allocation as it other funds for market MIS), there has been no progress under this component. However, CARLEP experiences, e.g. drip and sprinkler irrigation and land development have been incorporated in 12th FYP priorities.

Several Dzongkhags expressed the need to strengthen Gewog and Dzongkhag extension systems. It was agreed to incorporate these under this component.

This component is fundamental to the overall success of CARLEP and will also require seeing changes in current institutional mandates for a private sector to develop and grow.

Output 3.1: Strengthening Dzongkhag and Gewog staff

Capacity development initiatives focused at Gewog and Dzongkhag level will include infrastructure development, planning and M&E, ToT for extension staff and use of Tablets for M&E staff.

Output 3.2: Technical Assistance/contracted staff

Currently CARLEP is missing some key skill areas and because of the isolated locations there is a need to increase the availability of the positions below for CARLEP to successfully reach the development goal. CARLEP will engage the following staff at OPM either deputed from agencies/departments or recruited on contract as TA with IFAD no objection:

- Project management to support the NPD to ensure smooth post-MTR transition and ensure RGoB and IFAD requirements are met in terms of strategic planning, coordination and reporting
- Engineer to support design and implementation of pipe, sprinkler and drip based irrigation in non-paddy areas. This could be deputed from ARDC.
- Full time business development/marketing manager for Component 2 and to facilitate implementation of the MSP and matching grants facility. This could be deputed from RAMCO
- Climate Change Adaptation coordinator to mainstream climate change adaptation, resilient production and processing options and document proven options for dissemination and to provide formal and on-the-job training to Dzongkhag and Gewog staff as part of a Training of Trainer programme
- Institutional development TA to design guidelines and training material for groups and cooperatives in financial management, governance, administration and oversight mechanisms
- M&E/MIS TA

The detailed terms of reference are available in annex.

| Agreed Action | Responsibility | Agreed Date |
|---|-----------------------|--------------------|
| Overview and Project Progress | | |
| OPM Engineer Mobilize a full time or two part-time engineers as TA or deputed ARDC staff to support infrastructure investment. See also under 'OPM strengthening below. (TORs in the Technical Background Appendix) | OPM, ARDC | 01/2019 |
| FCBL Review and revise the MoU with FCBL to reflect their withdrawal from CARLEP | MoAF/OPM | 01/2019 |
| KIL Enter into a MoU with KIL as partners in the dairy chain, based on an approved investment plan and an agreed charter of roles, responsibilities and timelines | MoAF/OPM | 01/2019 |

E. Project implementation

a. Development Effectiveness

Effectiveness and Developmental Focus

Effectiveness

Rating: 4

Previous rating: 4

Justification of rating

The dairy value chain is progressing steadily with expansion of smallholder farmers' herd size, promotion of fodder cultivation, local processing and marketing of milk and milk procurement by KIL at more remunerative prices compared to local processing and sale. Though vegetable production and sales revenues also registered growth across 2016 and 2017, by 73% and 79%, respectively, project facilitation for marketing so far is primarily by way of linking schools to producer groups, accounting for only about one-fourth of the volume in 2017 with the bulk of sales through informal and uncertain channels and little evidence of market pull stimulating production. A few ideas to promote climate resilient farming systems are being piloted.

Log-Frame Analysis & Main Issues of Effectiveness

Project outreach so far is 5 636 HH against the completion target of 28 975 HH as per PDR, which would not be possible in view of proposed dropping of southern and central Dzongkhags as there are only 25 418 rural HH in the six eastern Dzongkhags. It is proposed to reduce the outreach targets to 20 000 HH. There is so far little overlap between irrigation and production investments due to fragmented planning and would improve with proposed integrated planning. Only 1 086 HH so far have access to increased water availability for agriculture against over 20 000 under Logframe Development Objective indicator. This is proposed to be revised down to 7 500 HH. Similarly, the output target of "over 23 000 HH supported in coping with the effects of climate change with sustainable land management practices" is overly optimistic and should be scaled down to 20 000, including support for irrigation, land development and promoting climate resilient practices. In order to measure the combined effectiveness of investments in irrigation, fencing and land development, the project shall report the area of fallow land brought under cultivation. Collaboration with KIL would enable dairy groups to join a nationally organized dairy value chain, leading to better HH incomes and higher production as already evidenced. Vegetable marketing is more likely to be linked to locally active (including exports to neighbouring towns across the international border with India) multiple value chains. The project needs to intensify outreach to achieve the design targets of 150 groups in dairy and 300 in vegetable production as the total number of groups presently is only 153.

| Agreed Action | Responsibility | Agreed Date |
|---|----------------|-------------|
| Development Effectiveness | | |
| Outreach Revise the outreach targets and update the Logframe Accelerate group formation and group development activity in order to achieve the design targets of 300 vegetable producers' and 150 dairy groups | IFAD/OPM | 03/2019 |

Development Focus

Targeting and Outreach

Rating: 3

Previous rating: 4

Justification of rating

The project is working in the six eastern Dzongkhags which are among the poorest in the country. Some of the project villages visited by the mission were small settlements with 10 households in remote locations in a rugged mountainous terrain with poor road connectivity. Work with youth, a 12th FYP priority is yet in early stages. Overall outreach in the 3rd year of a seven year project period is only about 20%. All the households are from the specified project Dzongkhags.

Main issues

The farmer groups include most households in project villages and a majority are poor. Older people with limited family labour to take up intensive, market oriented production activities often tend to be among those not participating though the project follows an inclusive approach. Project investments are generally in response to requests from the beneficiaries and address gaps in intensifying production activities, such as irrigation in dryland (upland) areas, cultivation of fodder and preparation of silage. Going forward, the project needs to engage more intensively with the youth by developing service enterprises in support of agriculture and livestock rearing, such as supply of inputs, equipment (e.g. drip irrigation), processing, aggregation and trading.

The project needs to revise the outreach targets as the southern and central Dzongkhags are proposed to be dropped and

villages adjoining the six eastern Dzongkhags are proposed to be included. The Logframe needs to be correspondingly updated.

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Development Effectiveness | | |
| YGs Intensify work with youth, both as individuals and groups by way of promoting service enterprises in agriculture and livestock sectors | OPM | |

Gender equality & women's participation

Rating: 4

Previous rating: 4

Justification of rating

The Gender and KM Officer resigned in September 2018 and currently these two areas are managed by the Programme Support Officer (PSO) and by the component manager of value chain and marketing. The project has developed a gender mainstreaming and social inclusion strategy which also contains a detailed action plan which might need to be reviewed/updated on the basis of the recommendations of the MTR and on the basis of the updated strategic components and objectives. The strategy was designed to facilitate transformation of a subsistence-based rural agricultural economy into a sustainable value chain and market driven productive sector.

Main issues

The budget allocation for gender activities is included in the AWPB but is cross-cutting across all components and activities. The mission noted that the number of women that are participating in group membership, group leadership, training and other livelihoods activities is well recorded and the gender mainstreaming and social inclusion in programme components is taken into consideration through the collection of sex-disaggregated and target group categorized data in the activities and outputs of the components. It was reported in the Progress Report covering the period from July 2017 to June 2018 that 46% of the beneficiaries are women. The highest number of women benefitting from CARLEP is through the agriculture component (44% of the total farmers) followed by livestock (41%). Although Bhutan is undergoing rapid economic development and the gaps in gender equality are tremendously reduced, in general women still remain stuck in agriculture, livestock and in household works. During field visits, the mission has observed that women and men do not always participate equally in the activities of the groups and the percentage of women in leadership positions is below 20%. CARLEP should explore different participatory approaches and methods to encourage more active participation of women farmers besides involvement in agricultural or livestock activities. In addition, it would be worthwhile to identify if there are problems or risks faced by women in their roles and responsibilities within the groups or within the households on the basis of which CARLEP can design mitigation measures with continuous follow ups on the adoption of the same.

So far, CARLEP has produced two editions of Stories of Change. The second issue contains 4 articles of which 2 are on women and 2 on youth. Moreover, CARLEP has produced 2 videos (one still under review) on making cookies and doughnuts which are particularly targeted for women farmers.

The mission also noted that during the current implementation period 6 staff from OPM and 1 representative each from ARDC and RAMCO attended a two day workshop on gender awareness and gender empowerment in Thimphu.

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Development Effectiveness | | |
| Encourage participation Encourage women to participate more actively in the community group and possibly in leadership positions – persuade women to explore also different activities besides agricultural or livestock | OPM | 06/2019 |

Agricultural Productivity

Rating: 4

Previous rating: 4

Justification of rating

Project activities have led to moderate gains in farm and production. Productivity increase is more significant for dairy than for vegetables. However, detailed information on productivity gains was not made available to the mission and is not systematically documented. The project has implemented a number of activities directly contributing to productivity gains. Introduction of improved breeds, establishment of a network of AITs, improved sheds and forage production have led to productivity gains in the dairy sector.

In the crop sector, the project has supported establishment of lead farmers and seed producers and has introduced

improved vegetable seeds as well as irrigation equipment. Nonetheless, productivity gains have been hampered by pests and diseases.

Main issues

During field consultations, farmer groups mentioned that the scope for expanding vegetable production was constrained by reliable market demand. There are missed opportunities in terms of market-based planning to adjust the production calendar to market demand and peak prices which would incentivise farmers to allocate more resources (land, labour, capital) to commercial vegetable production.

Another key constraint to increasing production and productivity is related to knowledge gaps in crop pest management. Farmers' groups lack operational guidance on how to identify, prevent and control pests affecting commercial vegetable crops. Simple preventive techniques such as solarization and insect traps should be piloted and disseminated through the extension network.

| | |
|------------------|----------------|
| Nutrition | Rating: |
|------------------|----------------|

| | | |
|-------------------------------------|------------------|---------------------------|
| Adaptation to Climate Change | Rating: 4 | Previous rating: 4 |
|-------------------------------------|------------------|---------------------------|

Justification of rating

Adaptation to climate change interventions are relatively well designed and targeted with 50-75% of interventions identified in the PDR being implemented. Operational shortcomings were observed regarding the use of human and financial resources and reporting, for which there were reasonable justifications. Main activities implemented are: (i) establishment of 6 CSVs in an area of 794 acre.; (ii) training of extension staff in climate change awareness; (iii) training of 12 extension staff on permaculture and (iv) introduction of good practices, e.g. use of bio-slurry, sustainable land management (SLM) techniques (hedgerows), use of poly house for vegetable nurseries to improve cropping calendar, multipurpose water supply systems, drip/sprinkler irrigation, seeds for crop diversification.

Main issues

Operational shortcomings to be addressed when implementing the forthcoming CSV activities are: (i) the CSV selection process is based on criteria such as remoteness, but does not include/ spell out criteria capturing the level of climate vulnerability, (ii) linkages of the planning process with the vulnerability assessment are not evident, (iii) the CSV plans are kept by project staff and are not available at community level, (iv) implementation remains focused on physical activities and providing equipment to the community with little attention to capacity building and access to knowledge, (v) permaculture has been introduced through trainings and awareness events but has yet to materialize on the ground, and (vi) introduction of innovations such as flexi-biogas has been delayed.

Key elements of the Climate Change Adaptation (CCA) strategy are missing, limiting the impact on resilience building. The CCA interventions supported by the ASAP grant funds adopt a multi-level approach such as: (i) intra-household (women and youth); (ii) household-level (vulnerability targeting); (iii) farm-level (nutrition, diversification, integrated climate sensitive farming and income generation); (iv) community level (social capital such as farmer groups, lead farmer model); and (v) local institutions (extension service outreach of and access to value chains/markets, improved sustainability of O&M of infrastructure).

The key dimensions contributing to rural households' climate resilience are: (i) participation in local planning and decision processes, (ii) membership of social networks, (iii) capacity building, (iv) access to knowledge, (v) diversified livelihood and income streams, (vi) access to credit, (vii) climatic risk hazard reduction through infrastructure and (viii) better soil and water management and water saving techniques.

b. Sustainability and Scaling up

| | | |
|---|------------------|---------------------------|
| Institutions and Policy Engagement | Rating: 3 | Previous rating: 3 |
|---|------------------|---------------------------|

Justification of rating

To date, none of the activities proposed in the PDR that were directly geared to policy engagement under Component 3 has been initiated. However, the positive results of pilot activities carried out in land development and non-paddy, highland irrigation by CARLEP have been incorporated as priority investments in agriculture in the 12th FYP, with detailed guidelines for countywide implementation.

Main issues

Lack of qualified personnel in OPM as highlighted in the concerned section is a key reason for the lack of progress. As ARDC and RLDC, the key MoAF agencies engaged in research and development in the region are partners in the

programme, going forward they would be the appropriate agencies for documenting successful experiences and disseminating/recommending those to the policy making apparatus.

Post MTR CARLEP will be fully aligned with the 12th FYP priorities, offering opportunities for incorporating successful experiences into policy through on-going Plan Reviews built into the FYP process.

Partnership-building **Rating: 4** **Previous rating: 4**

Justification of rating

Partners such as ARDC, RLDC, RAMCO, SJI and Koufuku International Limited (KIL) are working in close collaboration with the Programme. As per the previous supervision mission of 2017 recommendation greater engagement with KIL has resulted in increased production, increased collection centres, good prices for farmers (the price was actually negotiated between farmers and KIL) has meant also that KIL now needs to expand its range of products for which it already has a solid business plan. This has been a good experience for the CARLEP to now build on for other commodities and products. The FCBL partnership has had minimal engagement for market information areas as the majority of farmers can get better prices elsewhere thus their proposed withdrawal from the Programme.

Main issues

With KIL proposed to replace FCBL in the Dairy Value Chain and RAMCO designated to facilitate market linkages for the vegetables, the MoU with FCBL should be amended and a MoU be signed with KIL to delineate their role in the Dairy Value Chain. With changes in the roles of FCBL and RAMCO, expansion in the southern and central Dzongkhags is less relevant now and these could be taken out of the operational area with Dzongkhags adjoining the six Eastern Dzongkhags included to meet the overall outreach targets without excessively increasing overheads. Accordingly, the physical targets and number of beneficiaries across Dzongkhags and Outputs should be spelt out afresh in line with the project goal to sustainably increase smallholder producers' incomes, keeping investment per household within acceptable limits to promote replication and sustainability of interventions.

There is a need for the project to now expand private sector partnerships to deliver increased outputs, outcomes for the range of commodities and products coming through the project as well as to develop the private sector.

| Agreed Action | Responsibility | Agreed Date |
|---|-----------------------------|--------------------|
| Sustainability and Scaling Up | | |
| FCBL Review and revise the MoU with FCBL to reflect their withdrawal from CARLEP | MoAF/OPM | 01/2019 |
| KIL Enter into a MoU with KIL as partners in the dairy chain, based on an approved investment plan and an agreed charter of roles, responsibilities and timelines | MoAF/OPM | 01/2019 |
| MSP for vegetables Identify stakeholders in the vegetable VC and organise MSPs to link VFGs with traders to enter into formal agreements | Dzongkhags with OPM support | 01/2019 |

Human and Social Capital and Empowerment **Rating: 3** **Previous rating: 3**

Justification of rating

Groups, the principal mode of building social capital in the project, are presently mainly a mechanism for aggregation and accessing government support. Largely transactional, they lack the perspective, skills and practices to leverage the power of collectivisation even for efficient use of their considerable financial capital let alone for broader socio-economic transformation. Each group functions in isolation, confined only to the agreed transactional purpose. The present status of groups reflects inadequate investment in building their institutional capacity.

Main issues

Farmers' (including youth) groups and cooperatives are the key for the success of this programme. They are the platforms for delivery of services, including training, extension and financial services. Aggregation happens through groups and they are the owners and operators of production supporting and value adding infrastructure. Sustainability of the initiatives

promoted by the programme would depend on presence of strong groups where members implicitly trust each other, collaborate, have a strong sense of identity as a collective, are proactive, encourage participation of every one, practice and demand transparency, have and enforce strong norms and network with other groups. Development of these characteristics in the groups requires continued, non-directive facilitation over a period of time to inculcate new behaviours. This is presently lacking. Neither the Gewog extension personnel nor RAMCO, which is responsible for group development, has the competencies to carry out such facilitation. In the event, the only capacity development input groups and group members receive pertains to technical knowledge.

Quality of Beneficiary Participation

Rating: 4

Previous rating: 4

Justification of rating

The beneficiaries met by the mission are satisfied by the services received under CARLEP and have adopted new ideas, such as hygienic practices in dairy. YGs met by the mission were highly motivated and have taken up new enterprises. The programme for restocking with improved breed cows and construction of cow sheds have been particularly appreciated and successful at mobilizing substantial beneficiary contributions. Investments in irrigation (both off farm and on farm) are typically 100% financed by the project, whereby beneficiary intervention is limited to planting seedlings for minor slope stabilization works or mounting of on farm piped systems.

Main issues

The provision of 100% financing for on farm irrigation (in private land) should be restricted to strategically planned demonstrations to sustain the uptake of improved on farm water saving technologies in wider neighbouring areas. Such interventions are still required, particularly for the case of drip irrigation, which is still a fairly new technology in project areas. However, in order to ensure genuine participation and sustainability, subsequent future support for on farm irrigation development would be through a dedicated matching grant facility, complemented by support for the expansion of the retail and installation service for relevant equipment, particularly by the youth.

It is noted that for the case of Land Development works, the recently released RGoB guidelines include a pro-poor targeting mechanism (e.g. full support for beneficiaries under the THPP). A similar mechanism could be considered in all matching grant schemes to be established under CARLEP in the post-MTR phase.

| <i>Agreed Action</i> | <i>Responsibility</i> | <i>Agreed Date</i> |
|--|-----------------------|--------------------|
| Sustainability and Scaling Up | | |
| Matching grants for irrigation A matching grant facility is established for individuals undertaking on-farm irrigation development with water saving technologies (drip, sprinklers, hose + tank, etc.), prioritizing support for poor farmers | OPM | 12/2019 |

Responsiveness of Service Providers

Rating: 4

Previous rating: 4

Justification of rating

Regional agencies under the Ministry of Agriculture and Forests, such as ARDC, RLDC and RAMCO, the Dzongkhag Administrations and FCBL are the principal players in project implementation, and barring FCBL, have generally been responsive. KIL, not on board at the time of design, has responded positively to procure milk from dairy groups and train milk producers in hygienic practices in a win-win arrangement.

Main issues

FCBL is principally equipped to create market infrastructure, conduct auctions and physical marketing. It is not organised to develop groups and link them to markets. Going forward, the respective roles of FCBL and RAMCO have been restructured with FCBL to engage in large (direct) exports and bulk marketing and RAMCO charged with facilitating local marketing in the agriculture and allied sectors. Accordingly, as earlier recommended, the MoU with FCBL is to be changed to reflect this.

Environment and Natural Resource Management

Rating: 4

Previous rating: 4

Justification of rating

A few SLM and environment friendly practices have been introduced, including biogas and improved cow sheds for better cattle waste management, yet the opportunity of using biogas slurry and composting of abundantly available bio-mass to increase soil fertility is not fully exploited. Investments in irrigation have reduced water losses, yet the unrealised scope for

improving the irrigation methods both on farm and off farm and make sustainable use of water resources remains considerable.

Main issues

The post-MTR focus on upgrading irrigation systems for increased climate resilience and efficiency, coupled with more investments in land development (e.g. terracing, hedgerows and field bunds) to reduce soil erosion and in electric fencing to mitigate human-wildlife conflict broaden opportunities to promote improved natural resource management (NRM). These investments need to be accompanied by i) proper planning based on a thorough assessment of available water resources, ii) investments in on-farm development, including appropriate water saving technologies such as drip irrigation systems and iii) adequate capacity building after completion of the works (e.g. supporting Water Users' Associations in O&M and optimal irrigation scheduling).

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Sustainability and Scaling Up | | |
| Mapping of water sources In the context of the development of piped irrigation systems the available water sources in the upland areas shall be identified, georeferenced and their capacity assessed to serve as a basis for the design | OPM, Gewog Engineers | 01/2019 |

Exit Strategy

Rating: 3

Justification of rating

An exit strategy has not yet been formulated. However, CARLEP is only in the third year out of seven years of implementation till completion (not yet mid-way) and intensive implementation has been going on for just about 30 months. Field activities are yet to mature to a level where a clear exit strategy can be worked out.

Main issues

Going forward, a viable exit strategy would depend on the strength of the groups and cooperatives, institutionalisation of the MSP process to build vegetable marketing linkages, the strength and viability of collaboration between dairy groups and KIL, integration of successful experiences in the National Plans and capacity of Gewog and Dzongkhag extension personnel to carry forward such experiences as part of local pl

Potential for Scaling-up

Rating: 5

Justification of rating

CARLEP activities, including production and marketing of vegetables and dairy products, irrigation in non-paddy (dryland) areas, land development and climate resilient agriculture have high potential for scaling up. There is a large market locally as well as for exports across the open border with India for vegetables and dairy products. LF, CAHWs and AITs can be a dominant non-state extension mechanism if appropriate incentive systems can be institutionalised. As farmland is predominantly hilly and mountainous terrain, terracing and highland irrigation from untapped springs can be expanded.

c. Project Management

Quality of Project Management

Rating: 4

Previous rating: 4

Justification of rating

All activities except value chain work by FCBL and those pertaining to Component 3 (Institutions and Policy Engagement) are on stream. Several promising innovations have been initiated. The National Programme Steering Committee (NPSC) and Regional Programme Implementation Committee (RPIC) met once each during the review period and the mechanism has been institutionalised. Persistent challenges include inadequate strategic steer from the OPM, fragmented implementation and absence of business plans around project activities/investments.

Main issues

Some of the challenges can be traced to the Project Design, namely, a highly detailed Costab, inadequate staffing at the OPM and absence of an integrator or focal point at the Dzongkhags; others include non-adherence to the PDR with regard to OPM staffing, a mismatch between the key strengths of FCBL (bulk marketing, distribution and auctions) and the project tasks (working with dispersed groups, unorganised HHs and group strengthening) and recent policy-mandated

changes in the respective roles of FCBL and RAMCO.

A highly detailed Costab leads implementing agencies to pick CARLEP investments in isolation rather than conceiving 'whole projects', financed partly by CARLEP and partly from their own budgets, including in case of HH assets. For example, CARLEP investment in a milk chilling machine can be seen as an isolated contribution from the project or part of a 'milk processing project' where CARLEP investment is part of a financing plan that includes funds from the Dzongkhag, Gewog and the community, with a project report and business plan for the 'milk processing project', including group development and marketing plans, linkages to other investments in infrastructure (e.g. roads, irrigation, etc.) and projected benefits to HHs. Similarly, provision of a cattle shed to a farmer possessing cattle needs to be seen as a 'dairy unit' that may also include fodder cultivation, silo making, training in hygienic practices in dairy and include prior investment in dairy cattle by the HH as a part of the whole HH level project. The extant practice also has the un-intended consequence of under-reporting local contribution from public as well as private sources. Fragmentation is exacerbated by the fact that the OPM is staffed along 'components' with managers who are counterparts to the Dzongkhag sector heads (DAO/DLO) and there is no one at either end specifically charged to integrate the CARLEP perspective with the Dzongkhag perspective or integrate across sectors (e.g. irrigation with fodder development, use of bio-gas slurry for vegetable production, etc.). Going forward the Costabs have been reorganised with built-in flexibility and it is recommended to designate a CARLEP focal point from among the DAO/DLO at each Dzongkhag to bring on board the overall Dzongkhag perspective in the context of 12th FYP. It is also recommended to introduce a systematic planning process across the CARLEP area with clearly stated strategic objectives, business plans and sources of investments, integrated jointly by OPM and the Dzongkhag Focal Points and combining a cross-sectoral perspective in planning. Further, it is recommended to strengthen the OPM by inducting a project management specialist.

Considering the hierarchical nature of government agencies the PDR had proposed that the OPM Component Managers be of the rank of senior sector heads (DAO/DLO) at the Dzongkhags so that they can effectively integrate the CARLEP strategic perspective with the Dzongkhag's development plans through an interactive 'negotiation process' with their counterparts and the OPM does not become a mere 'drawing and disbursing office' and the implementing agencies task contractors. The mission recommends that this PDR provision regarding the level of staff posted to OPM be adhered to.

| Agreed Action | Responsibility | Agreed Date |
|--|----------------------------------|--------------------|
| Project Management | | |
| CARLEP Focal Point at Dzongkhags Designate one among the DLO and DAO as the CARLEP Focal point at each Dzongkhag to integrate planning, AWPB preparation and reporting for CARLEP, taking on board the CARLEP objective with the Dzongkhag's development strategy/plans. | MoAF/Dzongkhags with OPM support | 01/2019 |
| Strengthen OPM Upgrade the OPM Component Managers to the level of Dzongkhag Sector Officers Appoint a Project Manager to assist the NPD at OPM and additional personnel as outlined in Component 3 above | MoAF | 01/2019 |
| Planning and AWPB preparation Introduce a systematic planning process for AWPB preparation to align CARLEP Objectives, Outcomes and Outputs with Dzongkhags' development strategies and plans and ensure that investments are based on detailed business plans. | OPM | 01/2019 |

Knowledge Management

Rating: 4

Previous rating: 4

Justification of rating

During the implementation period FY 2017-18 CARLEP has undertaken substantial work related to knowledge management and has generated several knowledge products, including adoption of the multi stakeholder platform (MSP) based on the exposure visit to Nepal which is the overall sector development approach for value chain activities. So far 2 MSPs have been conducted.

Main issues

The project has a Programme Support Officer (PSO) working on KM jointly with the Component Manager for Value Chain. CARLEP has developed the KM Strategy which also includes a detailed action plan aimed to provide the project with the required framework and tools. Based on the IFAD KM Strategy, CARLEP has developed their own strategy on five strategic principles: (i) improve programme performance; (ii) increase the visibility of programme interventions; (iii)

promote collaboration and principles; (iv) provide evidence for policy level decision-making; and (v) stimulate innovations. The project might consider to review/update the KM strategy on the basis of the recommendations provided by the MTR mission and to be more aligned with the update of the objectives and components. OPM has established relationship with media so that media coverage is always provided, for examples during certification ceremonies of Lead Farmers, seed producers, CAIT among others or, recently during the official opening of the dairy outlet in Mongar.

KM related activities continue to be regularly included in the AWPB and adequate budget is allocated. During the implementation period FY 2017-18 CARLEP produced 8 new KM products, including one training material and two video tutorials (one still under review) on making cookies and doughnuts, which are particularly targeted at women farmers. The project has finalized two editions of the Stories of Change. The second issue contains 4 articles of which 2 are on women and 2 on youth.

All publications and training materials produced are intended to be used in the ground to generate knowledge sharing among stakeholder, famers, communities and groups, and are all uploaded in the CARLEP official website. For demonstrating success stories the project should prepare more videos on the overall achievements and on success stories from the field with a particular focus on value chains and/or innovative technologies. CARLEP should start preparing brochures, bi-annual newsletters and handouts that can be useful also during the annual mission, listing the name of each village, each Gewogs, number of beneficiaries with disaggregated data, activities, type of assets provided, amount funded and co-financiers. In addition, the project should start installing an information board with details on sub-projects-grants-beneficiaries, in each project site at village/Gewog level, for sharing the project services and support provided to all the communities. The programme has an official website and an official Facebook page and these are actively used for knowledge and information sharing among stakeholders, with regular uploads of articles and photographs. OPM has established a community of practice to share knowledge among staff and extension services, including two 'wechat' groups for farmers and traders. CARLEP has also adopted different knowledge sharing methods including workshop and exhibitions and Trade-Fair and has taken advantage of the various festivals and Tshechu to showcase products from CARLEP-assisted groups. As part of KM, exposure visits of CARLEP staff have been conducted to gain knowledge on value chain finance, service market and biogas in Nepal. The mission recommends more frequent use the IFAD community socials (IFADASIA portal and IFADASIA Facebook page) uploading regularly information related to the project progress and pictures from field visits.

While commending the OPM for the numerous KM related activities already started, the mission recommends that for capacity building of the Programme Support Officer he should be allowed to travel outside the country to advocate the success stories from Bhutan, interact with KM officers from other projects and participate in workshops and trainings.

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Project Management | | |
| Information board Install an information board with details on sub-projects-grants-beneficiaries, in each project site at village/Gewog level, for sharing the project services and support provided to all the communities. | OPM | 06/2019 |

Value for Money

Rating: 3

Justification of rating

At the time of MTR, the project has reached out to less than 20% of target households but has spent about 46% of IFAD and 34% of ASAP grant resources. Although a number of initiatives leading to economic development of the participating households were taken up, productivity increases recorded are not significant besides those achieved under the previous IFAD-funded MAGIP.

Main issues

Of the total allocated IFAD resources of USD 9.3 million, the project has spent about USD 4.3 million of IFAD resources (46%) and covered only some 5 636 households thus spent about USD 762 per household. Impact of key interventions thus far carried out included (i) supply of production inputs covering some 1 240 acres, (ii) renovation of irrigation infrastructure covering 1 277 acres and water efficient irrigation covering 652 acres for vegetable production, (iii) supply of 511 heads of milking cattle and provision of 679 cattle-sheds and perennial fodder on fallow and marginal lands covering some 2 225 acres and (iv) formation of 26 vegetable marketing groups and 28 dairy groups. Yet the dairy productivity remained at 921 litre, 47 kg of cheese and 33 kg of butter per household. Vegetable productivity was 2 600 kg/household but post-harvest losses were high at 18% and on an average a household was able to realise no more than BTN 24/kg of vegetables sold. Farm-gate price of milk was between BTN 30 and 35/litre. Irrigation is mostly used for paddy cultivation and post paddy season, some limited area i.e. no more than 13% is planted with vegetables. No perceptible changes in crop productivity between without and with irrigation renovation, in particular for paddy is recorded. Sources of household incomes were mainly through the sale of dairy products, followed by non-farm enterprises, vegetable sale, handicraft, etc.

Most input unit costs are reasonable and there is no significant variation between the planned and the actual expenditure. However, unit costs for dairy plant, equipment and irrigation infrastructure including land development and electric fencing,

etc. are showing some upward trend, though within manageable limits so far. There are strict control mechanisms in place with a view to avoiding any wasteful expenditure.

Although there are marginal changes in crops input and output ratio (i.e. cost of production and farm-gate sale value), most of the assumptions made at PDR are still valid for EFA. With a view to checking these assumptions and comparing them, an EFA assessment has been recalculated.

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|--|------------------|---------------------------|
| Coherence between AWPB and Implementation | Rating: 3 | Previous rating: 4 |
|--|------------------|---------------------------|

Justification of rating

Persisting problems in meeting the targets set in AWPB.

AWPB Inputs and Outputs Review and Implementation Progress

CARLEP has partly delivered against AWPBs. Cumulative expenditure was only 60% of the budget during fiscal years 2015-18. Districts used on average 85% of the allocated resources, whereas Agencies lagged behind, spending only 39% (despite receiving a larger share of budget allocation, 47%). This reveals inefficiencies in the implementation process as well as un-realistic planning in both cases due to gaps in integration/ coordination among Implementing Units (IU) which may be mitigated with (i) the institution of focal points at Dzongkhags and (ii) the introduction of a more systematic planning process. Currently cross-budgeting practices still persist and undermine the credibility and coherence of the budgeting process. More focus should be put in making realistic plans for the IUs to ensure that resources are allocated where most needed and efficiently utilised.

A budget ceiling is provided by the MoF to Implementing Units (Dzongkhags and Agencies) which is inclusive of CARLEP allocation and takes into account, *inter alia*, a first top-down estimate from IUs. Once the ceiling is set, the bottom-up planning process starts. The MoF has shown availability to provide resources above the mentioned ceiling subject to (over) performance of spending units. In order for the project to fully utilise 100% of current CARLEP financing, a minimum USD 3.5 million should be budgeted yearly for the six Dzongkhags together. Moreover, it is even more important that any CARLEP financing (eventually including additional financing if needed) be fully included in the upcoming 12th FYP.

| | | |
|--------------------------------------|------------------|---------------------------|
| Performance of M&E System | Rating: 4 | Previous rating: 4 |
|--------------------------------------|------------------|---------------------------|

Justification of rating

The project has conducted an Annual Outcome Survey and is active member of a Community of Practice with M&E officer of the South Asia Hub.

M&E System Review

The programme has a full time M&E Officer supported by a Programme Support Officer. The project has not yet developed its own MIS system and it is still using an excel spreadsheet through Google Share to report the data captured from the extension officers and reported to the Dzongkhag. The project has requested the assistance of HVAP MIS Officer to design their web-based MIS system. On monthly basis Component Managers, M&E Officer and Programme Support Officer undertake field monitoring visits to validate the reported data. While reportedly information is collected on an ongoing basis, data is not easily available at month ends and quarter ends. While a system of data collection has been introduced, the officials from Dzongkhags do not submit data regularly, rendering planning of field monitoring difficult. Extension services should receive basic training on M&E concepts. The OPM should receive the information collected on real time and not on quarterly basis and simultaneous transmission of data to OPM and the Dzongkhags should be introduced.

During the implementation period 2017-18 CARLEP has reached the physical target of 31% for household coverage. The programme has reported RIMS data for the year 2017 in early January 2018 and the problem of double counting of beneficiaries, including those still assisted from MAGIP has been raised and fixed. The project is included under the ASAP umbrella funding and in view of the change of the IFAD RIMS indicators, it is compulsory that CARLEP reports with all the climate change indicators. During the MTR the mission recommended to the OPM and the implementing agencies to review the logframe and the targets for each indicators to be more aligned with the development objectives and more realistic for the number of beneficiaries. Programme monitoring continues to be more on activity and output levels and rarely deals with results and outcomes. After the implementation of a web-based MIS system extension services can be trained and they can report also on outcomes.

The project has finalized the location of the assisted programme areas with the maps but they have not geo-referenced them as the staff would need training for this. The project has purchased tablets and they will install GPS to identify the project area during visits and then transfer the information onto maps. The project will also use Google Earth and customize the application to reflect the need of the project in the collection of the geo info. CARLEP is already using the maps through an application available in the Dzongkhags for infrastructure planning or for group mobilisation, among others. The project has conducted an Annual Outcome Survey (AOS) and has conducted a random survey in 20 Gewogs out of 70.

In June 2018 IFAD conducted an M&E training in Kathmandu and CARLEP was represented by the M&E Officer. One of the outcomes of the training was the creation of an M&E platform and a Community of Practice (CoP) with the M&E Officers. CARLEP is an active member of the CoP.

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Project Management | | |
| MIS System Develop a web based MIS System and report physical and financial progress | OPM | 02/2019 |
| Training Provide training on M&E to component managers and extension officers | IFAD | 03/2019 |
| Strengthen collaboration OPM and extension services should work in more synergies and not only through Dzongkhag | OPM | 03/2019 |

Requirements of Social, Environmental and Climate Assessment Procedures (SECAP)

Rating:

d. Financial Management & Execution

Disbursement by financier

| Type | Name | Current Amount | Disbursed Amount | Actual Rate |
|-------------------------------------|--------------------------------|-----------------------|-------------------------|--------------------|
| Domestic Financing breakdown | Beneficiaries | \$658,805 | | |
| | Food Corporation of Bhutan Ltd | \$4,802,410 | | |
| | National Government | \$5,773,849 | | |
| Co-financing breakdown, | To be determined | \$5,996,612 | | |

Acceptable Disbursement Rate

Rating: 6

Previous rating: 6

Justification of rating

The project is at its 3rd year of implementation and the overall disbursement rate of IFAD/ASAP financing to the Borrower's (RGoB) Designated Accounts (DAs) is 42%. Performance is highly satisfactory.

Main issues

CARLEP is a 7 years programme. It is funded by an IFAD Loan of SDR 5,9 million (USD 8,3 million), IFAD Grant of SDR 0,76 million (USD 1,1 million) and ASAP Grant of SDR 3,6 million (USD 5 million) equivalent to an overall amount of USD 14,4 million that is 56% of total project cost (USD 25,6 million).

As at end October 2018, the overall disbursement rate to CARLEP's designated accounts is 42% (IFAD Loan 45%, IFAD Grant 50%, ASAP Grant 34%), provided through 9 withdrawal applications, usually submitted on a quarterly basis (the latest at end October 2018). The 42% disbursement rate is made by 17% of outstanding advances to the DAs and 25% justified project expenditure. The authorised allocation to the Loan DA has been increased to USD 1,5 mln (from 0,8 mln) as a recommendation of prior supervision mission. As of now, the overall level authorised allocations is deemed adequate. Financing resources were made available by IFAD to the project on-time/in-full (being so far the main contributor with a share of 82%), however the real project expenditure is only half way of the resources received by IFAD/ASAP.

Fiduciary Aspects

Quality of Financial Management

Rating: 4

Previous rating: 4

Justification of rating

Quality of financial management is moderately satisfactory. Overall project potential fiduciary risk is deemed medium, however, the FM implementation support together with the values, the quality and the personal commitment of the finance team provide assurance that those areas of weakness will be promptly mitigated

Main issues

The project is *staffed* adequately both at OPM and at Implementing Units (IU). The OPM finance officer has just joined (from the RAA), after a vacancy of 1 quarter. He has precedent experience as FO at Trashigang districts and is supported by a solid and dynamic accountant (2 years in the role). However there are concerns with regards to the high turnover within the finance community (staff stay the role for no more than 4-5 year as per national policy on finance staff). For this, it is necessary to strengthen the finance network across Carlep to secure continuity and readiness of FM capacity, especially at IUs where Finance is not entirely dedicated to the project (max 50-80% in the case of the Accountant).

As the MTR has identified deficiencies in the area of Planning/Budgeting, Finance not only will play a key role in the consolidation phase, but will proactively enhance the reporting on actual cumulative investment (by IUs and per component/category/financier) strictly liaising with M&E (to link actual expenditure to output achievement) and with IUs to challenge the soundness of bottom-up plans (as a support to possible reallocations, additional financing and/or changes in the costab/AWPB structure).

Once requested, *funds* are flowing fluidly to IUs being timely released the the RGoB in max 5 days. WAs are regularly submitted using Smart SOE, through the ICP. Through the SOE checks (carried out in 6 IUs) some minor cases of expenditure category misclassification were detected as well as the claiming of taxes in the amounts submitted in WA since project inception (estimated ineligible amount of USD 50 k). While determining the precise amount of ineligible taxes, the project will also provide a clearer view on the RGoB contribution corresponded as tax. Internal controls are fully in place and adequately segregated. Accounting is performed manually and the recording is kept daily in the PEMS government system (whereas MYRB system is for the budget only). Supporting documentation is complete and readily available at IUs. Fixed asset registers are maintained however not backed by any asset tagging that ensure mapping and rigorous management (as per the case of a RLDC asset temporarily in use at KIL with missing documentation as support). *Reporting* is regularly performed based on data extracted from PEMS and reworked in excel into IFRs which will have to be enhanced to provide tracking of % expenditure vs AWPB (internally monthly, to IFAD quarterly) by IUs. The internal audit function exists at district although capacity is limited and coverage to CARLP is so far none. The external audit is carried out by the Royal Audit Authority. Audit for past FY 2017-18 is ongoing and will be finalised by December. The audit report for the fiscal year 2016-17 was timely provided and the risk assessed as low: minor observations were raised in the management letter and were fully addressed by the OPM.

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Financial Management & Execution | | |
| Reporting Enhance Interim Financial Progress and timely submit quarterly to IFAD | OPM | 12/2018 |
| Taxes – ineligible amounts Determine the ineligible amount of taxes charged to IFAD and provide communication to IFAD FO for refund/deduction from future WAs. Also track RGoB contribution provided as taxes. | OPM | 12/2018 |
| FCBL Analyse the breakdown of FCBL expenses which is mainly comprising salary cost (including those of the staff at stores) in order to determine what is/is not Recurrent Costs. | OPM | 01/2019 |
| Fixed Assets Full assets tagging and relevant reporting in asset registers, (i.e. starting to tag in ranking order from most expensive) | Finance OPM/ IUs | 03/2019 |
| E-Training on FM of IFAD funded projects All finance staff across CARLEP invited to undertake the IFAD FM e-learning (link has already been provided by the FMS to OPM). | OPM Finance | 06/2019 |
| Ring-fence CARLEP finance community OPM finance (i) to call, at least once a year, a FM workshop gathering all Carlep finance staff, (ii) OPM finance to provide one-to-one support through at least one visit per year at all IU (iii) and facilitate cross visit-cooperation of staff from adjacent districts. | OPM | 12/2019 |
| Budgeting/costab Support OPM management in the feasibility of any exercise aimed at enhancing current costab/AWPB component classification (i.e. MYRB), providing a bridge/mapping of current expenditure to future plans. | OPM | |
| Budget planning Early and stronger engagement of Finance in the planning process, to come up with enhanced reporting on actual expenditure and residual balance, by IU and benchmarked as % of AWPB (cumulative/period) | OPM | |

Quality and Timeliness of Audit
Rating: 4
Previous rating: 4
Justification of rating

The audit was not submitted on time and did not fully meet the requirements of IFAD's guidelines

Main issues

Not fully in line with IFAD's guidelines:

- no separate opinion on DA and SOEs
- accounting standards not disclosed
- no list of fixed assets

Justification of rating

Provision of counterpart funds is aligned to budgeted amount, however overall CARLEP utilization of RGoB.funds is still low at year 3 of implementation.

Main issues

So far there has been a low utilization of government funds from CARLEP both at AWPB and expenditure level. Overall, budgeted amounts have been spent. According to the FA, total government investment amounts to USD 5,7 million of which a part is for tax coverage (USD 2 million as per COSTAB provision). Total expenses on contribution has reached 7% only (11% excluding taxes). There is probably an issue of under-budgeting of resources and interventions under CARLEP from the Districts: during the mission there were clear scase of district interventions that reached CARLP beneficiaries but were not budgeted under the project. One of the challenges for the post-MTR budgeting/planning process is to establish a stronger integration with the overall Districts' plans, on yearly basis and in conjunction with next national 5 years development plan. Moreover, the tax quota within the RGoB contribution will have to be determined and regularly tracked/reported.

| Agreed Action | Responsibility | Agreed Date |
|---|-----------------------|--------------------|
| Financial Management & Execution | | |
| Budgeting of counterpart funds OPM to increase the planning of those activities funded by the RGoB and at the same time monitor that overall districts' planning does not put in place activities overlapping with CARLEP that may be included in the project's plan. | OPM | 12/2018 |
| Determine/monitor tax quota out of RGoB contribution Determine/monitor tax quota out of RGoB contribution | OPM | 01/2019 |

Justification of rating

Overall compliant with legal covenants

Main issues

As per FA schedule 2, the financing provided by IFAD/ASAP is 100% net of taxes. However, since inception of the project, gross expenditures (including tax) has been claimed to and replenished by IFAD. As already highlighted in financial management section, the ineligible amounts must be returned to IFAD.

Procurement**Justification of rating**

During the review period IFAD has carried out an ISM for CARLEP focusing on procurement. The project has started taking some corrective actions to address the issues highlighted by the 2017 SM, though with substantial delays and leaving most of the recommendations still valid. The Project Support Officer is now supporting the NPD and the Dzongkhags in compiling procurement plans and tracking implementation. However, the project is still experiencing moderate difficulty in meeting deadlines set in the PP and systematically collecting at the OPM the documentation related to procurement and contracting undertaken by the implementing agencies.

Procurement Review

Legal and Regulatory Framework: Procurement is carried out by each implementing agency in line with the provisions of the Bhutanese Public Procurement Regulations. The Public Procurement Policy Division (PPPD) of the Ministry of Finance has developed Standard Bidding Documents (SBDs) that have to be used for different types of procurement actions.

Staffing: The procurement process is managed by the procuring entity of each IU. Procurement handled directly by the OPM is carried out by the NPD with support from the PSO who has been trained in handling small procurement and

consolidating the draft PPs developed by each IU.

Procurement Planning: The Procurement Plan is in an adequate format containing all required milestones needed for procurement planning, but timelines of planned activities are not realistic.

Register of Contracts and Assets: The Contract Register includes all contracts subject to prior review, while post review documentation needs to be consolidated, particularly for the FY 2016-17. Variation orders need also to be reflected in the register of contracts. Only fixed assets procured by OPM are registered at OPM.

Procurement Documentation: The documentation related to contracts subject to prior review since the start of CARLEP is retained at the OPM. For the case of procurement of irrigation works the documentation includes the required information sheet with key summary data of the investment, but this but does not include the required economic analysis.

Processes and Procedures: The procurement review focused on a random sample of civil works contracts procured by Dzongkhags, following an open tender procedure.

The procurement process starts out with a cost estimate based on an official price list and price adjustment indexes. After that, the procurement opportunity is advertised in the national press and TV to invite interested bidders to participate and submit bids with a time window of a minimum of 14 and generally 30 days or more. The bidding documents provide adequate information on the method of evaluation, which includes an articulated scoring system for qualification (with a minimum score threshold) and for the computation of preference requirements. The practice of announcing multiple lots under a single tender is consolidated (each contractor is allowed to bid for one or more lots depending on its class) and deemed effective but not practiced in all cases. The areas identified by the review where improvements can be made are: (i) the time for bid submission to be reduced to 14 days only in exceptional cases, otherwise at least 30 days shall be given to prepare bids for any civil works contracts; ii) packaging in lots with other civil works carried out in the same area shall be encouraged as good practice; and iii) for the case of irrigation works the tender design documentation shall include a layout plan on a satellite image to support the contractors' evaluation of the scope of works and bid price.

| Agreed Action | Responsibility | Agreed Date |
|---|-----------------------|--------------------|
| Financial Management & Execution | | |
| Economic and Financial Analysis and Information Sheet All prior review procurements will be submitted with the information sheet (template provided to OPM) with an economic and financial analysis for the investment. For the case of irrigation investments, the information sheet shall also include a satellite image with the system layout | OPM | 03/2019 |
| Contracts and Fixed Assets Register The contract register must be prepared retroactively for all procurement, prior and post, that has been undertaken by CARLEP. Variation orders shall be reflected in the register of contracts. The register of assets needs to include all assets procured under CARLEP even by other agencies | OPM | 03/2019 |
| Bidding process Ensure that adequate time (at least 30 days) and information (system layouts on satellite image) is given to civil works contractors for the preparation of informed bids. | OPM | |

F. Relevance

Relevance

Rating: 5

Previous rating: 5

Justification of rating

CARLEP, with its focus on commercialisation of the agriculture sector is highly relevant to create a market pull for the farming-based rural economy in the region. It would enhance household incomes in this relatively poor part of the country by leveraging market opportunities locally and across the international border, reduce production deficits and import dependence in key commodities in household consumption basket and create new opportunities for youth in the rural economy, especially in processing and provision of services, including marketing. The approaches being fostered by the project would reduce climate vulnerability in an ecologically fragile mountain region.

G. Project Modifications

| Responsibility | Modification Type | Description |
|---|-----------------------------------|--|
| Climate Risk Classification (SECAP) | Climate Risk Classification | There is no changes in Climate Risk Category. |
| Environmental and social category (SECAP) | Environmental and Social Category | There is no changes in environmental and social category. |
| Project area | Project Area | At the time of negotiating for the additional finance, the selection and identification of additional districts would be discussed and agreed. Expansion of the project area is justified for the following reasons: (i) CARLEP is making satisfactory progress at the time of MTR and in order to ensure impact at large or regional level area expansion is necessary, (ii) there is a need for consolidating the achievements already made under MAGIP and now under the ongoing CARLEP programme; (iii) need to provide support in expanding the CARLEP interventions to other potential districts in Bhutan in particular those productive districts falling along the national highways; (iv) the OPM is fully geared to take these challenges in more appropriate manner and in this context, the OPM is logically strengthened with manpower and training. |
| Additional financing | Additional Financing | During the wrap up meeting it was discussed and agreed that the RGoB would send a formal request for the additional finance and also indicate new districts to be covered, a request for possible extension of the Project Completion Date, justification and rationale for reallocation of IFAD resources and other required details. |
| Logical framework | Logical Framework | There would be considerable changes and modification in the logframe, for example (i) increased number of households to be covered, (ii) expansion of additional project area districts, preferably adjoining the existing project area districts, (iii) changes or modifications necessary in view of area expansion and increased households, and (iii) additional new interventions and targets, etc. Revised logframe targets and indicators will be incorporated in consultation with the OPM |
| Extension of Project Completion Date | Completion Date | This would be decided at the time of the Finance Agreement for the proposed Additional Finance of USD 11.2 million equivalents and justification for the Project Completion Date would also be detailed. |

| Responsibility | Modification Type | Description | | | | | | | | | | | | | | | | | | | | |
|--|-------------------|---|--------------------------------------|---|---|---|--------------------------------------|-----------|-------|-------|-------|-------|------------|-------|-------|-------|-------|------------|-------|-------|-------|-------|
| Reallocation among categories | Reallocation | <p><i>In view of the fact that in accordance with the President's report, an amount equivalent to USD 11.2 million will be made available for CARLEP from the fiscal year 2019/20, it has become necessary that the Loan Disbursement Categories will be reallocated and more interventions added. Accordingly the costab has been re-organised in the sense that for the year 2019/20, all activities as proposed by the OPM in consultation with the participating implementing agencies have been provided in full and complete. In doing so, no changes are made in either the financing rules or disbursement categories. But there are possibilities that the overall size of the project post MTR will be significantly large with more activities, expansion to new areas and more number of target groups with the support of additional financing.</i></p> <p><i>As such no new Table for replacing existing Table under Schedule 2 has been proposed and this would be done once the the RGoB makes a written request to IFAD for the additional finance and it is confiremd by IFAD.</i></p> <p><i>A new costable for additional finance would have to be prepared during next mission.</i></p> <p><i>Current usage of funds and balance available are shown in Table below</i></p> | | | | | | | | | | | | | | | | | | | | |
| | | <table><tr><th>Financiers 1/</th><th>Authorized allocations (million USD)</th><th>Expenditure as on June 2018 (million USD)</th><th>Likely expenditure as on June 2019 (million USD) 2/</th><th>Balance fund available (million USD)</th></tr><tr><td>IFAD Loan</td><td>8.246</td><td>3.087</td><td>1.598</td><td>3.561</td></tr><tr><td>IFAD Grant</td><td>1.064</td><td>0.423</td><td>0.136</td><td>0.505</td></tr><tr><td>ASAP Grant</td><td>5.012</td><td>1.540</td><td>0.598</td><td>2.874</td></tr></table> | Financiers 1/ | Authorized allocations (million USD) | Expenditure as on June 2018 (million USD) | Likely expenditure as on June 2019 (million USD) 2/ | Balance fund available (million USD) | IFAD Loan | 8.246 | 3.087 | 1.598 | 3.561 | IFAD Grant | 1.064 | 0.423 | 0.136 | 0.505 | ASAP Grant | 5.012 | 1.540 | 0.598 | 2.874 |
| | | Financiers 1/ | Authorized allocations (million USD) | Expenditure as on June 2018 (million USD) | Likely expenditure as on June 2019 (million USD) 2/ | Balance fund available (million USD) | | | | | | | | | | | | | | | | |
| | | IFAD Loan | 8.246 | 3.087 | 1.598 | 3.561 | | | | | | | | | | | | | | | | |
| | | IFAD Grant | 1.064 | 0.423 | 0.136 | 0.505 | | | | | | | | | | | | | | | | |
| ASAP Grant | 5.012 | 1.540 | 0.598 | 2.874 | | | | | | | | | | | | | | | | | | |
| <p>1/ Source: OPM Finance Division; 2/ assuming some 65% of AWPB for the fiscal year 2018/19 will be spent</p> | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |

H. Lessons Learned

Use of freeware tools for feasibility studies in irrigation

In the context of an IFAD Implementation Support Mission for on-site training of local engineers on the principles of climate-resilient irrigation design, a reference guideline on the use of freeware software and smartphone apps has been developed to support the site assessments, feasibility studies and design of irrigation schemes. These works are in several instances carried out by a single engineer not necessarily having a specific background in irrigation that can quickly upgrade his/her capacity and quality of deliverables by using these readily available and easy-to-use tools. A community of practice with an online sharing platform for technical references, photos, drawing and BOQs has also been established among the engineers involved in the implementation of CARLEP financed works. However, the potential benefits deriving from the platform have been hampered by the lack a focal person to feed contents and stimulate its use.

Irrigation systems in terraced slopes

The existing irrigation schemes originally developed to provide supplementary irrigation for monsoon rice cultivation in terraced slopes are based on a plot-to-plot distribution system that poses a major limitation to the choice of crops to be cultivated and to individual farmers' initiatives for on farm development (e.g. establishment of drip irrigation for vegetables) and crop diversification. Simple technical upgrade options, however, include laying of branch pipelines along the maximum slope gradient that allow direct access to pressurized water to individual farmers (through direct hose connection) and prevent deepening of gullies in open channels. In the upgraded system the branch pipelines would be fitted with hydrants and break pressure tanks as required.

I. Agreed Actions

| Agreed Action | Responsibility | Agreed Date |
|--|-----------------------|--------------------|
| Overview and Project Progress | | |
| OPM Engineer Mobilize a full time or two part-time engineers as TA or deputed ARDC staff to support infrastructure investment. See also under 'OPM strengthening below. (TORs in the Technical Background Appendix) | OPM, ARDC | 01/2019 |
| FCBL Review and revise the MoU with FCBL to reflect their withdrawal from CARLEP | MoAF/OPM | 01/2019 |
| KIL Enter into a MoU with KIL as partners in the dairy chain, based on an approved investment plan and an agreed charter of roles, responsibilities and timelines | MoAF/OPM | 01/2019 |
| Development Effectiveness | | |
| Outreach Revise the outreach targets and update the Logframe Accelerate group formation and group development activity in order to achieve the design targets of 300 vegetable producers' and 150 dairy groups | IFAD/OPM | 03/2019 |
| Encourage participation Encourage women to participate more actively in the community group and possibly in leadership positions – persuade women to explore also different activities besides agricultural or livestock | OPM | 06/2019 |
| YGs Intensify work with youth, both as individuals and groups by way of promoting service enterprises in agriculture and livestock sectors | OPM | |

| Sustainability and Scaling Up | | |
|--|----------------------------------|---------|
| FCBL Review and revise the MoU with FCBL to reflect their withdrawal from CARLEP | MoAF/OPM | 01/2019 |
| KIL Enter into a MoU with KIL as partners in the dairy chain, based on an approved investment plan and an agreed charter of roles, responsibilities and timelines | MoAF/OPM | 01/2019 |
| MSP for vegetables Identify stakeholders in the vegetable VC and organise MSPs to link VFGs with traders to enter into formal agreements | Dzongkhags with OPM support | 01/2019 |
| Mapping of water sources In the context of the development of piped irrigation systems the available water sources in the upland areas shall be identified, georeferenced and their capacity assessed to serve as a basis for the design | OPM, Gewog Engineers | 01/2019 |
| Matching grants for irrigation A matching grant facility is established for individuals undertaking on-farm irrigation development with water saving technologies (drip, sprinklers, hose + tank, etc.), prioritizing support for poor farmers | OPM | 12/2019 |
| Project Management | | |
| CARLEP Focal Point at Dzongkhags Designate one among the DLO and DAO as the CARLEP Focal point at each Dzongkhag to integrate planning, AWPB preparation and reporting for CARLEP, taking on board the CARLEP objective with the Dzongkhag's development strategy/plans. | MoAF/Dzongkhags with OPM support | 01/2019 |
| Strengthen OPM Upgrade the OPM Component Managers to the level of Dzongkhag Sector Officers Appoint a Project Manager to assist the NPD at OPM and additional personnel as outlined in Component 3 above | MoAF | 01/2019 |
| Planning and AWPB preparation Introduce a systematic planning process for AWPB preparation to align CARLEP Objectives, Outcomes and Outputs with Dzongkhags' development strategies and plans and ensure that investments are based on detailed business plans. | OPM | 01/2019 |
| MIS System Develop a web based MIS System and report physical and financial progress | OPM | 02/2019 |
| Training Provide training on M&E to component managers and extension officers | IFAD | 03/2019 |

| | | |
|---|------------------|---------|
| Strengthen collaboration OPM and extension services should work in more synergies and not only through Dzongkhag | OPM | 03/2019 |
| Information board Install an information board with details on sub-projects-grants-beneficiaries, in each project site at village/Gewog level, for sharing the project services and support provided to all the communities. | OPM | 06/2019 |
| Financial Management & Execution | | |
| Budgeting of counterpart funds OPM to increase the planning of those activities funded by the RGoB and at the same time monitor that overall districts' planning does not put in place activities overlapping with CARLEP that may be included in the project's plan. | OPM | 12/2018 |
| Reporting Enhance Interim Financial Progress and timely submit quarterly to IFAD | OPM | 12/2018 |
| Taxes – ineligible amounts Determine the ineligible amount of taxes charged to IFAD and provide communication to IFAD FO for refund/deduction from future WAs. Also track RGoB contribution provided as taxes. | OPM | 12/2018 |
| Determine/monitor tax quota out of RGoB contribution Determine/monitor tax quota out of RGoB contribution | OPM | 01/2019 |
| FCBL Analyse the breakdown of FCBL expenses which is mainly comprising salary cost (including those of the staff at stores) in order to determine what is/is not Recurrent Costs. | OPM | 01/2019 |
| Economic and Financial Analysis and Information Sheet All prior review procurements will be submitted with the information sheet (template provided to OPM) with an economic and financial analysis for the investment. For the case of irrigation investments, the information sheet shall also include a satellite image with the system layout | OPM | 03/2019 |
| Contracts and Fixed Assets Register The contract register must be prepared retroactively for all procurement, prior and post, that has been undertaken by CARLEP. Variation orders shall be reflected in the register of contracts. The register of assets needs to include all assets procured under CARLEP even by other agencies | OPM | 03/2019 |
| Fixed Assets Full assets tagging and relevant reporting in asset registers, (i.e. starting to tag in ranking order from most expensive) | Finance OPM/ IUs | 03/2019 |

| | | |
|--|-------------|---------|
| E-Training on FM of IFAD funded projects All finance staff across CARLEP invited to undertake the IFAD FM e-learning (link has already been provided by the FMS to OPM). | OPM Finance | 06/2019 |
| Ring-fence CARLEP finance community OPM finance (i) to call, at least once a year, a FM workshop gathering all Carlep finance staff, (ii) OPM finance to provide one-to-one support through at least one visit per year at all IU (iii) and facilitate cross visit-cooperation of staff from adjacent districts. | OPM | 12/2019 |
| Bidding process Ensure that adequate time (at least 30 days) and information (system layouts on satellite image) is given to civil works contractors for the preparation of informed bids. | OPM | |
| Budgeting/costab Support OPM management in the feasibility of any exercise aimed at enhancing current costab/AWPB component classification (i.e. MYRB), providing a bridge/mapping of current expenditure to future plans. | OPM | |
| Budget planning Early and stronger engagement of Finance in the planning process, to come up with enhanced reporting on actual expenditure and residual balance, by IU and benchmarked as % of AWPB (cumulative/period) | OPM | |

Commercial Agriculture and Resilient Livelihoods Enhancement Programme

Logical Framework

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Outreach | 1.b Estimated corresponding total number of households members | | | | | | | RIMS | Annual | | |
| | Household members | | | 144 875 | 13 500 | 37 174 | 25.7 | | | | |
| | 1.a Corresponding number of households reached | | | | | | | RIMS | Annual | | |
| | Non-women-headed households | | | 28 975 | 3 375 | 9 011 | 31.1 | | | | |
| | Women-headed households | | | | | | | | | | |
| | 1 Persons receiving services promoted or supported by the project | | | | | | | | | | |
| | Indigenous people | | | | | | | | | | |
| | Males | | | | 7 500 | 21 210 | | | | | |
| | Not Young | | | | | | | | | | |
| | Non-Indigenous people | | | | | | | | | | |
| | Young | | | | 60 | 125 | | | | | |
| | Females | | | | 6 000 | 15 964 | | | | | |
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| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|---|---|----------|----------|------------|----------------------|--------------------------|----------------------------|---|-----------|----------------|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Goal Sustainably increase smallholder producers' incomes and reduce poverty through commercialization of production within programme households | 5 000 direct beneficiary HH in vegetable and dairy value chains report at least 25% increase in HH asset and income, as compared to baseline (disaggregated by HHs-head gender) | | | | | | | IFAD's Results and Impact Management System (RIMS) and baseline surveys | | | No major socio-economic slow down, or natural disasters Increasing support for collaboration between different Agencies, civil society and private sector to develop value chains - Continued MoAF support for innovative approaches Agricultural approaches and technologies primarily remain profitable - Programme investments are realized as designed |
| | % of increase in HH asset and income | | | 25 | | | | | | | |
| | 15% reduction in the prevalence of child malnutrition, as compared to baseline | | | | | | | Programme M&E | | | |
| | % reduction child malnutrition | | | 15 | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|---|--|----------|----------|------------|----------------------|--------------------------|----------------------------|--|-----------|----------------|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Objective Increased returns to smallholder farmers through climate resilient production of crops and livestock in nationally organized value chains and marketing systems | ≥ 30% increase in production of vegetables and dairy products | | | | | | | Baseline survey - Sector studies - Technical agencies' reports and studies Research and academic studies Programme M&E | | | No major socio-economic slow down, or natural disasters Increasing support for collaboration between different Agencies, civil society and private sector to develop value chains - Continued MoAF support for innovative approaches Agricultural approaches and technologies primarily remain profitable - Programme investments are realized as designed |
| | % increase in production | | | 30 | | | | | | | |
| | ≥ 20,000 HH in vulnerable areas with increased water availability for agriculture production | | | | | | | Baseline survey - Sector studies - Technical agencies' reports and studies Research and academic studies Programme M&E | | | |
| | Households | | | 20 000 | | | | | | | |
| Outcome Community-based Resilient Agricultural Production has sustainably increased | 6 000 HH adopt sustainable agricultural practices | | | | | | | Programme M&E reports - Contracted studies - RIMS and benchmark - Scientific and conference papers | | | Collaboration between Government Agencies/staff and non-state service providers is successful Royal Government of Bhutan (RGoB) complementary financing and supportive annual block grants (dzongkhags) is allocated and utilised |
| | Households | | | 6 000 | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|--|--|----------|----------|------------|----------------------|--------------------------|----------------------------|--|-----------|----------------|---|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Output Increased Production Resilience, Diversification and Innovation | ≥ 23 000 (of which 50% are women) smallholder HH supported in coping with the effects of climate change with sustainable land management practices | | | | | | | Base line studies Programme progress report Line agencies' reports | | | RGoB earmarked funding (including other donors) of agricultural inputs and capacity development of farmer groups is allocated and utilised as per programme design - Capacity of Government Agencies/staff and non-state service providers is adequate to achieve results as per programme design |
| | Females | | | 11 500 | | | | | | | |
| | Households | | | 23 000 | | | | | | | |
| Output Vegetable Production Intensified and Expanded | 300 new vegetable farmer groups (4 500 HH) established and functional; minimum 60% female members | | | | | | | Base line studies Programme progress report Line agencies' reports | | | RGoB earmarked funding (including other donors) of agricultural inputs and capacity development of farmer groups is allocated and utilised as per programme design - Capacity of Government Agencies/staff and non-state service providers is adequate to achieve results as per programme design |
| | No. of groups formed | | | 300 | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|--|---|----------|----------|------------|----------------------|--------------------------|----------------------------|---|-----------|----------------|---|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Output Dairy Production Intensified and Expanded | 150 Smallholder Dairy Farmer Groups (450 HH) established and functional, with minimum 50% female members | | | | | | | Base line studies Programme progress report Line agencies' reports | | | RGoB earmarked funding (including other donors) of agricultural inputs and capacity development of farmer groups is allocated and utilised as per programme design - Capacity of Government Agencies/staff and non-state service providers is adequate to achieve results as per programme design |
| | No. of groups formed | | | 150 | | 8 | 5.3 | | | | |
| | Households receiving animals from distribution/restocking | | | | | | | RIMS | Annual | | |
| | Households | | | | 265 | 511 | | | | | |
| Outcome Increased smallholder income from Crop and Livestock Value Chains | 70% of the agricultural enterprises established have a positive outlook on their profitability and sustainability | | | | | | | Programme M&E reports - RIMS and benchmark -Line agencies' reports - Sector studies and reports - Farmer satisfaction surveys | | | Willingness for collaboration between Government Agencies/staff, FCBL and non-state actors, including small entrepreneurs and businesses, to develop and manage value chains and market infrastructure |
| | % of positive outlook on profitability | | | 70 | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|--|--|----------|----------|------------|----------------------|--------------------------|----------------------------|---|-----------|----------------|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Output Resilient Vegetable and Dairy Value Chains developed | 65 geogs have developed climate resilient vegetable and dairy production, marketing, and infrastructure management plans | | | | | | | Programme progress report Sector reports and studies | | | FCBL has adequate financial allocations to develop its own capacity next to programme support - Geogs are willing to develop more holistic (value chain based) geog plans for dairy and vegetables to guide programme investments and strengthen local institutions for climate resilience |
| | No. of geogs | | | 65 | | 6 | 9.2 | | | | |
| Output Agricultural Commercialization and Enterprise Development strengthened | 200 agriculture enterprises (including cooperatives) established and strengthened as part of value chain development | | | | | | | Programme progress report - Sector reports and studies | | | Adequate number of interested and able entrepreneurs come forward to establish businesses - Access to finance for small rural agricultural entrepreneurs is adequately facilitated |
| | No. of enterprises | | | 200 | 6 | 9 | 4.5 | | | | |
| | Other productive infrastructure constructed/rehabilitated | | | | | | | RIMS | Annual | | |
| | No. of infrastructure | | | 830 | 606 | 626 | 75.4 | | | | |
| | People in groups managing productive infrastructure | | | | | | | RIMS | Annual | | |
| | Females | | | | 320 | 881 | | | | | |
| | Males | | | | 281 | 1 293 | | | | | |
| | Groups managing productive infrastructure formed/strengthened | | | | | | | RIMS | Annual | | |
| | No. of groups formed | | | 26 | 2 | 17 | 65.4 | | | | |
| | Crop/Livestock production groups formed/strengthened | | | | | | | RIMS | Annual | | |
| | No. of groups | | | | | 8 | | | | | |
| | Land under improved management practices | | | | | | | RIMS | Annual | | |
| | Hectares of land | | | | | 52 | | | | | |
| | People trained on land management practices | | | | | | | RIMS | Annual | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|--|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Females | | | | | 124 | | | | | |
| | Males | | | | | 146 | | | | | |
| | 2.1.4 Supported rural producers that are members of a rural producers' organization | | | | | | | RIMs survey Impact Assessment Survey MIS | Annual | PMU | |
| | Non-Indigenous people | | | | | | | | | | |
| | Women in leadership position | | | | | | | | | | |
| | Young | | | | | | | | | | |
| | Females | | | | | 40 | | | | | |
| | Indigenous people | | | | | | | | | | |
| | Males | | | | | 60 | | | | | |
| | Not Young | | | | | | | | | | |
| | 1.1.4 Persons trained in production practices and/or technologies | | | | | | | | | | |
| | Young people trained in fishery | | | | | | | | | | |
| | Total persons trained in crop | | | | 5 863 | 9 699 | | | | | |
| | Men trained in forestry | | | | | | | | | | |
| | Total persons trained in forestry | | | | | | | | | | |
| | Non indigenous people trained in forestry | | | | | | | | | | |
| | Not young people trained in fishery | | | | | | | | | | |
| | Non indigenous people trained in fishery | | | | | | | | | | |
| | Indigenous people trained in livestock | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|--|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Non indigenous people trained in crop | | | | | | | | | | |
| | Women trained in crop | | | | 4 098 | 6 425 | | | | | |
| | Men trained in fishery | | | | | | | | | | |
| | Indigenous people trained in fishery | | | | | | | | | | |
| | Total persons trained in livestock | | | | 5 646 | 5 646 | | | | | |
| | Men trained in livestock | | | | 2 823 | 4 940 | | | | | |
| | Total persons trained in fishery | | | | | | | | | | |
| | Women trained in livestock | | | | 2 823 | 4 494 | | | | | |
| | Women trained in forestry | | | | | | | | | | |
| | Indigenous people trained in crop | | | | | | | | | | |
| | Men trained in crop | | | | 6 411 | 9 419 | | | | | |
| | Not young people trained in crop | | | | | | | | | | |
| | Young people trained in crop | | | | | | | | | | |
| | Women trained in fishery | | | | | | | | | | |
| | Non indigenous people trained in livestock | | | | | | | | | | |
| | Not young people trained in livestock | | | | | | | | | | |
| | Young people trained in livestock | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions | | | |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|--|--|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | | | | |
| | Young people trained in forestry | | | | | | | RIMS | Annual | PMU | | | | |
| | Indigenous people trained in forestry | | | | | | | | | | | | | |
| | Not young people trained in forestry | | | | | | | | | | | | | |
| | 2.1.3 Rural producers' organizations supported | | | | | | | | | | | | | |
| | Young | | | | | | | | | | | | | |
| | Not Young | | | | | | | | | | | | | |
| | Total size of POs | | | | | | | | | | | | | |
| | Males | | | | 4 177 | 4 177 | | | | | | | | |
| | Women in leadership position | | | | | | | | | | | | | |
| | Females | | | | 4 756 | 4 756 | | | | | | | | |
| | Rural POs supported | | | 115 | 60 | 78 | 67.8 | | | | | | | |
| | Indigenous people | | | | | | | | | | | | | |
| | Non-Indigenous people | | | | | | | | | | | | | |
| | 2.1.6 Market, processing or storage facilities constructed or rehabilitated | | | | | | | RIMS | Annual | PMU | | | | |
| | Storage facilities constructed/rehabilitated | | | | | | | | | | | | | |
| | Market facilities constructed/rehabilitated | | | | 21 | 47 | | | | | | | | |
| | Processing facilities constructed/rehabilitated | | | | | | | | | | | | | |
| | 1.1.2 Farmland under water-related infrastructure constructed/rehabilitated | | | | | | | RIMS | Annual | PMU | | | | |
| | Hectares of land | | | | 199 | 571 | | | | | | | | |
| | | | | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|---|--|----------|----------|------------|----------------------|--------------------------|----------------------------|---|-----------|----------------|---|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Output Community-driven Strategic Market Infrastructure developed | Vegetable and dairy value chain processing and marketing infrastructure designed and constructed in 10 dzongkhags | | | | | | | Programme progress report - Sector reports and studies | | | Complementary financing from RGoB and FCBL will be provided as earmarked |
| | No. of value chain processing and market infrastructure | | | | | | | | | | |
| Outcome Strengthened Agricultural Institutions and Policies for Improved and Resilient Agricultural and Marketing Practices | ≥ 70% of VC stakeholders report the use of market information in investment decision-making 60% of VC stakeholders report satisfaction with the policy and regulatory framework as providing a fair distribution of incentives, costs, benefits, and risks | | | | | | | Programme M&E reports - Line agencies' - Department of Agriculture Marketing and Cooperatives (DAMC), FCBL and Business Opportunity and Information Centre (BOiC) reports - Sector studies and reports - Programme survey | | | MoAF will pro-actively implement the 11th FYP strategy for enabling private sector engagement and participation within the process of commercialisation of agricultural development |
| | % of stakeholders reporting use of market information | | | 70 | | | | | | | |
| | 3.2.2 Households reporting adoption of environmentally sustainable and climate-resilient technologies and practices | | | | | | | RIMS | Annual | | |
| | Women-headed households | | | | | | | | | | |
| | Households | | | | | | | | | | |
| | Non-women-headed households | | | | | | | | | | |
| | Males | | | | | | | | | | |
| | Households | | | | | | | | | | |
| | Young | | | | | | | | | | |
| | Non-Indigenous people | | | | | | | | | | |
| | Indigenous people | | | | | | | | | | |
| | Females | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions | | | |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|--|--|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | | | | |
| | Not Young | | | | | | | | | | | | | |
| | Total number of household members | | | | | | | | | | | | | |
| | 3.2.3 Households reporting a significant reduction in the time spent for collecting water or fuel | | | | | | | RIMS | Annual | | | | | |
| | Women-headed households | | | | | | | | | | | | | |
| | Not Young | | | | | | | | | | | | | |
| | Males | | | | | | | | | | | | | |
| | Non-women-headed households | | | | | | | | | | | | | |
| | Households | | | | | | | | | | | | | |
| | Households | | | | | | | | | | | | | |
| | Young | | | | | | | | | | | | | |
| | Total household members | | | | | | | | | | | | | |
| | Indigenous people | | | | | | | | | | | | | |
| | Females | | | | | | | | | | | | | |
| | Non-Indigenous people | | | | | | | | | | | | | |
| | 1.2.3 Households reporting reduced water shortage vis-à-vis production needs | | | | | | | | | | | | | |
| | Young | | | | | | | | | | | | | |
| | Males | | | | | | | | | | | | | |
| | Women-headed households | | | | | | | | | | | | | |
| | Non-women-headed households | | | | | | | | | | | | | |
| | Households | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Females | | | | | | | | | | |
| | Non-Indigenous people | | | | | | | | | | |
| | Total household members | | | | 921 | | | | | | |
| | Households | | | | | | | | | | |
| | Not Young | | | | | | | | | | |
| | Indigenous people | | | | | | | | | | |
| | Poor smallholder household members supported in coping with the effects of climate change | | | | | | | RIMS | Annual | PMU | |
| | Males | | | | 160 | 1 442 | | | | | |
| | Females | | | | 160 | 720 | | | | | |
| | Total household members | | | 115 000 | 320 | 2 162 | 1.9 | | | | |
| | Households supported with increased water availability or efficiency | | | | | | | RIMS | Annual | PMU | |
| | Households | | | 10 000 | 1 267 | 3 186 | 31.9 | | | | |
| | Individuals engaged in NRM and climate risk management activities | | | | | | | RIMS | Annual | PMU | |
| | Males | | | | | | | | | | |
| | Total | | | 30 000 | 820 | 820 | 2.7 | | | | |
| | Females | | | | | | | | | | |
| | Community groups engaged in NRM and climate risk management activities | | | | | | | RIMS | Annual | PMU | |
| | Groups | | | 65 | | | | | | | |
| | Group members - males | | | | | | | | | | |
| | Group members - females | | | | | | | | | | |
| | Group members (total) | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|--|---|----------|----------|------------|----------------------|--------------------------|----------------------------|--|-----------|----------------|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| Output Strengthened value chain and marketing knowledge and communication | Market Information System MoAF/DAMC providing relevant (real-time) information to farmers | | | | | | | Programme M&E reports Line agencies', DAMC, FCBL and BOiC reports Sector studies and reports | | | Adequate technical and process support is provided to develop the models and approaches on the ground, to access learning and to document good practice (presently a weak part of IFAD projects) |
| | No of market information system | | | | 1 | 1 | | | | | |
| | 2.1.2 Persons trained in income-generating activities or business management | | | | | | | RIMS | Annual | PMU | |
| | Young | | | | | | | | | | |
| | Not Young | | | | | | | | | | |
| | Females | | | | 576 | 1 362 | | | | | |
| | Non-Indigenous people | | | | | | | | | | |
| | Indigenous people | | | | | | | | | | |
| | Males | | | | 864 | 1 389 | | | | | |
| | Persons trained in IGAs or BM (total) | | | | | | | | | | |
| | 1.1.4 Persons trained in production practices and/or technologies | | | | | | | | | | |
| | Young people trained in fishery | | | | | | | | | | |
| | Total persons trained in crop | | | | | | | | | | |
| | Men trained in forestry | | | | | | | | | | |
| | Total persons trained in forestry | | | | | | | | | | |
| | Non indigenous people trained in forestry | | | | | | | | | | |
| | Not young people trained in fishery | | | | | | | | | | |
| | Non indigenous people trained in fishery | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|--|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Indigenous people trained in livestock | | | | | | | | | | |
| | Non indigenous people trained in crop | | | | | | | | | | |
| | Women trained in crop | | | | | | | | | | |
| | Men trained in fishery | | | | | | | | | | |
| | Indigenous people trained in fishery | | | | | | | | | | |
| | Total persons trained in livestock | | | | | | | | | | |
| | Men trained in livestock | | | | | | | | | | |
| | Total persons trained in fishery | | | | | | | | | | |
| | Women trained in livestock | | | | | | | | | | |
| | Women trained in forestry | | | | | | | | | | |
| | Indigenous people trained in crop | | | | | | | | | | |
| | Men trained in crop | | | | | | | | | | |
| | Not young people trained in crop | | | | | | | | | | |
| | Young people trained in crop | | | | | | | | | | |
| | Women trained in fishery | | | | | | | | | | |
| | Non indigenous people trained in livestock | | | | | | | | | | |
| | Not young people trained in livestock | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|--|---|----------|----------|------------|----------------------|--------------------------|----------------------------|---|-----------|----------------|---|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Young people trained in livestock | | | | | | | | | | |
| | Young people trained in forestry | | | | | | | | | | |
| | Indigenous people trained in forestry | | | | | | | | | | |
| | Not young people trained in forestry | | | | | | | | | | |
| Output Climate change resilience and value chain development lessons mainstreamed in agricultural policies and sector strategies | Enhanced engineering norms for building climate resilient irrigation systems | | | | | | | Programme M&E reports Line agencies' reports Sector studies and reports Policy documents Regulatory framework document for private sector and PPP | | | Dialogue and collaboration between Government Agencies/staff and external stakeholders is successful and generates meaningful lessons and insights for policy development |
| | No. of norms | | | | | | | | | | |
| | Vegetable and dairy development policies enhanced based on multi-stakeholder consultation processes and programme lessons (resilience, value chain and marketing) | | | | | | | Programme M&E reports Line agencies' reports Sector studies and reports Policy documents Regulatory framework document for private sector and PPP | | | |
| | No. of policies | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|---|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Regulatory framework for private sector development and PPP in agriculture sector developed | | | | | | | Programme M&E reports Line agencies' reports Sector studies and reports Policy documents Regulatory framework document for private sector and PPP | | | |
| | No. of framework | | | | | | | | | | |
| | 3.1.2 Persons provided with climate information services | | | | | | | RIMS | Annual | | |
| | Not Young | | | | | | | | | | |
| | Males | | | | | 6 | | | | | |
| | Non-Indigenous people | | | | | | | | | | |
| | Young | | | | | 90 | | | | | |
| | Indigenous people | | | | | | | | | | |
| | Females | | | | | 86 | | | | | |
| | 1.1.2 Farmland under water-related infrastructure constructed/rehabilitated | | | | | | | RIMS | Annual | | |
| | Hectares of land | | | | | | | | | | |
| | 1.1.3 Rural producers accessing production inputs and/or technological packages | | | | | | | RIMS | Annual | PMU | |
| | Females | | | | 110 | 5 126 | | | | | |
| | Young | | | | | | | | | | |
| | Males | | | | 286 | 5 019 | | | | | |
| | Not Young | | | | | | | | | | |
| | 3.1.3 Persons accessing technologies that sequester carbon or reduce greenhouse gas emissions | | | | | | | RIMS | Annua | | |
| | Indigenous people | | | | | | | | | | |
| | Young | | | | | | | | | | |
| | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions | | | | | |
|-------------------|--|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|--|--|--|--|--|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | | | | | | |
| | Females | | | | 360 | 360 | | | | | | | | | | |
| | Not Young | | | | | | | | | | | | | | | |
| | Non-Indigenous people | | | | | | | | | | | | | | | |
| | Males | | | | 260 | 272 | | | | | | | | | | |
| | Government officials and staff trained | | | | | | | | | | | | | | | |
| | Males | | | | 12 | 76 | | | | | | | | | | |
| | Females | | | | 3 | 18 | | | | | | | | | | |
| | 2.1.1 Rural enterprises accessing business development services | | | | | | | RIMS | Annual | PMU | | | | | | |
| | Rural enterprises | | | | | | | | | | | | | | | |
| | Number of groups supported to sustainably manage natural resources and climate-related risks | | | | | | | | | | | | | | | |
| | Number of groups supported by crops sector | | | | 5 | 88 | | | | | | | | | | |
| | Natural resource manage groups with women in leadership positions | | | | | | | | | | | | | | | |
| | Number of groups supported by livestock sector | | | | 81 | 113 | | | | | | | | | | |
| | 2.1.2 Persons trained in income-generating activities or business management | | | | | | | RIMS | Annual | PMU | | | | | | |
| | Females | | | | | | | | | | | | | | | |
| | Males | | | | | | | | | | | | | | | |
| | Number of members of the project-supported enterprise | | | | | | | | | | | | | | | |
| | Females | | | | 81 | 126 | | | | | | | | | | |
| | Young | | | | 5 | 30 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| Results Hierarchy | Indicators | | | | | | | Means of verification | | | Assumptions |
|-------------------|---|----------|----------|------------|----------------------|--------------------------|----------------------------|-----------------------|-----------|----------------|-------------|
| | Name | Baseline | Mid-Term | End Target | Annual Result (2018) | Cumulative Result (2018) | Cumulative Result % (2018) | Source | Frequency | Responsibility | |
| | Number of project-supported enterprise with women in leadership positions | | | | 3 | 25 | | | | | |
| | Males | | | | 5 | 30 | | | | | |
| | Number of project-supported enterprise headed by young farmers | | | | 6 | 9 | | | | | |
| | 2.1.6 Market, processing or storage facilities constructed or rehabilitated | | | | | | | RIMS | Annual | PMU | |
| | Storage facilities constructed/rehabilitated | | | | | | | | | | |
| | Market facilities constructed/rehabilitated | | | | 21 | 47 | | | | | |
| | Processing facilities constructed/rehabilitated | | | | | | | | | | |
| | International and country dialogues on climate supported | | | | | | | RIMS | Annual | PMU | |
| | Dialogues | | | 1 | | | | | | | |
| | Land under climate-resilient practices | | | | | | | RIMS | Annual | PMU | |
| Land area | | | | 92 | 711 | | | | | | |

Bhutan

Commercial Agriculture and Resilient Livelihoods Enhancement Programme Mid-term Review

Appendix 1: Financial: actual financial performance; by financier by component and disbursements by category

Mission Dates: 24 November – 7 December 2018
Document Date: 16/02/2019
Project No. 1100001739
Report No. 4990-BT

Asia and the Pacific Division
Programme Management Department

[Click here and type country name](#)

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Supervision report - Mission dates: [\[click here and insert mission dates\]](#)

Appendix 2: Financial: Actual financial performance by financier; by component and disbursements by category

CARLEP (Bhutan) - FINANCIAL PERFORMANCE (as at 31 October 2018)

Table 5A: Financial performance by FINANCIER (USD 000, as at 31 October 2018)

| FINANCIER: | Appraisal (USD 000) | Disbursement (USD 000) | Disbursed % |
|--------------------------|------------------------|---------------------------|----------------|
| IFAD loan | 8 273 | 3 767 | 46% |
| IFAD grant | 1 073 | 535 | 50% |
| ASAP grant | 5 023 | 1 714 | 34% |
| Government | 5 739 | 414 | 7% |
| FCBL | 4 802 | 669 | 14% |
| Beneficiary contribution | 659 | 174 | 26% |
| TOTAL | 25 569 | 7 273 | 28% |
| sub-ifad | 14 369 | 6 016 | 42% |

Table 5B: Financial performance by COMPONENT (USD 000, as at 31 October 2018)

| COMPONENT: | IFAD loan | | | IFAD grant | | | ASAP grant | | | GOVERNMENT | | | FCBL | | | BENEFICIARIES | | | TOTAL | | |
|---|------------------------|---------------------|------------|------------------------|---------------------|------------|------------------------|---------------------|------------|------------------------|---------------------|-----------|------------------------|---------------------|------------|------------------------|---------------------|------------|------------------------|---------------------|------------|
| | Appraisal (USD 000) | Actual (USD 000) | % | Appraisal (USD 000) | Actual (USD 000) | % | Appraisal (USD 000) | Actual (USD 000) | % | Appraisal (USD 000) | Actual (USD 000) | % | Appraisal (USD 000) | Actual (USD 000) | % | Appraisal (USD 000) | Actual (USD 000) | % | Appraisal (USD 000) | Actual (USD 000) | % |
| Market led sustainable agriculture production | 4 809 | 1 817 | 38% | 400 | 54 | 14% | 3 025 | 795 | 26% | 4 196 | 180 | 4% | | | | 659 | 174.2 | 26% | 13 088 | 3 021 | 23% |
| Value chain development and marketing support | 3 150 | 424 | 13% | 174 | 28 | 16% | 1 729 | 119 | 7% | 599 | 14 | 2% | 4 281 | | 0% | | | | 9 933 | 585 | 6% |
| Institutional support & policy development | 144 | 7 | 5% | 34 | | 0% | 269 | | 0% | 14 | | 0% | | | | | | | 461 | 7 | 2% |
| Project management, coordination and M&E | 171 | 18 | 11% | 465 | 253 | 54% | | | | 930 | 219 | 24% | 522 | 669 | 128% | | | | 2 088 | 1 159 | 56% |
| Outstanding advance | | 1 500 | | | 200 | | | 800 | | | | | | | | | | | 0 | 2 500 | |
| TOTAL | 8 273 | 3 767 | 46% | 1 073 | 535 | 50% | 5 023 | 1 714 | 34% | 5 738 | 414 | 7% | 4 803 | 669 | 14% | 659 | 174.2 | 26% | 25 569 | 7 273 | 28% |

[Click here and type country name](#)

[Click here and type project name](#)

Supervision report - Mission dates: [\[click here and insert mission dates\]](#)

Table 5C: IFAD Loan disbursement (SDR, as at 31 October 2018)

| CATEGORY: | Original Allocation (SDR) | Disbursement (SDR) | W/A pending (SDR) | Balance (SDR) | % Disbursed* |
|------------------------------------|---------------------------|--------------------|-------------------|------------------|--------------|
| 200003 Works | 1 890 000 | 515 000 | 10 | 1 375 000 | 27% |
| 200012 Grants and Subsidies | 180 000 | | | 180 000 | 0% |
| 200013 Goods, Services and Input | 2 000 000 | 971 391 | 45 | 1 028 609 | 49% |
| 200019 Training | 1 230 000 | 141 484 | 14 | 1 088 516 | 12% |
| 200016 Operating costs unallocated | 590 000 | | | 590 000 | 0% |
| 270001 Initial deposit | | 1 049 030 | | -1 049 030 | |
| TOTAL | 5 890 000 | 2 676 906 | 70 | 3 213 094 | 45% |

* excluding pending WAs

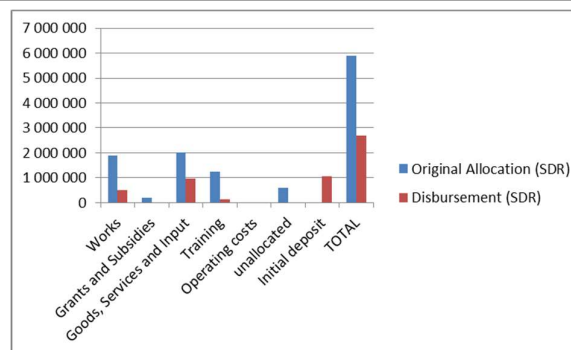


Table 5C: IFAD Grant disbursement (SDR, as at 31 October 2018)

| CATEGORY: | Original Allocation (SDR) | Disbursement (SDR) | W/A pending (SDR) | Balance (SDR) | % Disbursed* |
|------------------------------------|---------------------------|--------------------|-------------------|----------------|--------------|
| 200003 Works | | | | 0 | |
| 200012 Grants and Subsidies | 40 000 | | | 40 000 | 0% |
| 200013 Goods, Services and Input | 210 000 | 116 475 | | 93 525 | 55% |
| 200019 Training | 370 000 | 111 329 | 9 | 258 671 | 30% |
| 200016 Operating costs unallocated | 70 000 | 11 406 | 2 | 58 594 | 16% |
| | 70 000 | | | 70 000 | 0% |
| 270001 Initial deposit | | 142 276 | | -142 276 | |
| TOTAL | 760 000 | 381 486 | 11 | 378 514 | 50% |

* excluding pending WAs

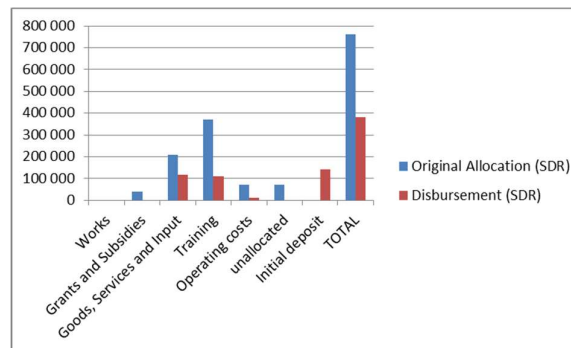
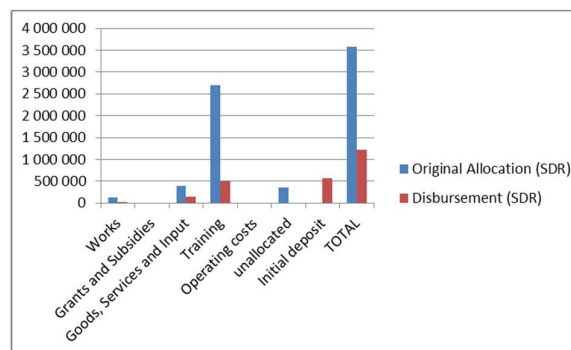


Table 5C: ASAP Grant disbursement (SDR, as at 31 October 2018)

| CATEGORY: | Original Allocation (SDR) | Disbursement (SDR) | W/A pending (SDR) | Balance (SDR) | % Disbursed* |
|------------------------------------|---------------------------|--------------------|-------------------|------------------|--------------|
| 200003 Works | 120 000 | 3 368 | | 116 632 | 3% |
| 200012 Grants and Subsidies | | | | 0 | |
| 200013 Goods, Services and Input | 400 000 | 151 271 | 6 | 248 729 | 38% |
| 200019 Training | 2 700 000 | 496 584 | 33 | 2 203 416 | 18% |
| 200016 Operating costs unallocated | 360 000 | | | 360 000 | 0% |
| 270001 Initial deposit | | 567 364 | | -567 364 | |
| TOTAL | 3 580 000 | 1 218 587 | 39 | 2 361 413 | 34% |

* excluding pending WAs



Bhutan

Commercial Agriculture and Resilient Livelihoods Enhancement Programme Mid-term Review

Appendix 2: Physical progress measured against AWP&B

Mission Dates: 24 November – 7 December 2018
Document Date: 16/02/2019
Project No. 1100001739
Report No. 4990-BT

Asia and the Pacific Division
Programme Management Department

Appendix 2: Physical progress measured against AWP&B

| Component/Outcome <i>Sub-component or Output</i> | Indicator | Unit | Period: 01-07-17 to 30-06-18 | | | Cumulative Actual | Appraisal Target | % | |
|--|---|--|------------------------------|--------|-------|-------------------|------------------|------|--------|
| | | | AWP&B | Actual | % | | | | |
| | | | | | | | | | |
| Component 1: Market-led Sustainable Agriculture Production | | | | | | | | | |
| Output 1.1. Increased production resilience and diversification in agriculture | | | | | | | | | |
| 1.1.A | Climate Smart Agriculture Production and Management | | | | | | | | |
| 1 | Upgrading of existing farmer groups | No. of farmers Groups upgraded | No. | 8 | 5 | 62.50 | 14 | 6 | 233.33 |
| 2 | Training of extension agents | No. of EAs trained | No. | 27 | 21 | 77.78 | 25 | 200 | 12.50 |
| 3 | Production inputs for farm resilience and diversification(Agriculture) | Area under farm resilience and diversification | Acre | 35 | 26.84 | 76.69 | 1135.17 | 194 | 585.14 |
| 4 | Production inputs for farm resilience and diversification (Livestock - Poultry) | No of native poultry units promoted | No. | 43 | 49 | 113.95 | 228 | 368 | 61.96 |
| 5 | Production inputs for farm resilience and diversification (Livestock - Piggery) | No. of native piggery units promoted | No. | 30 | 23 | 76.67 | 23 | 240 | 9.58 |
| 6 | Production inputs for farm resilience and diversification (Livestock - Goat) | No. of goat promoted | Nos. | 25 | 27 | 108.00 | 27 | 0 | - |
| 7 | Production support fund | Amount supported | Nu. | 0 | 0 | - | 0 | 0 | - |
| 8 | Promotion of SLM techniques | Area under SLM | Acres | 5 | 0 | 0.00 | 76.5 | 150 | 51.00 |
| 9 | Land development | Area under land development | Acres | 10 | 0 | 0.00 | 128.14 | 300 | 42.71 |
| 10 | Local germplasm collection, conservation and promotion | No. of lines | No. | 0 | 0 | - | 67 | 70 | 95.71 |
| 11 | Crop diversification(Cereals, oil seeds, pulses& fruits) | Area under diversification | Acre | 100 | 0 | 0.00 | 798.35 | 3000 | 26.61 |
| 1.1.B | Innovation through Permaculture & Biogas | | | | | | | | |
| 1 | Farm level rainwater harvesting infrastructure | No. of infrastructure established | No. | 9 | 1 | 11.11 | 2 | 12 | 16.67 |
| 2 | Seed and seedlings | Area covered | Acre | 6 | 35.2 | 586.67 | 76.31 | 72 | 105.99 |
| 3 | Tools for permaculture | Sets of tools supplied | No. | 6 | 3 | 50.00 | 4 | 12 | 33.33 |
| 4 | Inputs for permaculture (livestock) | No. of units supported | No. | 0 | 0 | - | 14 | 30 | 46.67 |
| 5 | Bee Keeping | No. of household supported | No. | 0 | 0 | - | 7 | 30 | 23.33 |
| 6 | Inputs for permaculture (agriculture) | No. of units supported | No. | 0 | 0 | - | 0 | 0 | - |
| 7 | Nursery set up | No. of nurseries set up | No. | 6 | 7 | 116.67 | 24 | 2 | |

| | | | | | | | | | |
|---|--|---|------|-----|----|--------|-------|-----|--------|
| 8 | Training course on permaculture | No. of training conducted | No. | 0 | 0 | - | 0 | 1 | 0.00 |
| 9 | Staff training on permaculture | No. of staff trained | No. | 0 | 0 | - | 0 | 0 | - |
| 10 | Farmers training on permaculture | No. of farmers trained | No. | 0 | 0 | - | 176 | 120 | 146.67 |
| 11 | Permaculture materials & translation | No. of materials published | No. | 0 | 0 | - | 1 | 4 | 25.00 |
| 12 | Biogas digester | No. of biogas digester promoted | No. | 0 | 0 | - | 12 | 12 | 100.00 |
| 13 | TA biogas | No. of TA recruited | No. | 0 | 0 | - | 0 | 0 | - |
| 14 | SLM practices | Area coverage | Acre | 6 | 1 | 16.67 | 31 | 12 | 258.33 |
| 1.1.C Innovation through ICTs | | | | | | | | | |
| 1 | Hand-held tablets, software and soil test kits | No. of ICT tools introduced | No. | 6 | 0 | 0.00 | 0 | 100 | 0.00 |
| 2 | Training on tablet-based soil monitoring technology | No. of training conducted | No. | 0 | 0 | - | 0 | 4 | 0.00 |
| 3 | Training on report writing documentation and information sharing | No. of training conducted | No. | 0 | 0 | - | 2 | 0 | - |
| 4 | Pilot e-reporting system | No. of e-reporting system | No. | 0 | 0 | - | 1 | 0 | - |
| 5 | Information management dissemination | No. of publication | | 0 | 0 | - | 0 | | - |
| 1.1.D Increase Outreach of Extension Services | | | | | | | | | |
| 1.1.D.1 Strengthening & expansion of the Lead Farmer Model | | | | | | | | | |
| 1 | Training of trainers (ToT) | No. of ToT conducted | No. | 2 | 1 | 50.00 | 3 | 17 | 17.65 |
| 2 | Training of lead farmers | No. of lead farmers trained | No. | 31 | 34 | 109.68 | 102 | 355 | 28.73 |
| 3 | Development of training material and field manuals | No. of training materials developed | No. | 0 | 0 | - | 3 | 11 | 27.27 |
| 4 | Farmer-to-farmer trainings | No. of F-F training conducted/No of farmers trained | No. | 160 | 11 | 6.88 | 32 | 60 | 53.33 |
| 5 | Lead model scaling-up training | No. of lead model scaling-up trained | No. | 5 | 4 | 80.00 | 8 | 0 | - |
| 6 | Farmer field festivals | No. of Farmers field festivals convened | No. | 13 | 12 | 92.31 | 12 | 0 | - |
| 7 | Workshops (planning, review, evaluation) | No. of Workshops conducted | No. | 5 | 3 | 60.00 | 6 | 4 | 150.00 |
| 8 | Documentation and systematization | Documents produced | No. | 1 | 1 | 100.00 | 2 | 0 | - |
| 9 | Protected gear kits for extensions | No. of Kits supplied | No | 0 | 0 | - | 0 | 362 | 0.00 |
| 1.1.D.2 Demonstration inputs & equipment for lead farmers | | | | | | | | | |
| 1 | Production inputs | Area under production inputs | Acre | 30 | 0 | 0.00 | 10.18 | 130 | 7.83 |

| | | | | | | | | | |
|--|---|---|--------|-----|-----|--------|---------|-----|--------|
| 3 | Poly-tunnels | No. of poly-tunnels set up | No. | 12 | 33 | 275.00 | 73 | 40 | 182.50 |
| 1.1.E Resilient & Water Use Efficient Irrigation Development | | | | | | | | | |
| 1.1.E.1 Training on Climate Resilient Irrigation | | | | | | | | | |
| 1 | District engineers and extension agents (design and construction) | No. of DEs and EAs trained on climate resilient irrigation | No. | 10 | 15 | 150.00 | 19 | 0 | - |
| 2 | Water Users Associations (O&M) | No. of WUAs trained on Climate resilient irrigation | No. | 5 | 6 | 120.00 | 6 | 0 | - |
| 3 | Preparation of manual for upgrading irrigation engineering norms | Manual for upgrading Irrigation Engineering norms prepared | No. | 1 | 1 | 100.00 | 6 | 0 | - |
| 1.1.E.2 Irrigation Infrastructure | | | | | | | | | |
| 1 | Feasibility studies | No. of Feasibility studies conducted | No. | 6 | 1 | 16.67 | 1 | 2 | 50.00 |
| 2 | Renovation of irrigation infrastructure | Irrigation Infrastructure renovated (Area coverage) | Acre | 144 | 438 | 304.17 | 1277.49 | 864 | 147.86 |
| 3 | Pilot irrigation schemes | No. of Pilots irrigation schemes developed | No. | 6 | 0 | 0.00 | 149 | 0 | - |
| 4 | Quality control and supervision | No. of quality control and supervision conducted | No. | 3 | 0 | 0.00 | 0 | 0 | - |
| 5 | Promotion of water use efficient technologies | No. of improved irrigation system | No | 0 | 0 | - | 12 | 47 | 25.53 |
| 6 | Formation and strengthening of water user associations | No. of water user association formed | No | 0 | 0 | - | 22 | 30 | 73.33 |
| 1.1.F Strengthening of Local Institutions on Smallholder's Climate Resilience | | | | | | | | | |
| 1 | Awareness on climate smart Agriculture | No. of awareness conducted | No. | 0 | 0 | - | 6 | 12 | 50.00 |
| 2 | Development of business model and sustainability plan for service and O&M | No. of business model and sustainability plan developed | No. | 0 | 0 | - | 0 | 0 | - |
| 3 | Upgrading of farm roads to climate resilient standards | No. or length of farm roads upgraded to climate resilient standards | No./Km | 1 | 0 | 0.00 | 35.6 | 0 | - |
| 4 | Capacity development of existing farmer groups, WUG and RUG | No. of FGs, WUGs and RUGs trained | No. | 4 | 8 | 200.00 | 26 | 18 | 144.44 |
| 5 | Updating of O&M models for irrigation and farm | No. of O&M models developed | No. | 1 | 0 | 0.00 | 58 | 0 | - |

| | | | | | | | | | |
|--|--|--|------|----|-----|----------|-------|-----|--------|
| | roads | for irrigation & farm roads | | | | | | | |
| 1.1.G | Technical Assistance (C1) | | | | | | | | |
| 1 | Recruitment of National TA done | No. of TA recruited | No. | 1 | 0 | 0.00 | 0 | 0 | - |
| Output 1.2: Intensification & Expansion of Vegetable Production | | | | | | | | | |
| 1.2.A | Development of training and extension material | | | | | | | | |
| 1 | Training & extension material developed | No. of training & extension materials developed | No. | 1 | 2 | 200.00 | 8 | 3 | 266.67 |
| 1.2.B | Capacity Development of Vegetable Production Groups | | | | | | | | |
| 1.2.B.1 | Awareness & Mobilization | | | | | | | | |
| 1 | Awareness and mobilisation carried out | No. of awareness & mobilization conducted | No. | 0 | 0 | - | 50 | 54 | 92.59 |
| 1.2.B.2 | Training on Production Techniques & Post-harvest Management | | | | | | | | |
| 1 | Training on vegetable production techniques | No. of farmers training conducted | No. | 16 | 23 | 143.75 | 72 | 120 | 60.00 |
| 2 | Retraining on vegetable production techniques | No. of farmers training conducted | No. | 8 | 24 | 300.00 | 8 | 0 | - |
| 3 | Training on post-harvest management | No. of farmers trained on post-harvest management | No. | 16 | 14 | 87.50 | 275 | 120 | 229.17 |
| 4 | Retraining on post-harvest management | No. of farmers retrained on post-harvest management | No. | 24 | 261 | 1,087.50 | 5 | 0 | - |
| 5 | Exchange visits for farmers | No. of farmers sent on exchange visits | No. | 5 | 16 | 320.00 | 49 | 10 | 490.00 |
| 1.2.B.3 | Commercial production by farmers groups | | | | | | | | |
| 1 | Commercial production by farmers groups promoted | Area under commercial production | Acre | 20 | 92 | 460.00 | 218.1 | 58 | 376.03 |
| 1.2.C | Vegetable Seed Research & Production | | | | | | | | |
| 1 | Developing packages of practice (extension material) | No. of extension materials produced on vegetable seed production | No. | 0 | 0 | - | 1 | 2 | 50.00 |
| 2 | Training and certification of vegetable seed growers | No. of vegetable seed growers trained on seed certification | No. | 0 | 0 | - | 17 | 65 | 26.15 |
| 3 | Equipment and input support vegetable seed | No. of Equipment supplied to | No. | 20 | 6 | 30.00 | 38 | 65 | 58.46 |

| | | | | | | | | | |
|--|--|---|---------|-----|--------|--------|--------|-----|--------|
| | growers | veg. seed growers | | | | | | | |
| 4 | Retraining of vegetable seed growers | No. of veg. seed growers retrained | No. | 65 | 6 | 9.23 | 6 | 0 | - |
| 5 | Seed processing units vegetable seed farm NSC | No. of seed processing units supported | No. | 1 | 1 | 100.00 | 1 | 0 | - |
| 6 | Glasshouse construction vegetable seed farms NSC | No. of glasshouse constructed | No. | 2 | 1 | 50.00 | 1 | 0 | - |
| 1.2.D Provision of Vegetable Production Inputs | | | | | | | | | |
| 1 | Provision of stress tolerant vegetable seeds | Quantity of vegetable seeds supplied | Kg/Pkts | 115 | 44.62 | 38.80 | 679.56 | 180 | 377.53 |
| 2 | Water efficient irrigation | Area under water efficient irrigation system | Acre | 140 | 387.54 | 276.81 | 652.24 | 840 | 77.65 |
| 3 | Small post-harvest equipment | No. of small post-harvest equipment promoted | No. | 279 | 180 | 64.52 | 1944 | 0 | - |
| Output 1.3: Intensification & Expansion of Dairy Production | | | | | | | | | |
| 1.3.A Development of training & extension materials | | | | | | | | | |
| 1 | Training & Extension materials developed | No. training & extension materials developed on dairy production | No. | 1 | 1 | 100.00 | 1 | 3 | 33.33 |
| 1.3.B Capacity Development of Dairy Production Groups | | | | | | | | | |
| 1.3.B.1 Awareness & Mobilization | | | | | | | | | |
| 1 | Awareness & Mobilization Carried Out | No. of Dairy groups sensitized and mobilized | No. | 0 | 0 | - | 27 | 50 | 54.00 |
| 1.3.B.2 Training on Good Dairy Management Practices | | | | | | | | | |
| 1 | Training on livestock husbandry | No. of dairy groups or individuals trained on livestock husbandry | No. | 19 | 17 | 89.47 | 45 | 75 | 60.00 |
| 2 | Retraining on livestock husbandry | No. of dairy groups or individuals retrained on livestock husbandry | No. | 14 | 9 | 64.29 | 9 | 0 | - |
| 3 | Training on clean milk production | No. of dairy groups or individuals trained on clean milk production | No. | 25 | 22 | 88.00 | 45 | 150 | 30.00 |
| 4 | Retraining on clean milk production | No. of dairy groups or individuals retrained on clean milk | No. | 14 | 27 | 192.86 | 27 | 0 | - |

| | | | | | | | | | |
|----------------|--|---|------|-----|-------|--------|--------|------|--------|
| | | production | | | | | | | |
| 5 | Training on farm record keeping | No. of dairy groups or individuals trained on farm record keeping | No. | 23 | 56 | 243.48 | 74 | 65 | 113.85 |
| 6 | Retraining on farm record keeping | No. of dairy groups or individuals retrained on farm record keeping | No. | 12 | 18 | 150.00 | 18 | 0 | - |
| 1.3.C | Improved Services Outreach through CAHWs & Lead Farmers | | | | | | | | |
| 1.3.C.1 | CAHW Model | | | | | | | | |
| 1 | CAHW model development and packaging | No. of CAHW model developed | No. | 1 | 1 | 100.00 | 1 | 2 | 50.00 |
| 2 | Training of trainers (ToT) | No. of ToT conducted on CAHW & lead farmers | No. | 1 | 1 | 100.00 | 1 | 2 | 50.00 |
| 3 | Training of CAHWs | No. of CAHWs trained | No. | 109 | 32 | 29.36 | 81 | 60 | 135.00 |
| 4 | Retraining of CAHWs | No. of CAHWs retrained | No. | 0 | 0 | - | 0 | 0 | - |
| 5 | Kits for AI practitioner | No. of Kits supplied | No. | 50 | 32 | 64.00 | 32 | 80 | 40.00 |
| 6 | Transport facilities for CAHWs | No. of CAHWs supported with transport facilities | No. | 24 | 0 | 0.00 | 0 | 30 | 0.00 |
| 7 | Stipend for CAHWs | Amount disbursed | Nu. | 50 | 0 | 0.00 | 0 | 90 | 0.00 |
| 1.3.D | Support to Fodder & Feed Production | | | | | | | | |
| 1 | Perennial fodder in fallow and marginal land | Area of fallow & marginal land under perennial fodder | Acre | 229 | 95.4 | 41.66 | 635.4 | 1500 | 42.36 |
| 2 | Winter fodder crop demonstration and seed supply | Area under Winter fodder | Acre | 38 | 260.8 | 686.32 | 704.31 | 230 | 306.22 |
| 3 | Training of feed producers | No. of feed producers trained | No. | 67 | 30 | 44.78 | 60 | 15 | 400.00 |
| 4 | Chopping machine (for dairy groups) | No. of chopping machines supplied | No. | 35 | 24 | 68.57 | 24 | 57 | 42.11 |
| 5 | Training on use of crop residues and feed/fodder | No. of training conducted | No. | 9 | 8 | 88.89 | 8 | 40 | 20.00 |
| 1.3.E | Provision of Dairy Production Inputs | | | | | | | | |
| 1 | Milk cans | No. of Milk cans supplied | No. | 120 | 351 | 292.50 | 518 | 0 | - |
| 2 | Cross-breed cattle | No. of cross-breed cattle supported | head | 255 | 265 | 103.92 | 511 | 790 | 64.68 |
| 4 | Shed construction | No. of sheds constructed | unit | 218 | 286 | 131.19 | 679 | 770 | 88.18 |
| 5 | Equipment dairy production groups | No. of equipment supplied to dairy producer groups | No. | 9 | 10 | 111.11 | 7 | 0 | - |

| | | | | | | | | | |
|---|---|---|-----------------|---|---|--------|-----|-----|--------|
| 6 | Refrigerators for schools | No. of refrigerators supplied to schools | No. | 0 | 0 | - | 0 | 75 | 0.00 |
| Component 2: Value Chain Development & Marketing Support | | | | | | | | | |
| Output 2.1: Development of Resilient Vegetable & Dairy Value Chains | | | | | | | | | |
| 2.1.A | Strengthening of FCBL for Value Chain Development | | | | | | | | |
| 1 | Design of organizational strategy, business plan and capacity development plan | Organizational development strategy, business plan and capacity development plan in place | Strategy & Plan | 0 | 0 | - | 1 | 1 | 100.00 |
| 2 | Capacity development activities | No. of staff trained on value chain development | No. | 1 | 2 | 200.00 | 344 | 4 | 8,600 |
| 2.1.B | Vegetable value-chain design and business plan | | | | | | | | |
| 1 | Vegetable value chain plans prepared | Vegetable value-chain design & business plan in place | Plan | 0 | 0 | - | 1 | 3 | 33.33 |
| 2.1.C | Dairy value-chain design and business plan | | | | | | | | |
| 1 | Dairy value chain business plans prepared | Dairy value-chain design & business plan in place | Plan | 0 | 0 | - | 1 | 3 | 33.33 |
| 2.1.D | Value Chain Development, Strengthening and Expansion | | | | | | | | |
| 1 | Multi Stakeholders facilitation process | No. of stakeholders engaged or consulted | No. | 2 | 2 | 100.00 | 4 | 4 | 100.00 |
| 2.1.E | Technical Assistance (C2) | | | | | | | | |
| 1 | National/External TA | No. of National/External TA recruited | No. | 0 | 0 | - | 0 | 72 | 0.00 |
| Output 2.2: Agricultural Commercialization & Enterprise Development strengthened | | | | | | | | | |
| 2.2.A | Support to Agriculture Enterprise Development | | | | | | | | |
| 1 | Support to Agriculture Enterprise Development | No of Agriculture Enterprises supported | No. | 0 | 0 | 0 | 0 | 200 | 0.00 |
| 2.2.B | Support to Marketing Groups | | | | | | | | |
| 1 | Awareness on marketing groups | No. of Marketing groups sensitized | No. | 5 | 0 | 0.00 | 73 | 20 | 365.00 |
| 2 | Strengthening of existing marketing and cooperative capacity development packages | No. of marketing & cooperative capacity development packages | No. | 0 | 0 | - | 0 | 1 | 0.00 |

[illegible]

| | | | | | | | | | |
|---|--|---|-----|----|----|--------|----|-----|--------|
| 2.3.A | Planning & Design | | | | | | | | |
| 1 | Business plan-based planning of market infrastructure | No. of market infrastructure developed based on business plan | No. | 1 | 1 | 100.00 | 1 | 3 | 33.33 |
| 2 | Development of business plans for 3 windows shops | No. of Developments windows shops convened | No. | 1 | 1 | 100.00 | 1 | 2 | 50.00 |
| 2.3.B | Vegetable Value-chain, Post-harvest & Market Infrastructure & Equipment | | | | | | | | |
| 1 | Value-chain equipment | No. of value-chain equipment promoted | No. | 1 | 3 | 300.00 | 3 | 3 | 100.00 |
| 2 | Value-chain infrastructure | No. of value-chain infrastructure put in place | No. | 1 | 1 | 100.00 | 1 | 3 | 33.33 |
| 3 | Transportation (Vehicle) | No. of vehicles purchased | No. | 0 | 0 | - | 0 | 0 | - |
| 2.3.C | Dairy Value-chain Post-harvest & Market Infrastructure & Equipment | | | | | | | | |
| 1 | Construction of milk collection sheds | No. of milk collection shed constructed | No. | 60 | 10 | 16.67 | 23 | 90 | 25.56 |
| 2 | Equipment of milk collection sheds | No. of equipment set up in milk collection sheds | No. | 0 | 0 | - | 0 | 114 | 0.00 |
| 3 | Construction of milk collection centers with chilling facilities | No. of milk collection centers with chilling facilities | No. | 30 | 30 | 100.00 | 37 | 0 | - |
| 4 | Milk chillers | No. of milk chillers supplied | No. | 8 | 5 | 62.50 | 15 | 24 | 62.50 |
| 5 | Milk quality test equipment | No. of milk quality testing equipment supplied | No. | 8 | 14 | 175.00 | 14 | 24 | 58.33 |
| 6 | Milk Analyser | No. of milk analysers supplied | No. | 0 | 0 | - | 0 | 24 | 0.00 |
| 7 | Milk processing unit | No. of milk processing unit established | No. | 9 | 11 | 122.22 | 11 | 0 | - |
| 8 | Milk processing equipment | No. of milk processing equipment supplied | No. | 2 | 0 | 0.00 | 0 | 0 | - |
| 9 | Milk chilling van | No. of milk chilling van provided | No. | 2 | 0 | 0.00 | 0 | 4 | 0.00 |
| Component 3: Institutional Support & Policy Development | | | | | | | | | |
| Output 3.1: Strengthened Value-Chain & Marketing Knowledge and Communication | | | | | | | | | |
| 3.1.A | Strengthening of the DAMC Market Information System | | | | | | | | |
| 1 | Strengthening of the DAMC market information | DAMC MIS strengthened | MIS | 1 | 0 | 0.00 | 0 | 2 | 0.00 |

| | | | | | | | | | |
|---|--|---|-----------|---|---|------|----|-----|--------|
| | system | | | | | | | | |
| 2 | Equipment related to Market Information System upgrade | No. of equipment supplied for MIS upgradation | No. | 0 | 3 | - | 3 | 0 | - |
| 3.1.B | Curriculum development of RNR Training and Education institutes | | | | | | | | |
| 1 | Curricula for RNR Training & Education Institutes Developed | No. of curriculum developed | No. | 0 | 0 | - | 0 | 2 | 0.00 |
| Output 3.2: Mainstreaming Climate Change Resilience & Value Chain Development Lessons into agricultural policies and sector strategies | | | | | | | | | |
| 3.2.A | Participatory policy development and monitoring approach | | | | | | | | |
| 1 | Participatory Policy Development Approaches Developed | No. of participatory policy development process or approach initiated | No. | 0 | 0 | - | 0 | 2 | 0.00 |
| 3.2.B | Mainstreaming climate resilience and value chain development lessons in agricultural policies | | | | | | | | |
| 1 | Policy Notes Developed, incorporating lessons from Climate Resilient Value Chain Development | No. of Policy Notes developed based on Climate resilience & and value chain development lessons | No. | 0 | 0 | - | 0 | 3 | 0.00 |
| 3.2.C | Development of a regulatory framework for PPP | | | | | | | | |
| 1 | Regulatory Frameworks for PPP | A regulatory framework for PPP developed | Framework | 1 | 0 | 0.00 | 0 | 2.5 | 0.00 |
| 3.2.D | Technical Assistance (C3) | | | | | | | | |
| 1 | National/International TA | No. of Nationals/International TA recruited | No. | 0 | 0 | - | 0 | 8 | 0.00 |
| 2 | Support budget RNR training and education institutes | Amount supported | No. | 0 | 0 | - | 0 | 3 | 0.00 |
| 3 | Support budget climate resilience mainstreaming | Amount supported | No. | 0 | 0 | - | 0 | 4 | 0.00 |
| 4 | Support budget PPP regulatory framework | Amount supported | No. | 0 | 0 | - | 0 | 3 | 0.00 |
| Component 4: Project Management, Coordination and M&E | | | | | | | | | |
| 4.1. | Project Management Unit | | | | | | | | |
| 4.1.A | Material & Equipment | | | | | | | | |
| 1 | Vehicles | No. of vehicles purchased | No. | 0 | 1 | - | 1 | 2 | 50.00 |
| 2 | Laptops | No. of laptops purchased | No. | 0 | 0 | - | 10 | 12 | 83.33 |
| 3 | Printer | No. of printers purchased | No. | 0 | 0 | - | 10 | 5 | 200.00 |

| | | | | | | | | | |
|--|---|---|---------|---|---|--------|---|-----|--------|
| 4 | Scanner | No. of scanners purchased | No. | 0 | 0 | - | 1 | 2 | 50.00 |
| 5 | Photocopier heavy duty | No. of heavy duty photocopier purchased | No. | 0 | 0 | - | 1 | 2 | 50.00 |
| 6 | Office equipment | Stes of office equipment purchased | Set | 0 | 1 | - | 5 | 5 | 100.00 |
| 4.1.B Capacity Building | | | | | | | | | |
| 1 | Training on gender | No. of staff trained on gender | No. | 0 | 0 | - | 1 | 1 | 100.00 |
| 2 | Training on knowledge management | No. of staff trained on KM | No. | 0 | 0 | - | 1 | 1 | 100.00 |
| 3 | Training on monitoring and evaluation | No. of staff trained on M&E | No. | 0 | 0 | - | 1 | 1 | 100.00 |
| 4 | Training on financial management | No. of staff trained on FM | No. | 0 | 0 | - | 1 | 6 | 16.67 |
| 4.1.C Coordination | | | | | | | | | |
| 1 | Coordination meetings with dzongkhags | No. of Dzongkhags coordination meeting held | No. | 1 | 1 | 100.00 | 4 | 7 | 57.14 |
| 4.1.D Food Corporation of Bhutan | | | | | | | | | |
| 4.1.D.1 Material and equipment | | | | | | | | | |
| 1 | Materials and Equipment Procured for FCBL | No. of Materials and equipment procured by FCBL | No. | 0 | 1 | - | 2 | 205 | 0.98 |
| 4.1.E Monitoring & Evaluation | | | | | | | | | |
| 1 | Baseline and impact studies | No. of baseline & impact studies conducted | No. | 0 | 0 | - | 1 | 1 | 100.00 |
| 2 | Programme Supervision Mission | No. Of Mission | No. | 0 | 1 | - | 3 | 14 | 21.43 |
| 3 | Annual outcome surveys | No. of AOS conducted | No. | 1 | 1 | 100.00 | 1 | 3 | 33.33 |
| 4 | Mid-term review | Mid-term review conducted | Mission | 0 | 0 | - | 0 | 1 | 0.00 |
| 5 | Project completion report | PCR prepared | Report | 0 | 0 | - | 0 | 1 | 0.00 |
| 4.1.F Knowledge Management | | | | | | | | | |
| 1 | Printing and publications | No. of quality KM products published | No. | 1 | 2 | 200.00 | 4 | 7 | 57.14 |
| 2 | Setting up IMS (CARLEP Webpage) | Web page established | No. | 0 | 0 | - | 1 | 1 | 100.00 |
| 3 | Multi=stakeholder platform and networking | No. Of platforms & networks established | No. | 0 | 0 | - | 0 | 0 | - |
| 4 | Workshops and meetings | No. of workshops & meetings conducted | No. | 1 | 1 | 100.00 | 2 | 4 | 50.00 |

| | | | | | | | | | |
|--------------|--|--------------------|--------|-------|------|-------|-------|-----|-------|
| 4.2.A | OPM, Mongar | | | | | | | | |
| 1 | National Program Director | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 2 | Finance Manager | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 3 | Accountant | No. of months Paid | Months | 12 | 6 | 50.00 | 26 | 84 | 30.95 |
| 4 | M&E and Gender Manager | No. of months Paid | Months | 12 | 6 | 50.00 | 36 | 84 | 42.86 |
| 5 | Project Support Officer | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 6 | KM Officer | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 7 | Component Manager (Agriculture Production) | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 8 | Component Manager (Livestock Production) | No. of months Paid | Months | 12 | 6 | 50.00 | 26 | 84 | 30.95 |
| 9 | Component Manager (Value-chain and Marketing) | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 10 | Dy. Manager-RAMCO | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 11 | Office Assistant | No. of months Paid | Months | 0 | 0 | - | 24 | 84 | 28.57 |
| 12 | Driver (x2) | No. of months Paid | Months | 24 | 12 | 50.00 | 76 | 168 | 45.24 |
| 4.2.B | Liaison Office, Thimphu | | | | | | | | |
| 1 | IFAD Focal Officer, PPD | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 2 | IFAD Focal Officer, AFD | No. of months Paid | Months | 12 | 6 | 50.00 | 38 | 84 | 45.24 |
| 4.2.C | Operating Cost, Project Management Unit | | | | | | | | |
| 1 | Vehicle operation and Maintenance | No of Vehicles | LPS | 2 | 0.28 | 14 | 2.616 | | - |
| 2 | Maintenance of Building | Lump sum | LPS | 1 | 0.5 | 50 | 1.093 | | - |
| 3 | Maintenance of Equipment | Lump sum | LPS | 0.1 | 0.07 | 70 | 0.1 | | - |
| 4 | Utilities - telephone, internet, electricity, water, sewerage, fax, post, etc. | Lump sum | LPS | 0.52 | 0.42 | 80.77 | 1.02 | | - |
| 5 | Office supplies | Lump sum | LPS | 8 | 0.12 | 1.50 | 8.32 | | - |
| 6 | Travel and Meetings | Lump sum | LPS | 2.058 | 1.56 | 75.80 | 4.23 | | - |

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Commercial Agriculture and Resilient Livelihoods Enhancement Programme Mid-term Review

Appendix 3: Compliance with legal covenants: status of implementation

Mission Dates: 24 November – 7 December 2018
Document Date: 16/02/2019
Project No. 1100001739
Report No. 4990-BT

Asia and the Pacific Division
Programme Management Department

Appendix 3: Compliance with legal covenants: Status of implementation

| Section | Covenant | Target/Action Due Date | Compliance Status/Date | Remarks |
|--------------------|---|------------------------|------------------------|--|
| FA - Section E.2.a | OPM to be duly established and staffed | | YES | |
| FA-Section E.2.b | IFAD's no-objection to PIM | | YES | |
| FA-Section E.2.c | Designated accounts opened and authorise signature received by IFAD | | YES | |
| FA-Section E.2.d | Establishment of subsidiary agreement between MoAF and FCBL | | YES | |
| FA-Schedule 1.13 | Mid Term Review to be conducted | | YES | |
| FA-Schedule 2 | IFAD/ASAP financing net of taxes | | NO | OPM to determine the amount of taxes charged to IFAD in past WAs and then refund/deduct from future WAs. |
| LTB-G.32 | Audit report submitted to IFAD. | | YES | Timely submitted FS 2016-17 (on 3 rd Jan 2018) |
| LTB-G.31 | Progress reports to be submitted to IFAD on a quarterly basis. | | YES | 1 st quarter fiscal year 2018-19 has been issued via email at the time this supervision. |
| GC. 4.02 | AWPB to be submitted to the Fund, for its review and comments | | YES | |

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Commercial Agriculture and Resilient Livelihoods Enhancement Programme Mid-term Review

Appendix 4: Technical background analysis

Mission Dates: 24 November – 7 December 2018
Document Date: 16/02/2019
Project No. 1100001739
Report No. 4990-BT

Asia and the Pacific Division
Programme Management Department

Appendix 4: Technical Background Analysis

Appendix 4.1: Technical Paper: Project Costs and Financing Post MTR

Assumptions: Following were and are the key assumptions used in constructing expenditure and disbursement costables

| Assumptions | At Design | Post MTR |
|---------------------------------|---|---|
| Project implementation duration | 7 year with a completion date of Dec 2022 | 42 months; likely to be extended following Additional Financing |
| Exchange rate per USD | BTN xx /USD | BTN 72/USD |
| Inflation rate, domestic | 8.5% | 5% |
| Inflation rate, foreign | 2% | 2% |
| SDR values in USD | \$1.3721 | \$1.3832 |
| Costab Expenditure year | Calendar year | Aligned to Fiscal year (July –June) |
| Tax rate | Applicable taxes | VAT values |
| Start date | Dec 2015 | June 2019 |
| Data input currency | USD | USD & BTN |
| Financing rules | As per Schedule 2 | As per Schedule 2 |
| Disbursement Categories | As set in Schedule 2 | No changes |

Authorized allocations by financiers and amount spent as on July 2018 and likely to be spent till end of the current fiscal are shown in Table below

| Financiers 1/ | Authorized allocations (million USD) | Expenditure as on June 2018 (million USD) | Likely expenditure as on June 2019 (million USD) 2/ | Balance fund available (million USD) |
|---|--------------------------------------|---|---|--------------------------------------|
| IFAD Loan | 8.246 | 3.087 | 1.598 | 3.561 |
| IFAD Grant | 1.064 | 0.423 | 0.136 | 0.505 |
| ASAP Grant | 5.012 | 1.540 | 0.598 | 2.874 |
| 1/ Source: OPM Finance Division; 2/ assuming some 65% of AWPB for the fiscal year 2018/19 will be spent | | | | |

Post MTR budgets are prepared according to balance fund available.

However taking in to consideration that Additional Financing of amounts equivalents to USD 11.2 including a Grant amount of USD1.0 million are likely to be made available, *a full and complete plan has only be presented for the fiscal year 2019/20.*

For the remaining years appropriate plans would be prepared and presented at the time of Additional Financing.

ASAP Grant resources are fully used till the end of fiscal year 2021/22.

Summary Tables and detailed tables by Components are presented in following pages.

IT SHOULD BE NOTED THAT THE AWPB FOR THE FISCAL YEAR 2019/20 SHOULD BE PREPARED BASED ON THE PROVISIONS CONTAINED IN THIS COSTAB TABLES

Table-1: EXPENDITURE BY PROJECT COST SUMMARY POST MTR SCENARIO

| Kingdom of Bhutan | | | | |
|-------------------------------|------------------------------------|-----------------|------------------|------------|
| CARLEP MTR | | | | |
| Expenditure Accounts | Project Cost Summary (BTN Million) | (US\$ '000) | % | % Total |
| | | | Foreign Exchange | Base Costs |
| I. Investment Costs | | | | |
| A. Works | 452.9 | 6,290.0 | 20 | 32 |
| B. Equipment and materials | 368.0 | 5,110.8 | 30 | 26 |
| C. Vehicles | - | - | - | - |
| D. Goods, services and inputs | 304.1 | 4,224.0 | 30 | 22 |
| E. Consultancies | 22.7 | 315.7 | 10 | 2 |
| F. Workshops | 6.5 | 90.0 | 10 | - |
| G. Trainings | 189.3 | 2,629.0 | - | 13 |
| H. Fund | - | - | - | - |
| Total Investment Costs | 1,343.5 | 18,659.4 | 22 | 95 |
| II. Recurrent Costs | | | | |
| A. Operating costs | 39.4 | 547.1 | 10 | 3 |
| B. Salaries and allowances | 30.1 | 418.3 | - | 2 |
| Total Recurrent Costs | 69.5 | 965.4 | 6 | 5 |
| Total BASELINE COSTS | 1,413.0 | 19,624.9 | 21 | 100 |
| Physical Contingencies | - | - | - | - |
| Price Contingencies | 67.4 | 935.8 | 11 | 5 |
| Total PROJECT COSTS | 1,480.4 | 20,560.7 | 21 | 105 |

Table-2: EXPENDITURE ACCOUNTS BY FINANCIERS

Kingdom of Bhutan

CARLEP MTR

Expenditure Accounts by Financiers

(US\$ '000)

| | ie Government | | IFAD loan | | IFAD grant | | ASAP grant | | Beneficiaries | | Total | |
|-------------------------------|----------------|-------------|-----------------|-------------|--------------|------------|----------------|-------------|----------------|-------------|-----------------|--------------|
| | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % |
| I. Investment Costs | | | | | | | | | | | | |
| A. Works | 374.7 | 5.6 | 5,900.1 | 88.3 | - | - | 24.3 | 0.4 | 383.3 | 5.7 | 6,682.5 | 32.5 |
| B. Equipment and materials | 269.6 | 5.0 | 2,564.0 | 48.0 | 27.1 | 0.5 | 97.8 | 1.8 | 2,385.0 | 44.6 | 5,343.6 | 26.0 |
| C. Vehicles | - | - | - | - | - | - | - | - | - | - | - | - |
| D. Goods, services and inputs | 235.3 | 5.3 | 2,121.0 | 47.7 | 10.4 | 0.2 | 934.6 | 21.0 | 1,148.0 | 25.8 | 4,449.4 | 21.6 |
| E. Consultancies | 17.1 | 5.0 | 41.7 | 12.2 | 49.2 | 14.4 | 233.5 | 68.4 | - | - | 341.5 | 1.7 |
| F. Workshops | 0.0 | - | 56.9 | 58.2 | 40.9 | 41.8 | - | - | - | - | 97.8 | 0.5 |
| G. Trainings | 131.4 | 5.0 | 504.9 | 19.2 | 393.9 | 15.0 | 1,597.5 | 60.8 | 1.2 | - | 2,629.0 | 12.8 |
| H. Fund | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Investment Costs | 1,028.2 | 5.3 | 11,188.7 | 57.2 | 521.6 | 2.7 | 2,887.8 | 14.8 | 3,917.5 | 20.0 | 19,543.6 | 95.1 |
| II. Recurrent Costs | | | | | | | | | | | | |
| A. Operating costs | 598.7 | 100.0 | - | - | - | - | - | - | - | - | 598.7 | 2.9 |
| B. Salaries and allowances | 334.7 | 80.0 | - | - | 83.6 | 20.0 | - | - | - | - | 418.3 | 2.0 |
| Total Recurrent Costs | 933.4 | 91.8 | - | - | 83.6 | 8.2 | - | - | - | - | 1,017.0 | 4.9 |
| Total PROJECT COSTS | 1,961.6 | 9.5 | 11,188.7 | 54.4 | 605.1 | 2.9 | 2,887.8 | 14.0 | 3,917.5 | 19.1 | 20,560.7 | 100.0 |

Table-3: PROJECT COMPONENTS BY FINANCIERS

Kingdom of Bhutan

CARLEP MTR

Components by Financiers

(US\$ '000)

| | The Government | | IFAD loan | | IFAD grant | | ASAP grant | | Beneficiaries | | Total | |
|---|----------------|------|-----------|------|------------|------|------------|------|---------------|------|----------|-------|
| | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % |
| 1. Market-led agricultural production | 660.2 | 5.5 | 7,767.0 | 64.3 | - | - | 2,578.3 | 21.3 | 1,081.3 | 8.9 | 12,086.8 | 58.8 |
| 2. Value chain development and marketing | 305.7 | 5.0 | 2,851.2 | 46.6 | - | - | 120.6 | 2.0 | 2,836.2 | 46.4 | 6,113.7 | 29.7 |
| 3. Institutional Support and Policy Development | 9.9 | 5.0 | - | - | - | - | 188.9 | 95.0 | - | - | 198.8 | 1.0 |
| 4. Project management, coordination and M&E | 985.8 | 45.6 | 570.5 | 26.4 | 605.1 | 28.0 | - | - | - | - | 2,161.4 | 10.5 |
| Total PROJECT COSTS | 1,961.6 | 9.5 | 11,188.7 | 54.4 | 605.1 | 2.9 | 2,887.8 | 14.0 | 3,917.5 | 19.1 | 20,560.7 | 100.0 |

Table-4: PROJECT COMPONENTS BY YEAR TOTAL INCLUDING CONTINGENCIES

Kingdom of Bhutan

CARLEP MTR

Project Components by Year -- Totals Including Contingencies

(US\$ '000)

| | Totals Including Contingencies | | | | |
|---|--------------------------------|---------|---------|-------|----------|
| | 19/20 | 20/21 | 21/22 | 22/23 | Total |
| 1. Market-led agricultural production | 5,081.7 | 3,979.3 | 3,002.3 | 23.5 | 12,086.8 |
| 2. Value chain development and marketing | 3,188.5 | 1,580.9 | 1,344.3 | - | 6,113.7 |
| 3. Institutional Support and Policy Development | 94.8 | 63.1 | 40.9 | - | 198.8 |
| 4. Project management, coordination and M&E | 642.3 | 626.0 | 607.1 | 286.0 | 2,161.4 |
| Total PROJECT COSTS | 9,007.3 | 6,249.4 | 4,994.6 | 309.5 | 20,560.7 |

Table-5: FINANCING OF INVESTMENT AND RECURRENT COSTS BY YEAR AND FINANCIERS

| Kingdom of Bhutan | | | | | |
|--|------------------|----------------|----------------|--------------|-----------------|
| CARLEP MTR | | | | | |
| Financing of Investment/Recurrent | | | | | |
| (US\$ '000) | | | | | |
| | Financing | | | | |
| | 19/20 | 20/21 | 21/22 | 22/23 | Total |
| I. Investment Costs | | | | | |
| The Government | 458.6 | 317.5 | 247.1 | 5.0 | 1,028.2 |
| IFAD loan | 4,833.7 | 3,566.5 | 2,755.0 | 33.5 | 11,188.7 |
| IFAD grant | 151.8 | 160.7 | 158.8 | 50.3 | 521.6 |
| ASAP grant | 1,300.0 | 952.0 | 613.5 | 22.3 | 2,887.8 |
| Beneficiaries | 1,997.3 | 980.0 | 940.2 | - | 3,917.5 |
| Total Investment Costs | 8,741.4 | 5,976.6 | 4,714.6 | 111.0 | 19,543.6 |
| II. Recurrent Costs | | | | | |
| The Government | 242.0 | 248.9 | 256.1 | 186.5 | 933.4 |
| IFAD loan | - | - | - | - | - |
| IFAD grant | 23.9 | 23.9 | 23.9 | 11.9 | 83.6 |
| ASAP grant | - | - | - | - | - |
| Beneficiaries | - | - | - | - | - |
| Total Recurrent Costs | 265.9 | 272.8 | 279.9 | 198.4 | 1,017.0 |
| Total Financing of Costs | 9,007.3 | 6,249.4 | 4,994.6 | 309.5 | 20,560.7 |

COMPONENT 1: MARKET-LED SUSTAINABLE AGRICULTURAL PRODUCTION

Kingdom of Bhutan

CARLEP MTR

Table 1. Market-led agricultural production

Detailed Costs

| Table 1. Market-led agricultural production | | | | | | | | | | | | | | | |
|--|--------------|------------|-------|-------|-------|-------------------------|--------------------------|--|-------|-------|-------|-------|----------------|-------------|--------------------------------|
| Detailed Costs | | | | | | | | | | | | | | | |
| | Unit | Quantities | | | | Unit Cost (BTN '000) | Unit Cost (US\$ '000) | Totals Including Contingencies (US\$ '000) | | | | | Other Accounts | | |
| | | 19/20 | 20/21 | 21/22 | 22/23 | | | Total | 19/20 | 20/21 | 21/22 | 22/23 | Total | Disb. Acct. | Fin. Rule |
| I. Investment Costs | | | | | | | | | | | | | | | |
| A. Output 1.1: Increased Production Resilience, Diversification and Innovation | | | | | | | | | | | | | | | |
| 1. Climate Smart Agriculture Production and Management | | | | | | | | | | | | | | | |
| Production support -seeds | acre | 150 | 150 | 150 | - | 450 | 14.976 | 0.208 | 31.8 | 33.1 | 34.5 | - | 99.4 | GSI_DA | ASAP (80%); BEN (20%) |
| Processing and value addition equipment | set | 10 | 10 | 10 | - | 30 | 55.008 | 0.764 | 7.8 | 8.1 | 8.4 | - | 24.3 | EQUIP_DA | IFAD_LOAN(80%); BEN (20%) |
| Post-harvest equipment | set | 10 | 10 | 10 | - | 30 | 65.016 | 0.903 | 9.2 | 9.6 | 10.0 | - | 28.8 | EQUIP_DA | IFAD_LOAN (80%); BEN (20%) |
| Field day demonstration | each | 15 | 15 | 15 | - | 45 | 6.48 | 0.09 | 1.4 | 1.4 | 1.4 | - | 4.1 | TRAINING_DA | ASAP (80%); BEN (20%) |
| Cultivation practices training | event | 4 | 4 | 4 | - | 12 | 14.4 | 0.2 | 0.8 | 0.8 | 0.8 | - | 2.4 | TRAINING_DA | ASAP (80%); BEN (20%) |
| Packaging materials | Lps | 1 | - | - | - | 1 | 59.976 | 0.833 | 0.8 | - | - | - | 0.8 | GSL_DA | IFAD_LOAN (80%); BEN (20%) |
| Mushroom intensification | 1000 billets | 50 | 50 | 50 | - | 150 | 7.992 | 0.111 | 5.7 | 5.9 | 6.1 | - | 17.7 | GSI_DA | ASAP (80%); BEN (20%) |
| Subtotal | | | | | | | | | 57.5 | 58.9 | 61.2 | - | 177.5 | | |
| 2. Innovation through permaculture and biogas | | | | | | | | | | | | | | | |
| a. Agriculture and livestock interventions | | | | | | | | | | | | | | | |
| Farm level rainwater harvesting infrastructure | unit | 50 | 50 | 50 | - | 150 | 14.4 | 0.2 | 10.2 | 10.7 | 11.1 | - | 32.0 | WORKS_DA | ASAP (80%); BEN (20%) |
| Installation of biogas digester | each | 500 | 500 | 400 | - | 1,400 | 24.984 | 0.347 | 177.0 | 184.2 | 153.4 | - | 514.6 | GSI_DA | ASAP (80%); BEN (20%) |
| Capacity building on biogas technology /a | lsp | 30 | 30 | 16 | - | 76 | 2.016 | 0.028 | 0.8 | 0.8 | 0.4 | - | 2.1 | TRAINING_DA | ASAP (100%) |
| Collection of indigenous fodder germplasm | acre | 15 | 15 | 15 | - | 45 | 120.024 | 1.667 | 25.0 | 25.0 | 25.0 | - | 75.0 | TRAINING_DA | ASAP (100%) |
| Planting native species fodder | lsp | 5,500 | 5,500 | 5,500 | - | 16,500 | 0.144 | 0.002 | 11.0 | 11.0 | 11.0 | - | 33.0 | TRAINING_DA | ASAP (100%) |
| Exchange visits for staff & lead farmers /b | lsp | 70 | 70 | 70 | - | 210 | 20.016 | 0.278 | 19.5 | 19.5 | 19.5 | - | 58.4 | TRAINING_DA | ASAP (100%) |
| Indigenous poultry farming (10 birds & above) | unit | 100 | 100 | 100 | - | 300 | 36 | 0.5 | 51.0 | 53.1 | 55.3 | - | 159.4 | GSI_DA | ASAP (80%); BEN (20%) |
| resilient seeds and seedlings | lps | - | - | - | - | - | - | - | 1.5 | 1.1 | 1.1 | - | 3.7 | GSI_DA | ASAP (100%) |
| Tools for permaculture | unit | - | 12 | 12 | - | 24 | 27 | 0.375 | - | 4.8 | 5.0 | - | 9.8 | EQUIP_DA | ASAP (100%) |
| Electric fencing | km | 30 | 30 | 30 | - | 90 | 45 | 0.625 | 19.1 | 19.9 | 20.7 | - | 59.8 | EQUIP_DA | ASAP (60%); BEN (40%) |
| Apiculture units | set | 200 | 200 | 200 | - | 600 | 6.12 | 0.085 | 17.3 | 18.0 | 18.8 | - | 54.2 | GSI_DA | ASAP (80%); BEN (20%) |
| Promotion of solar dryers | each | 12 | 12 | 12 | - | 36 | 87.984 | 1.222 | 15.0 | 15.6 | 16.2 | - | 46.7 | EQUIP_DA | ASAP (80%); BEN (20%) |
| Subtotal | | | | | | | | | 347.5 | 363.6 | 337.5 | - | 1,048.6 | | |
| 3. Increased outreach of extension services | | | | | | | | | | | | | | | |
| a. Establishment of lead farms | | | | | | | | | | | | | | | |
| Lead farm establishment | each | 15 | 15 | 10 | - | 40 | 45.936 | 0.638 | 9.8 | 10.2 | 7.1 | - | 27.0 | GSI_DA | IFAD_LOAN (100%) |
| Expansion of lead farmers | persons | 30 | 30 | 30 | - | 90 | 36 | 0.5 | 15.3 | 15.9 | 16.6 | - | 47.8 | GSI_DA | IFAD_LOAN (100%) |
| Subtotal | | | | | | | | | 25.1 | 26.1 | 23.6 | - | 74.8 | | |
| Subtotal | | | | | | | | | 430.1 | 448.6 | 422.3 | - | 1,300.9 | | |
| B. Output 1.2: Vegetable Production Intensified and Expanded | | | | | | | | | | | | | | | |
| 1. Development of training and extension material | | | | | | | | | | | | | | | |
| | lps | 1 | 1 | - | 1 | 3 | 1,440 | 20 | 20.5 | 21.4 | - | 23.5 | 65.4 | CONSULT_DA | ASAP (100%) |
| 2. Capacity development of vegetable production groups | | | | | | | | | | | | | | | |
| a. Awareness and mobilization | | | | | | | | | | | | | | | |
| | event | 95 | - | - | - | 95 | 360 | 5 | 475.0 | - | - | - | 475.0 | TRAINING_DA | ASAP (100%) |
| b. Training on production techniques and post-harvest management | | | | | | | | | | | | | | | |
| Training on vegetable production techniques /c | event | 95 | 95 | - | - | 190 | 90 | 1.25 | 118.8 | 118.8 | - | - | 237.5 | TRAINING_DA | ASAP (100%) |
| Retraining on vegetable production techniques | event | - | 95 | 95 | - | 190 | 46.8 | 0.65 | - | 61.8 | 61.8 | - | 123.5 | TRAINING_DA | ASAP (100%) |
| Training on post-harvest management | event | 95 | 95 | - | - | 190 | 90 | 1.25 | 118.8 | 118.8 | - | - | 237.5 | TRAINING_DA | ASAP (100%) |
| Retraining on post-harvest management | event | - | 95 | 95 | - | 190 | 46.8 | 0.65 | - | 61.8 | 61.8 | - | 123.5 | TRAINING_DA | ASAP (100%) |
| Exchange visits for farmers | visits | 2 | 2 | 2 | - | 6 | 597.6 | 8.3 | 16.6 | 16.6 | 16.6 | - | 49.8 | TRAINING_DA | ASAP (100%) |
| Subtotal | | | | | | | | | 254.1 | 377.6 | 140.1 | - | 771.8 | | |
| Subtotal | | | | | | | | | 729.1 | 377.6 | 140.1 | - | 1,246.8 | | |

Kingdom of Bhutan
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Table 1. Market-led agricultural production

| Table 1. Market-led agricultural production | | | | | | | | | | | | | | | |
|---|----------|------------|-------|-------|-------|------------|-------------|--------|--|-------|-------|-------|-------------|----------------|--------------------------------|
| Detailed Costs | | Quantities | | | | | Unit Cost | | Totals Including Contingencies (US\$ '000) | | | | | Other Accounts | |
| Unit | 19/20 | 20/21 | 21/22 | 22/23 | Total | (BTN '000) | (US\$ '000) | 19/20 | 20/21 | 21/22 | 22/23 | Total | Disb. Acct. | Fin. Rule | |
| I. Investment Costs | | | | | | | | | | | | | | | |
| 3. Vegetable seed research and production | | | | | | | | | | | | | | | |
| Training and certification of vegetable seed growers /d | pers | 30 | - | 35 | - | 65 | 10.8 | 0.15 | 4.5 | - | 5.3 | - | 9.8 | TRAINING_DA | ASAP (100%) |
| Equipment and input support vegetable seed growers | set | - | 30 | - | 35 | 65 | | | - | - | - | - | | GSI_DA | BEN (20%); IFAD_LOAN (80%) |
| Production support for seed growers | pers | 10 | 10 | - | - | 20 | 65.016 | 0.903 | 9.0 | 9.0 | - | - | 18.1 | TRAINING_DA | IFAD_LOAN (100%) |
| Seed packaging equipment vegetable seed farm NSC | set | 1 | - | - | - | 1 | 3,749.976 | 52.083 | 53.1 | - | - | - | 53.1 | EQUIP_DA | IFAD_LOAN (100%) |
| Subtotal | | | | | | | | | 66.7 | 9.0 | 5.3 | - | 80.9 | | |
| 4. Provision of vegetable production inputs | | | | | | | | | | | | | | | |
| Provision of resilient vegetable seeds | lps | 50 | 50 | 50 | - | 150 | 6.12 | 0.085 | 4.3 | 4.5 | 4.7 | - | 13.5 | GSI_DA | IFAD_LOAN(00%) |
| Water efficient irrigation /e | lps | 50 | 50 | 50 | - | 150 | 21.6 | 0.3 | 15.3 | 15.9 | 16.6 | - | 47.8 | EQUIP_DA | IFAD_LOAN (80%); BEN (10%) |
| Small post-harvest equipments | lps | 50 | 50 | 50 | - | 150 | 144 | 2 | 102.0 | 106.2 | 110.5 | - | 318.7 | EQUIP_DA | IFAD_LOAN(80%); BEN (20%) |
| Subtotal | | | | | | | | | 121.7 | 126.6 | 131.8 | - | 380.1 | | |
| 5. Vegetable commercialisation | | | | | | | | | | | | | | | |
| Formation of new vegetable groups | group | 50 | 50 | 26 | - | 126 | 30.024 | 0.417 | 21.3 | 22.1 | 12.0 | - | 55.4 | GSI_DA | ASAP (100%) |
| Vegetable commercialisation | sites | 30 | 20 | 10 | - | 60 | 879.984 | 12.222 | 374.1 | 259.5 | 135.1 | - | 768.7 | GSI_DA | IFAD_LOAN (80%); BEN (20%) |
| Protected agriculture with youth farmers | set | 30 | 20 | 10 | - | 60 | 360 | 5 | 153.0 | 106.2 | 55.3 | - | 314.5 | GSI_DA | IFAD_LOAN (80%); BEN (20%) |
| Subtotal | | | | | | | | | 548.4 | 387.8 | 202.3 | - | 1,138.5 | | |
| Subtotal | | | | | | | | | 1,486.3 | 922.5 | 479.4 | 23.5 | 2,911.7 | | |
| C. Output 1.3: Dairy Production Intensified and Expanded | | | | | | | | | | | | | | | |
| 1. Improved service outreach through CAHWs and lead farmers | | | | | | | | | | | | | | | |
| a. Dairy breed enhancement | | | | | | | | | | | | | | | |
| AI service expansion & CAIT establishment | centres | 15 | 15 | 15 | - | 45 | 120.024 | 1.667 | 25.5 | 26.5 | 27.6 | - | 79.7 | GSI_DA | ASAP (100%) |
| Breed intensification through sex sorted semen | lsp | 2,000 | 2,000 | 1,100 | - | 5,100 | 1.512 | 0.021 | 42.9 | 44.6 | 25.5 | - | 113.0 | GSI_DA | ASAP (100%) |
| Breed intensification through community breeding bull service | lsp | 25 | 25 | 25 | - | 75 | 20.016 | 0.278 | 7.1 | 7.4 | 7.7 | - | 22.1 | GSI_DA | ASAP (100%) |
| Breed intensification through CHBPP | lsp | 1,000 | 1,000 | 295 | - | 2,295 | 1.008 | 0.014 | 14.3 | 14.9 | 4.6 | - | 33.7 | GSI_DA | ASAP (100%) |
| Subtotal | | | | | | | | | 89.7 | 93.4 | 65.4 | - | 248.5 | | |
| b. Dairy production | cow unit | 400 | 100 | 100 | - | 600 | 54 | 0.75 | 306.1 | 79.6 | 82.9 | - | 468.6 | GSI_DA | IFAD_LOAN (70%); BEN (30%) |
| c. Improved service outreach | | | | | | | | | | | | | | | |
| Training of CAIT -CAHW with AI kits package | event | 15 | 15 | 15 | - | 45 | 59.976 | 0.833 | 12.5 | 12.5 | 12.5 | - | 37.5 | TRAINING_DA | ASAP (100%) |
| Transport facilities to CAIT & CAHW | person | 15 | 15 | 15 | - | 45 | 45 | 0.625 | 9.4 | 9.4 | 9.4 | - | 28.1 | TRAINING_DA | IFAD_LOAN (100%) |
| Advanced staff training in breeding programme | event | 25 | 25 | 25 | - | 75 | 84.96 | 1.18 | 29.5 | 29.5 | 29.5 | - | 88.5 | TRAINING_DA | ASAP (100%) |
| Establishment of LN2 Plant | each | 1 | - | - | - | 1 | 5,299.992 | 73.611 | 75.1 | - | - | - | 75.1 | EQUIP_DA | IFAD_LOAN (100%) |
| Subtotal | | | | | | | | | 126.5 | 51.4 | 51.4 | - | 229.2 | | |
| Subtotal | | | | | | | | | 522.3 | 224.4 | 199.6 | - | 946.3 | | |

Kingdom of Bhutan

CARLEP MTR

Table 1. Market-led agricultural production

Detailed Costs

I. Investment Costs

2. Support to fodder & feed production

Pasture/legume production in livestock farms
Promote fodder slips plantation
Promote fodder tree plantation in fallow land
Winter fodder crop demonstration
and seed supply
Support for silo pit construction
Crop residue enrichment /t
Support to chaff cutter supply
TMR facilities for youth

Subtotal

3. Animal health to Safe guard

public health

CABC programme & public
health programme /g
Bio-security for field staff

Subtotal

Subtotal

D. Output 1.4; Production related infrastructure

1. Irrigation improvement

Feasibility studies and surveys /h
Pump irrigation network up to field edge
Canal system upgrading
Piped network in dryland
Onfarm demo including rainwater harvesting
Onfarm works (on matching grant)
WUA formation and training
for pump irrigation units
Other investments in irrigation systems
upgrading /i

Subtotal

2. Electrical fencing

Electrical fencing

3. Land development

Terracing, land consolidation & SLM

4. Farm road improvement

Model upgrading of farm roads to
climate resilient standards

Subtotal

Total Investment Costs

II. Recurrent Costs

Total

| Unit | Quantities | | | | | Unit Cost (BTN '000) | Unit Cost (US\$ '000) | Totals Including Contingencies (US\$ '000) | | | | | Other Accounts | |
|---------|------------|-------|-------|-------|---------|-------------------------|--------------------------|--|---------|---------|-------|----------|----------------|--------------------------------|
| | 19/20 | 20/21 | 21/22 | 22/23 | Total | | | 19/20 | 20/21 | 21/22 | 22/23 | Total | Disb. Acct. | Fin. Rule |
| acre | 300 | 300 | 300 | - | 900 | 0.504 | 0.007 | 2.1 | 2.2 | 2.3 | - | 6.7 | GSI_DA | IFAD_LOAN (40%); BEN (60%) |
| acre | 200 | 200 | 65 | - | 465 | 20.016 | 0.278 | 56.7 | 59.0 | 20.0 | - | 135.7 | GSI_DA | IFAD_LOAN (40%); BEN (60%) |
| lsp | | | | | | | | 3.0 | 2.1 | - | - | 5.2 | GSI_DA | IFAD_LOAN (40%); BEN (60%) |
| acre | 500 | 485 | - | - | 985 | 0.432 | 0.006 | 3.1 | 3.1 | - | - | 6.2 | GSI_DA | IFAD_LOAN (100%) |
| silopit | 400 | 300 | 125 | - | 825 | 20.016 | 0.278 | 113.5 | 88.5 | 38.4 | - | 240.4 | GSI_DA | IFAD_LOAN (80%); BEN (20%) |
| ton | 1,800 | 1,500 | - | - | 3,300 | 0.187 | 0.003 | 4.8 | 4.1 | - | - | 8.9 | GSI_DA | IFAD_LOAN (80%); BEN (20%) |
| each | 300 | 250 | 250 | - | 800 | 1.512 | 0.021 | 6.4 | 5.6 | 5.8 | - | 17.8 | GSI_DA | IFAD_LOAN (80%); BEN (20%) |
| each | 2 | 2 | 1 | - | 5 | 249.984 | 3.472 | 7.1 | 7.4 | 3.8 | - | 18.3 | GSI_DA | IFAD_LOAN (80%); BEN (20%) |
| | | | | | | | | 196.7 | 172.1 | 70.3 | - | 439.1 | | |
| lsp | 2,300.2 | - | - | - | 2,300.2 | 1.066 | 0.015 | 34.7 | - | - | - | 34.7 | GSI_DA | IFAD_LOAN (100%) |
| lsp | 100.9 | - | - | - | 100.9 | 2.7 | 0.038 | 3.9 | - | - | - | 3.9 | GSI_DA | IFAD_LOAN (100%) |
| | | | | | | | | 38.6 | - | - | - | 38.6 | | |
| | | | | | | | | 757.6 | 396.5 | 270.0 | - | 1,424.1 | | |
| lps | 1 | - | - | - | 1 | 2,880 | 40 | 40.8 | - | - | - | 40.8 | GSI_DA | IFAD_LOAN (100%) |
| each | 20 | - | - | - | 20 | 288 | 4 | 81.7 | - | - | - | 81.7 | WORKS_DA | IFAD_LOAN (100%) |
| acre | 750 | 750 | 700 | - | 2,200 | 108 | 1.5 | 1,149.6 | 1,199.9 | 1,169.0 | - | 3,518.5 | WORKS_DA | IFAD_LOAN (100%) |
| acre | 250 | 200 | 100 | - | 550 | 144 | 2 | 510.9 | 426.6 | 222.7 | - | 1,160.2 | WORKS_DA | IFAD_LOAN (100%) |
| demo | 200 | 200 | 100 | - | 500 | 8.64 | 0.12 | 24.5 | 25.6 | 13.4 | - | 63.5 | WORKS_DA | IFAD_LOAN (100%) |
| lsp | 1,000 | 1,000 | 1,000 | - | 3,000 | 8.64 | 0.12 | 122.6 | 128.0 | 133.6 | - | 384.2 | WORKS_DA | IFAD_LOAN (50%); BEN (50%) |
| WUA | 15 | 10 | 5 | - | 30 | 36 | 0.5 | 7.5 | 5.0 | 2.5 | - | 15.0 | TRAINING_DA | IFAD_LOAN (100%) |
| lsp | 1 | - | - | - | 1 | 3,600 | 50 | 51.1 | - | - | - | 51.1 | WORKS_DA | IFAD_LOAN (100%) |
| | | | | | | | | 1,988.8 | 1,785.1 | 1,541.2 | - | 5,315.1 | | |
| acre | 250 | 200 | 100 | - | 550 | 14.4 | 0.2 | 51.1 | 42.7 | 22.3 | - | 116.0 | WORKS_DA | IFAD_LOAN (60%) |
| acre | 300 | 300 | 300 | - | 900 | 57.6 | 0.8 | 245.2 | 256.0 | 267.2 | - | 768.4 | WORKS_DA | IFAD_LOAN (80%); BEN (20%) |
| km | 6 | 6 | - | - | 12 | 1,440 | 20 | 122.6 | 128.0 | - | - | 250.6 | WORKS_DA | IFAD_LOAN (100%) |
| | | | | | | | | 2,407.7 | 2,211.7 | 1,830.7 | - | 6,450.1 | | |
| | | | | | | | | 5,081.7 | 3,979.3 | 3,002.3 | 23.5 | 12,086.8 | | |
| | | | | | | | | 5,081.7 | 3,979.3 | 3,002.3 | 23.5 | 12,086.8 | | |

\a Training, workshop & field days

\b on climate smart feed and fodder technologies

\c Incl. soil fertility management, staggered sowing/planting

\d Training by NSC in their production facilities.1/geog, 5growers/session, 5daysx4/year

\e Sprinklers, drip, etc.

\f for winter feeding

\g (Gewogs, towns, schools, hospitals)

\h 2.5% of construction cost

\i Including retro-fitting the rehabilitated schemes for improved climate resilience

COMPONENT 2: VALUE CHAIN DEVELOPMENT AND MARKETING

Kingdom of Bhutan

CARLEP MTR

Table 2. Value chain development and marketing

Detailed Costs

I. Investment Costs

A. Output 2.1: Resilient Vegetable and

Dairy Value Chains developed

1. Output 2.1 Vegetable commercialisation

Multi-stakeholder platforms

and network development

Vegetable value-chain equipments /a

Value-chain infrastructure /b

Subtotal

2. Output 2.2 Dairy commercialisation

Milk collection centres

with processing facilities

Support to KIL

Subtotal

3. Output 2.3 Support to entrepreneurs

(Matching Grant)

Development of business plans

for entrepreneurs

Training and exposure visits

Support to inputs and equipment suppliers

Support to post-harvest/processing enterprises

Support to trading enterprises

Support to agri-services

such as CAIT, inputs producers

Support to LUCs

Subtotal

Total Investment Costs

II. Recurrent Costs

Total

| Unit | Quantities | | | | | Unit Cost (BTN '000) | Unit Cost (US\$ '000) | Totals Including Contingencies (US\$ '000) | | | | | Other Accounts | |
|------------------------|------------|-------|-------|-------|-------|-------------------------|-----------------------------|--|---------|---------|-------|---------|----------------|--------------------------------|
| | 19/20 | 20/21 | 21/22 | 22/23 | Total | | | 19/20 | 20/21 | 21/22 | 22/23 | Total | Disb. Acct. | Fin. Rule |
| event | 1 | 1 | 1 | - | 3 | 1,333.44 | 18.52 | 18.5 | 18.5 | 18.5 | - | 55.6 | TRAINING_DA | IFAD_LOAN (100%) |
| set | 1 | 1 | 1 | - | 3 | 2,892.024 | 40.167 | 41.0 | 42.6 | 44.4 | - | 128.0 | EQUIP_DA | IFAD_LOAN (80%); BEN (20%) |
| sites | 2 | 2 | 2 | - | 6 | 2,880 | 40 | 81.7 | 85.3 | 89.1 | - | 256.1 | WORKS_DA | IFAD_LOAN (80%); BEN (20%) |
| Subtotal | | | | | | | | 141.2 | 146.5 | 152.0 | - | 439.7 | | |
| each | 10 | 10 | - | - | 20 | 1,800 | 25 | 255.1 | 265.4 | - | - | 520.5 | EQUIP_DA | IFAD_LOAN (100%) |
| lsp | | | | | | | | 2,399.7 | 761.6 | 792.6 | - | 3,953.9 | EQUIP_DA | IFAD_LOAN (40%); BEN (60%) |
| Subtotal | | | | | | | | 2,654.7 | 1,027.0 | 792.6 | - | 4,474.4 | | |
| plan | 1 | 1 | - | - | 2 | 1,499.76 | 20.83 | 21.3 | 22.3 | - | - | 43.6 | CONSULT_DA | ASAP (100%) |
| events | 2 | 2 | 2 | - | 6 | 1,000.08 | 13.89 | 27.8 | 27.8 | 27.8 | - | 83.3 | TRAINING_DA | ASAP (100%) |
| lsp | 1 | 1 | 1 | - | 3 | 1,666.8 | 23.15 | 23.6 | 24.6 | 25.6 | - | 73.8 | GSI_DA | IFAD_LOAN (50%); BEN (50%) |
| lsp | 1 | 1 | 1 | - | 3 | 3,033.288 | 42.129 | 43.0 | 44.7 | 46.6 | - | 134.3 | GSI_DA | IFAD_LOAN (50%); BEN (50%) |
| enterprises | - | - | - | - | - | - | - | - | - | - | - | - | GSI_DA | IFAD_LOAN (100%) |
| lsp | 1 | 1 | 1 | - | 3 | 3,332.88 | 46.29 | 47.2 | 49.1 | 51.2 | - | 147.5 | GSI_DA | IFAD_LOAN (50%); BEN (50%) |
| lsp | 1 | 1 | 1 | - | 3 | 16,200 | 225 | 229.6 | 238.9 | 248.6 | - | 717.1 | GSI_DA | IFAD_LOAN (50%); BEN (50%) |
| Subtotal | | | | | | | | 392.5 | 407.4 | 399.7 | - | 1,199.6 | | |
| Total Investment Costs | | | | | | | | 3,188.5 | 1,580.9 | 1,344.3 | - | 6,113.7 | | |
| II. Recurrent Costs | | | | | | | | | | | | | | |
| Total | | | | | | | | 3,188.5 | 1,580.9 | 1,344.3 | - | 6,113.7 | | |

\a Incl. refrigerators for schools, dryers for farmer groups, micro-processing units, etc.

\b Incl. market sheds, cold stores, pack-houses, as required as financially viable models

COMPONENT 3 INSTITUTIONAL SUPPORT

Kingdom of Bhutan

CARLEP MTR

Table 3. Institutional Support

Detailed Costs

I. Investment Costs

A. Output 3.1: Strengthening district and Gewo level staff

| | | | | | | | | | | | | | | | |
|---|-----------|-----|-----|-----|---|-----|-------|------|------|-----|-----|---|------|-------------|---------------|
| Tablest for M&E staff | each | 70 | - | - | - | 70 | 20.16 | 0.28 | 20.0 | - | - | - | 20.0 | EQUIP_DA | ASAP (100%) |
| Infrastructure related capacity building /a | pers_days | 105 | 105 | - | - | 210 | 3.6 | 0.05 | 5.3 | 5.3 | - | - | 10.5 | TRAINING_DA | ASAP (100%) |
| Planning and M&E staff /b | pers_days | 105 | - | 105 | - | 210 | 3.6 | 0.05 | 5.3 | - | 5.3 | - | 10.5 | TRAINING_DA | ASAP (100%) |
| TOT for extension staff | pers_day | 140 | 140 | 140 | - | 420 | 3.6 | 0.05 | 7.0 | 7.0 | 7.0 | - | 21.0 | TRAINING_DA | ASAP (100%) |

Subtotal

37.5 12.3 12.3 - 62.0

B. TA and contractual staff training

| | | | | | | | | | | | | | | | |
|---|------------|---|---|---|---|---|-----|-----|------|------|------|---|------|------------|---------------|
| Project Management TA | pers_month | 2 | 1 | - | - | 3 | 252 | 3.5 | 7.2 | 3.7 | - | - | 10.9 | CONSULT_DA | ASAP (100%) |
| Engineering TA | pers_month | 2 | 2 | 1 | - | 5 | 252 | 3.5 | 7.2 | 7.5 | 3.9 | - | 18.6 | CONSULT_DA | ASAP (100%) |
| Business development marketing TA | pers_month | 2 | 2 | 2 | - | 6 | 252 | 3.5 | 7.2 | 7.5 | 7.9 | - | 22.5 | CONSULT_DA | ASAP (100%) |
| Climate change adaptation coordinator | pers_month | 2 | 2 | - | - | 4 | 360 | 5 | 10.2 | 10.7 | - | - | 20.9 | CONSULT_DA | ASAP (100%) |
| Institutional development TA (Groups, WUA, cooperatives) | pers_month | 3 | 2 | 1 | - | 6 | 360 | 5 | 15.4 | 10.7 | 5.6 | - | 31.7 | CONSULT_DA | ASAP (100%) |
| M&E and MIS TA | pers_month | 2 | 2 | 2 | - | 6 | 360 | 5 | 10.2 | 10.7 | 11.2 | - | 32.2 | CONSULT_DA | ASAP (100%) |

Subtotal

57.3 50.9 28.6 - 136.8

Total Investment Costs

94.8 63.1 40.9 - 198.8

II. Recurrent Costs

Total

94.8 63.1 40.9 - 198.8

\a 15 persons for one week training

\b one week training for 15 staff

COMPONENT 4 PROJECT MANAGEMENT AND M&E

Kingdom of Bhutan

CARLEP MTR

Table 4. Project management, coordination and M&E

Detailed Costs

| | Unit | 19/20 | 20/21 | 21/22 | 22/23 | Total | (BTN '000) | '000) | 19/20 | 20/21 | 21/22 | 22/23 | Total | Disb. Acct. | Fin. Rule |
|---|---------|-------|-------|-------|-------|-------|------------|-------|-------|-------|-------|-------|---------|-------------|---------------------------------------|
| I. Investment Costs | | | | | | | | | | | | | | | |
| A. Project Management Unit | | | | | | | | | | | | | | | |
| 1. Material and equipment | | | | | | | | | | | | | | | |
| Vehicles /a | each | 9 | - | - | - | 9 | | | - | - | - | - | - | VEHICLE_DA | IFAD_GRANT (100%) |
| Laptops | each | 10 | 15 | - | - | 25 | 72 | 1 | 10.2 | 15.9 | - | - | 26.1 | EQUIP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Printers | each | - | 10 | - | - | 10 | 72 | 1 | - | 10.6 | - | - | 10.6 | EQUIP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Scanner | each | 2 | - | - | - | 2 | 57.6 | 0.8 | 1.6 | - | - | - | 1.6 | EQUIP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Photocopier heavy duty | each | - | 1 | - | - | 1 | 165.6 | 2.3 | - | 2.4 | - | - | 2.4 | EQUIP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Office equipment | set | 3 | 3 | 3 | - | 9 | 122.4 | 1.7 | 5.2 | 5.4 | 5.6 | - | 16.3 | EQUIP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Subtotal | | | | | | | | | 17.0 | 34.4 | 5.6 | - | 57.1 | | |
| 2. Capacity building & training | | | | | | | | | | | | | | | |
| Training on gender aspects /b | lps | 1 | 1 | - | - | 2 | 180 | 2.5 | 2.5 | 2.5 | - | - | 5.0 | TRAINING_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Training on knowledge management /c | lps | 1 | 1 | 1 | - | 3 | 180 | 2.5 | 2.5 | 2.5 | 2.5 | - | 7.5 | TRAINING_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Training on monitoring and evaluation /d | lps | 1 | 1 | 1 | - | 3 | 180 | 2.5 | 2.5 | 2.5 | 2.5 | - | 7.5 | TRAINING_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Training on financial management /e | lps | 2 | 2 | 2 | - | 6 | 180 | 2.5 | 5.0 | 5.0 | 5.0 | - | 15.0 | TRAINING_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Training and workshop for OPM staff | event | 5 | 5 | 2 | - | 12 | 599.76 | 8.33 | 41.7 | 41.7 | 16.7 | - | 100.0 | TRAINING_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Subtotal | | | | | | | | | 54.2 | 54.2 | 26.7 | - | 135.0 | | |
| 3. Coordination | | | | | | | | | | | | | | | |
| Coordination meetings with dzongkhags | meeting | 2 | 2 | 2 | 2 | 8 | 360 | 5 | 10.2 | 10.7 | 11.2 | 11.8 | 43.9 | WORKSHOP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Subtotal | | | | | | | | | 81.4 | 99.3 | 43.5 | 11.8 | 236.0 | | |
| B. Monitoring and evaluation & MIS | | | | | | | | | | | | | | | |
| 1. M&E | | | | | | | | | | | | | | | |
| Baseline and impact studies | study | - | - | 1 | - | 1 | 1,440 | 20 | - | - | 22.4 | - | 22.4 | CONSULT_DA | IFAD_GRANT (100%) |
| Annual outcome surveys | study | 1 | 1 | 1 | 1 | 4 | 720 | 10 | 10.2 | 10.7 | 11.2 | 11.7 | 43.9 | CONSULT_DA | IFAD_LOAN (100%) |
| Software development for M&E | lps | 2 | - | - | - | 2 | 1,497.6 | 20.8 | 42.4 | - | - | - | 42.4 | GSI_DA | IFAD_LOAN (100%) |
| IFAD supervision missions | year | 1 | 1 | 1 | - | 3 | 360 | 5 | 5.1 | 5.4 | 5.6 | - | 16.1 | WORKSHOP_DA | IFAD_LOAN (100%) |
| Project completion report | report | - | - | - | 1 | 1 | 1,800 | 25 | - | - | - | 29.4 | 29.4 | CONSULT_DA | IFAD_GRANT (100%) |
| Subtotal | | | | | | | | | 57.8 | 16.1 | 39.3 | 41.1 | 154.2 | | |
| 2. MIS | | | | | | | | | | | | | | | |
| LS | LS | 1 | 1 | 1 | 1 | 4 | 2,498.4 | 34.7 | 34.7 | 34.7 | 34.7 | 34.7 | 138.8 | TRAINING_DA | IFAD_LOAN (50%); IFAD_GRANT (50%) |
| Subtotal | | | | | | | | | 92.5 | 50.8 | 74.0 | 75.8 | 293.0 | | |
| C. Knowledge management | | | | | | | | | | | | | | | |
| Printing and publications | lps | 1 | 1 | 1 | - | 3 | 496.8 | 6.9 | 7.0 | 7.3 | 7.6 | - | 22.0 | GSI_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Workshops and meetings | lps | 2 | 2 | 3 | - | 7 | 360 | 5 | 10.2 | 10.7 | 16.8 | - | 37.8 | WORKSHOP_DA | IFAD_GRANT (50%); IFAD_LOAN (50%) |
| Subtotal | | | | | | | | | 17.3 | 18.0 | 24.5 | - | 59.8 | | |
| D. Study tours | | | | | | | | | | | | | | | |
| Study tours and learning visits (both in-country and overseas) | lsp | 1 | 1 | 1 | - | 3 | 13,334.4 | 185.2 | 185.2 | 185.2 | - | - | 555.6 | TRAINING_DA | IFAD_LOAN (50%); IFAD_GRANT (50%) |
| Total Investment Costs | | | | | | | | | 376.4 | 353.3 | 327.1 | 87.6 | 1,144.4 | | |

Kingdom of Bhutan

CARLEP MTR

Table 4. Project management, coordination and M&E

Detailed Costs**II. Recurrent Costs****A. Salaries and allowances****1. PMO Mongar**

| | Unit | 19/20 | 20/21 | 21/22 | 22/23 | Total | Unit Cost (BTN '000) | Unit Cost (US\$ '000) | Totals Including Contingencies (US\$ '000) | | | | | Disb. Acct. |
|-----------------------------------|------------|-------|-------|-------|-------|-------|-------------------------|--------------------------------|--|------|------|-----|------|-------------|
| National project director | pers-month | 12 | 12 | 12 | 6 | 42 | 73.44 | 1.02 | 12.2 | 12.2 | 12.2 | 6.1 | 42.8 | SAA_DA |
| Financial manager | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |
| Accountant | pers-month | 12 | 12 | 12 | 6 | 42 | 46.08 | 0.64 | 7.7 | 7.7 | 7.7 | 3.8 | 26.9 | SAA_DA |
| M&E and gender manager | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |
| Asst KM, Gender & M&E Officer /f | pers-month | 12 | 12 | 12 | 6 | 42 | 46.08 | 0.64 | 7.7 | 7.7 | 7.7 | 3.8 | 26.9 | SAA_DA |
| Agricultural production manager | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |
| Livestock production manager | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |
| Value-chain and marketing manager | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |
| Office assistants | pers-month | 24 | 24 | 24 | 12 | 84 | 38.16 | 0.53 | 12.7 | 12.7 | 12.7 | 6.4 | 44.5 | SAA_DA |
| Drivers | pers-month | 24 | 24 | 24 | 12 | 84 | 38.16 | 0.53 | 12.7 | 12.7 | 12.7 | 6.4 | 44.5 | SAA_DA |
| Cleaner cum peon | pers-month | 12 | 12 | 12 | 6 | 42 | 20.88 | 0.29 | 3.5 | 3.5 | 3.5 | 1.7 | 12.2 | SAA_DA |

Subtotal

101.5 101.5 101.5 50.8 355.3

2. Liaison office Thimphu

| | | | | | | | | | | | | | | |
|------------------------------|------------|----|----|----|---|----|----|------|-----|-----|-----|-----|------|--------|
| IFAD focal officer at PPD | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |
| IFAD focal accountant at AFD | pers-month | 12 | 12 | 12 | 6 | 42 | 54 | 0.75 | 9.0 | 9.0 | 9.0 | 4.5 | 31.5 | SAA_DA |

Subtotal

18.0 18.0 18.0 9.0 63.0

Subtotal

119.5 119.5 119.5 59.8 418.3

B. Operating costs**1. Project management unit**

| | | | | | | | | | | | | | | |
|----------------------|--------------|----|----|----|---|----|---------|------|------|------|------|------|-------|--------|
| Vehicles O&M | vehicle/year | 9 | 9 | 9 | 9 | 36 | 468 | 6.5 | 59.9 | 62.7 | 65.6 | 68.7 | 256.9 | OCC_DA |
| Office O&M | lps | 2 | 2 | 2 | 2 | 8 | 496.8 | 6.9 | 14.1 | 14.8 | 15.5 | 16.2 | 60.6 | OCC_DA |
| Office supplies | lps | 1 | 1 | 1 | 1 | 4 | 1,497.6 | 20.8 | 21.3 | 22.3 | 23.3 | 24.4 | 91.3 | OCC_DA |
| Travels and meetings | lps | 12 | 12 | 12 | 6 | 42 | 299.52 | 4.16 | 51.1 | 53.5 | 56.0 | 29.3 | 189.9 | OCC_DA |

Subtotal

146.4 153.2 160.4 138.7 598.7

Total Recurrent Costs

265.9 272.8 279.9 198.4 1,017.0

Total

642.3 626.0 607.1 286.0 2,161.4

\a 2 vehicles fongkhagsor OPM, one each for RAMCO and six Dz

\b For the M&E and knowledge management assistant

\c For the M&E and knowledge management assistant

\d For the M&E officer

\e For the financial officer and the two accountants

\f Can also cover gender related aspects. Initial training in KM and gender required.

Appendix 4.2 Technical Paper: Economic and Financial Analysis (EFA)

I. INTRODUCTION

1. **Approach and methodology:** Cost-benefit analysis method was used for carrying out the economic and financial analysis of CARLEP at MTR. Prices were collected for all inputs and outputs as prevailing at nearby markets and adjusted to farm-gate prices using standard conversion factor. Data relating to crop productivity were obtained from case studies carried out by ARDC and RAMCO and survey teams and other available documents such as annual progress reports, annual outcome surveys, etc. Data bases from PMU was used as basic sources of reference for all key activities. Using available databases, both primary and secondary, different type of production models for crop agriculture, vegetables, mushroom, backyard poultry, household dairy units, milk chilling plants, etc. were developed. From these models household models were developed, aggregated into subproject models and finally into the project model with the use of FARMOD. Final results were input in to IFAD-PTA-generated templates (*Annex-A to F*).

2. **Benefits and beneficiaries included in the EFA.** The EFA includes all benefits related to agricultural and livestock production as well as dairy processing and marketing. The analysis is based on representative and conservative models intended not to overestimate the benefits. They are based on data collected during the MTR mission but not validated completely. As a result most of the crop models show either high productivity or low incomes. Efforts to get reasonably reliable production models did not yield any result. Conservative number of households has been taken as CARLEP direct beneficiaries and these are listed below (These will undergo changes after Additional Financing, tentatively scheduled in 2019):

- 2,050 households benefited from irrigation facilities and cultivating paddy, maize and quinoa crops on traditional lines or using improved practices;
- 900 households benefited from land development interventions and cultivating rain-fed crops such as maize and quinoa;
- 2,018 vegetable farmers cultivating off-season and high value vegetables in response to market signals and organised into groups and 150 households engaged in mushroom production;
- 1,654 dairy farmers belonging to both existing and new production groups tending at least two cow;
- 300 households engaged in backyard poultry production and
- 109 milk chilling facilities.

I. II. FINANCIAL ANALYSIS

A. A. Assumptions for Financial Analysis

3. Key assumptions are:

- Conventional technologies (cultivation, processing, etc.) are available for most of the agricultural produce but the target groups have limited access to the emerging technologies.
- With training, technology support and better input services, the farmers, in particular the women are capable of undertaking improved farming practices and thereby enhancing productions at farm level.
- There are skills and practices for rain-fed and irrigated agriculture, horticulture, vegetables, spices, medicinal and aromatic plants, etc. and these have potential for expansion with improved farm management practices.
- Average size of an operational holding is reported to be 2.35 acres per household and the area that is put to cultivation is about 1.08 acre, while remaining 1.27 acres are left fallow.

- Although there are three or four agro-climatic zones with varying degree of soil quality, rainfall patterns, production potential, only crop and plantation models that are common to these zones were prepared and used in the analysis.
- Soil health is invariably poor and as a result overall production potential is far lower than other places. Therefore continued application of farmyard manure (FYM), composts and other organic manure is necessary to restore the soil health and fertility and sustaining production. However, availability of these inputs is highly limited.
- All farm operations are carried out manually and use of animal-drawn ploughs and implements is limited. But the recent introduction of power tillers in some locations has been a boon to farmers, in particular the women.
- Households have some area under orchards but these are in poor conditions. Reviving and improving existing orchards such as mandarin may be more profitable than planting new orchards.
- Households carry forward sufficient seed to the following season but these are often of poor quality. While timely availability of quality seed remains an issue to most of the farmers, with the support of farmers' groups and primary cooperatives, there have been some improvements.
- Nearly 56% households produce for own consumption and the rest produce both for own consumption and markets.
- Farm gate prices of farm produce are nearly 20 to 25% lower than those of the nearby market prices. In case of vegetables, the farm gate prices are highly fluctuating.
- Post-harvest losses are high and estimated at 20%. These losses are even higher with vegetables and fruits. However, these have been factored in to the analysis in the form of conservative productivity levels.
- Households own livestock but manage them along traditional lines. They have limited or no access to vaccination or parasite control, limited access to pastures; the households meet their fodder and fuel wood requirements from nearby forests.
- Varying types of irrigation infrastructure facilities are created by the project and their O&M is far from satisfactory and thereby significantly reducing the potential benefits.
- Productivity increases are assumed at conservative levels ranging no more than 20% over the baseline levels for paddy, 15% for maize, 15% for potato and significant increases for vegetables due to improved seeds, adoption of new package of practices, access to irrigation, linkage to market, etc.
- The project area has network of roads and local markets but these are inadequate to cater to the project beneficiaries and are being improved gradually by the government.
- Hiring of labour for farm operations is negligible as households tend to manage their farm operations themselves. This is largely due to (i) severe shortage of labour and (ii) high cost of hiring labour.
- Land tax has been assumed at BTN 100/acre/year in financial models but excluded in economic models.
- Consistence with the IFAD guidelines for EFA, proxy labour has been valued at BTN 350 for all new operations under with project situation.

4. **Data:** The data used for the EFA have been collected during the MTR mission. The sources of data include: (i) agricultural and livestock statistics published by the MoAF in 2017/18; (ii) reports from MoAF, ARDC and RAMCO on costs of production; (iii) random interviews during field visits; and (iv) technical reports and studies from development partners and academics¹.

¹ Para 4 to 8 are extracted from Annex 10 of Design Report

5. **Prices:** Market prices in Bhutan do not always reflect the economic prices due to subsidies and other distortions in-country or in India, especially in case of traded products. The import parity based conversion factor [SCF 0.95] was applied to all chemical inputs as well as the hybrid vegetable seeds which are imported in the country. The financial prices for the dairy value chain are not diverging substantially from economic prices as the products are mainly for local markets.
6. **WOP and WP:** The analysis is based on incremental benefits corresponding to the difference between a “without Project situation” and a “with Project situation”. Conservative hypotheses have been adopted in order not to overestimate CARLEP’s benefits.
7. **Labour:** The labour cost has been dramatically increasing in recent years in Bhutan, largely due to high rural-urban migration triggering off labour shortage in the rural areas. The cost of labour ranges from BTN 350 to 500 per day plus 3 to 4 meals. In the Eastern region, the average cost has been estimated to BTN 350, all included. A conversion of 0.9 has been applied for the economic analysis.
8. **Home consumption:** In each production model the auto-consumption at household level has been valued. It represents the share of production used for the household’s food requirements, for the livestock feed or as seeds for the next agricultural campaign (in the “without Project situation” most of the farmers use seeds from their own harvest).
9. For the CARLEP MTR following production models were developed and used in the EFA²:

| Table 1: Production Models | | |
|--|----------------------------|----------------------------|
| Production Models | Production Model size | Household model size a/ |
| <i>Irrigated agriculture paddy, vegetables, oilseeds, etc.</i> | <i>1 acre</i> | <i>1.60 acre</i> |
| <i>Vegetable cultivation</i> | <i>1 acre</i> | <i>1.35 acre</i> |
| <i>Dry land cultivation</i> | <i>1 acre</i> | <i>0.75 acre</i> |
| <i>Mushroom cultivation, shitake variety</i> | <i>80 kg</i> | <i>80 kg/hh</i> |
| <i>Dairy cattle model</i> | <i>Two cow</i> | <i>Two cow</i> |
| <i>Milk collection centre/chilling unit</i> | <i>1,000 lit /day unit</i> | <i>1,000 lit /day unit</i> |

a/ Based on an indicative MIS data provided by the OPM, CARLEP

B. Farm / Household Models

10. Using indicative crop and activity models, several Farm and Household Models were prepared using FARMOD: (i) cereal and oilseed crops, (ii) vegetable crops, (iii) dryland crops, (iv) mushroom cultivation, (v) household dairy unit, (vi) backyard poultry, and (viii) milk chilling units. The models broadly illustrate the project’s impact on the incomes, and labour use of households adopting and/or adapting both on-farm and non-farm technology options. These are briefly described below.

(i) Cereal and oilseeds crops: this household model was based on the datasets obtained from the PMU, primarily with crops like rain-fed paddy, maize³, mustard, quinoa, etc. Operational size of a household model has been assumed at 1.6 acre for all participating households with: paddy 0.8 acre, mustard 0.2 acre, quinoa 0.1 acre, vegetables 0.4 acre, etc. No major shift in cropping patterns is proposed. In all 2,450 households participate during the project period.

(ii) Dryland household model: CARLEP provides facilities to develop fallow dryland into cultivable land under rain-fed conditions and in some cases pipelines are also provided for critical irrigation. Average area assumed is 0.75 acre and used mainly for cultivating maize and quinoa crops, with maize (50%) and quinoa (50%), etc. In all 900 households participate during the project period.

² Basic format for quantities and yield are based on the SNV developed cost of production for major cereal, oilseeds and vegetables but prices were updated

³ Potatoes are normally inter-cropped with maize

(iii) Vegetable crop households: this household model assumes an operational area of 1.35 acre per household and all off-seasonal and common vegetables are grown including onion, asparagus, broccoli, potato, etc. For the purposes of analysis common vegetables are planted equally at 0.135 acre each. In all 2,018 households participate during the project period.

(iv) Backyard poultry household model: Poor households were provided 20 pullets, materials for constructing poultry shed and feed. CARLEP is funding small flocks of laying hens with a 30% cost-share from participating households. Beneficiaries constructed the poultry-sheds using their own labour. Annual egg production is 5,220 per unit and mortality rate of the poultry birds is assumed at 5%. In all 300 households participate during the project period.

(v) Milk production household model: Individual households were provided two cross-bred milk animals for dairy purposes and average cost of a cow including transport charges and insurance was BTN 54,000, of which 70% of the cost was shared by the beneficiaries themselves. Annual milk production is assumed at 1,840 litre per household. In all 1,654 households participate during the project period.

(vi) Milk chilling plants: CARLEP is supporting establishment of 1,000 litre milk chilling plants in each key milk producing zones and these are owned and operated by the milk producers' groups or cooperatives. These groups or coops, in addition to chilling the daily collected milk, also use additional milk for producing cheese and butter. On an average these groups procure milk at BTN 30/litre and supply to the milk processing units at BTN 40/litre. In all 109 plants are set up during the project period and each milk chilling plant caters to some 100 dairy farmers.

11. Details of the financial analysis of each model are presented in Annex-3 and are summarised in Table-2 below:

| Table 2: Summary Results Unit Farm Models (Financial, incremental) | | | | | |
|--|-----------------|---------------------|-----------------|--------------|--------------|
| Area, household production models | Income (BTN) | Input Cost (BTN) | Labour (BTN) | BCR ratio | NPV (BTN) |
| Cereal and food crops, 1.6 acre/household | 17,873 | 300 | 1,192 | 1.50 | 123,658 |
| Dryland cultivation, 0.75 acre/household | 3,740 | 310 | 480 | 3.92 | 20,060 |
| Vegetables, 1.35 acre/household | 31,842 | 280 | 3,024 | 13.58 | 185,158 |
| Mushroom cultivation, 80 kg shitake unit | 56,700 | 1,300 | 8,400 | 3.24 a/ | 216,230 |
| Cattle dairy, 2 cow unit | 95,500 | 18,500 | 17,500 | 1.64 b/ | 238,390 |
| Milk chilling unit, 1000 lit capacity/day | 8,210,700 | 6,487,500 | - | 1.16 c/ | 3,238,290 |
| Household poultry, 20 bird unit | 43,500 | 25,100 | 10,500 | 1.23 d/ | 31,010 |
| a/ yields 126% of FIRR; b/ yields 46% of FIRR, c/ yields 18% of FIRR and d/ yields 21% of FIRR | | | | | |
| NPV discounted at 12% | | | | | |

12. In general, the livestock-based activities including dairy are most preferred activities and are economically profitable due to significantly increased access to market, regular through put of milk facilitating collection and processing and availability of feed-stock at reasonable prices. All other interventions supported by CARLEP are also equally viable.

B. C. Subproject Models

13. In all three subproject models were developed to estimate the project performance: (i) cereal crops subproject; (ii) vegetables subproject; and (iii) livestock subproject. These are briefly described below.

14. The cereal crops subproject includes the following household models: 2,450 cereal crop households and 900 households from the dryland agriculture. Dryland households start from year 5 and the other from year 2. Both financial and economic budgets of this sub-project are presented in Annex-2.1 & 2.2.

15. The vegetable crops subproject: In all 2,170 households including 2,118 vegetable households and 150 mushroom households participate in this subproject. Mushroom households start from year 5. Both economic and financial budget for this subproject are presented in Annex-2.3 & 2.4.

16. **Livestock subproject:** In all 1,954 households comprising 1,654 of milk dairy households and 300 poultry households and also 109 chilling plants are participating in this subproject in a phased manner. The poultry households start from year 5 and the other two from year 1. Detailed economic and financial budgets of this subproject are presented in Annex-2.5 & 2.6.

17. Summary results of these four sub-projects are presented in Table3 below:

Table-3: Financial summary results of subprojects & average household income

| Details (incremental) | Cereal crops subproject (000, BTN) | Vegetables subproject (000, BTN) | Livestock Subproject (000, BTN) |
|-----------------------|------------------------------------|----------------------------------|---------------------------------|
| Income | 47,172 | 71,759 | 1,066,283 |
| Inputs | 3,075 | 56 | 765,557 |
| Labour | 428 | 5,837 | 32,095 |
| Net Income | 43,393 | 65,995 | 268,354 |

Incremental incomes per household are s BTN 15,000, 83,875 and 107,660 respectively in Project Year 1, 5 and 10 respectively

Average household incremental income in Year 1 is BTN 15,000 and it is expected to grow to BTN 107,660 at full development stage, i.e. in project year 10.

II. III. ECONOMIC ANALYSIS

C. A. Objectives of Economic Analysis

18. The objective of the economic analysis is to evaluate the expected contribution of the proposed project to the economic development of the project area districts. The purpose of such analysis is to determine whether the economic benefits sufficiently justify the use of the scarce resources that the project needs. The analysis includes all incremental costs and incremental benefits that are quantifiable and associated with the project's investments in development. Target group households adopting and participating in project interventions contribute to increased production, besides ensuring their increases in incomes.

D. B. Assumptions

19. The following assumptions underlie the economic analysis of MAGIP:

- A 20 year analysis period has been assumed, which included the project investment period.
- Agricultural goods move freely within the project area in response to market signals.
- All agricultural inputs and outputs that are traded are valued at their border prices as of November 2018.
- Economic costs are net of duties, taxes and price contingencies, etc. All costs directly associated with the incremental production are included in full, including incremental farm inputs and labour.
- Standard conversion factors (SCF) have been applied to both traded and non-traded items for adjusting financial prices and these are listed in Annex-1.8.
- The analysis includes only incremental direct benefits from all project supported interventions;
- All costs and benefits pertain to investments made on targeted project area households and the resultants benefits;

- No significant changes or shifts in cropping patterns are assumed but the key assumptions have been adoption of appropriate agronomic practices including inter-cropping, crop rotation, conservation farming, etc. and these reflect in cultivation of off-season vegetables and spices;
- The analysis employs an Opportunity Cost of Capital (OCC) at 10%, which is the long-term Treasury bond rate in Bhutan.

E. C. Costs-Benefits Streams and Analysis

20. **Investment and Recurrent Costs:** The incremental cost streams include all incremental on-farm investment and operating costs (total incremental production costs calculated using FARMOD) including the economic value of all the necessary incremental labour; and the project investment costs (calculated using COSTAB) and excluding the cost of the input packages⁴, taxes and duties, price contingencies, etc. Refer Annex-1.3. Recurrent costs for continued operations and maintenance and periodic replacements have also been included.

21. **Production Beneficiaries:** The farm productions are direct outputs, which are based on the respective production models. It is assumed that about 7,470 households are in receipt of project services and in addition some 10,900 dairy farmers who are directly benefited by the milk chilling plants, thus totalling 18,370. There is, thus, some overlapping of households, which has not been estimated. Based on field observations, it is assumed that the actual number of households could be around, say 50% i.e. 8,300: (18,370-1,654 dairy farmers/2). Project benefits quantified in monetary terms are presented in Annex-1.7.

22. **Project Performance Indicators:** Cost-benefit analysis method was used for the economic analysis of the project and using three indicators to assess the overall performance of the project. These are (i) economic internal rate of return (IRR), (ii) net present value (NPV), and (iii) benefit cost ratio (BCR). Overall, the analysis yields an IRR of 22% with an NPV of BTN 649 million and the BCR of 1.13. A positive NPV under the current Opportunity Cost of Capital (OCC) of 10% indicates that the project investments are robust. See Table below and details in Annex-1.1 & 1.2 for the sensitivity analysis and in EFA Data summary in Annex at the end of text.

| Table 4: Base case and Sensitivity Analysis of NPV, IRR & BCR | | | | | |
|---|-----------|-------------------|------|------------------|------|
| Scenario | Base case | Cost Increased by | | Benefits down by | |
| | | 10% | 20% | 10% | 20% |
| NPV (million BTN) at 10% a/ | 649 | 164 | -322 | 69 | -451 |
| IRR % | 22% | 13% | 5% | 12% | 0% |
| BCR discounted at 10% | 1.13 | 1.03 | 0.94 | 1.02 | 0.91 |

a/ Bhutan long-term bond rate has been employed as discount factor

23. **Sensitivity analysis:** If benefits delayed by two years (in effect, if the project's production activities take longer to become established) then the IRR declines to 10% with (-34) million NPV. The decline in benefits is more sensitive to the project than cost increases. Sensitivity analysis confirms that the Project remains sensitive both to decreases in benefits and increases in costs. Decrease in benefits may be brought about by a decline in output prices, or a failure in achieving projected yields or outputs, natural calamities and also damages to crops by wild animals, etc. Therefore there are possibilities of decline in benefits occurring more often than cost increases. Switching values indicate that the investments are worthy even if costs increased over or benefits declined by 12%.

24. **Comparison of Project performance indicators at Design and MTR:** A comparison of the project performance indicators at Design and MTR scenarios have been attempted in order to test-check the key assumptions and resultant indicators and identify reasons for any variations. These are presented in Table-5 below.

| Table-5: Comparison of EFA at Design and MTR in 2018 | | |
|--|-----------|--------|
| Details | At Design | At MTR |

⁴ As the PMO has not been keeping expenditures by project components and sub-components, the mission experienced considerable difficulties in segregating costs for inputs packages and estimating applicable, economic investment costs

| | | | | | |
|-----|------------------------------------|-----|----------|-----|----------|
| 2. | Discount rate applied: | 3. | 8% | 4. | 10% |
| 5. | Costs and benefits streams: | 6. | 20 years | 7. | 20 years |
| 8. | NPV, million BTN discounted at 10% | 9. | 1,370 | 10. | 649 |
| 11. | IRR | 12. | 23% | 13. | 22% |
| 14. | BCR, ratio: | 15. | - | 16. | 1.13 |
| 17. | Costs increased by 10%, IRR | 18. | 19% | 19. | 13% |
| 20. | Costs increased by 20%, IRR | 21. | 14% | 22. | 5% |
| 23. | Benefits declined by 10%, IRR | 24. | 20% | 25. | 12% |
| 26. | Benefits declined by 20%, IRR | 27. | 16% | 28. | 0% |
| 29. | Two year delay, IRR | 30. | 14% | 31. | 10% |
| 32. | Switching values | 33. | | 34. | % change |
| 35. | -Benefits: | 36. | - | 37. | -12 |
| 38. | -Costs: | 39. | - | 40. | 13 |

41. Factors responsible for above variations are many and in particular (i) application of varying discount factors, social discount factor of 8% at the time of Design and long-term bond rate of 10% at MTR; (ii) complete list of project interventions have not been identified for absorbing the full project investments and hence not incorporated; and (iii) many production models provided are skewed and with distorted revenues and expenditures. The matter was taken up with the OPM but results not satisfactory. It is therefore necessary that at the time of additional financing the EFA should also be revised.

III. IV. BENEFITS AND BENEFICIARIES

F. A. Benefits and Beneficiaries

42. 25. **Beneficiaries:** Number of beneficiary households covered by subproject and year are shown in Table-6 below and this is subject to further verification and study.

| Table-6: Number of Participating Households | | | | | | | | |
|---|-------------------------------|---------|---------|---------|---------|---------|---------|----------------|
| BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES | | | | | | | | |
| Project year → | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | Total |
| Interventions | Project implementation period | | | | | | | Adoption rates |
| # of Food crops households (adopting hh) | 0 | 113 | 797 | 1,106 | 1,564 | 2,022 | 2,451 | 2,451 |
| | 0 | 113 | 797 | 1,106 | 1,564 | 2,022 | 2,451 | 2,451 |
| # of Dryland agriculture households (adopting hh) | 0 | 0 | 0 | 0 | 300 | 600 | 900 | 900 |
| | 0 | 0 | 0 | 0 | 300 | 600 | 900 | 900 |
| # of Vegetable crops households (adopting hh) | 110 | 235 | 482 | 662 | 1,094 | 1,466 | 1,778 | 2,018 |
| | 110 | 235 | 482 | 662 | 1,094 | 1,466 | 1,778 | 2,018 |
| # of Cattle dairy households (adopting hh) | 105 | 334 | 829 | 1,054 | 1,454 | 1,554 | 1,654 | 1,654 |
| | 105 | 334 | 829 | 1,054 | 1,454 | 1,554 | 1,654 | 1,654 |
| # of Mushroom growing households (adopting hh) | 0 | 0 | 0 | 0 | 50 | 100 | 150 | 150 |
| | 0 | 0 | 0 | 0 | 50 | 100 | 150 | 150 |
| # of poultry households (adopting hh) | 0 | 0 | 0 | 0 | 100 | 200 | 300 | 300 |
| | 0 | 0 | 0 | 0 | 100 | 200 | 300 | 300 |
| # of Milk chilling plants (adopting hh) | 9 | 22 | 39 | 54 | 69 | 89 | 109 | 109 |
| (each plant caters to some 100 farmers) | 900 | 2,200 | 3,900 | 5,400 | 6,900 | 8,900 | 10,900 | 10,900 |
| Deliberately 100% adoption rate is kept as data on more interventions are not available | | | | | | | | |
| Total # of participating households | 215 | 682 | 2,108 | 2,822 | 4,562 | 5,942 | 7,233 | 7,582 |
| Total # of adopting households | 1,115 | 2,882 | 6,008 | 8,222 | 11,462 | 14,842 | 18,133 | 18,373 |

26. **Benefits:** The immediate benefits from the project are increased productivity through the introduction of improved farming practices including a marginal shift in cropping patterns in response to market dairy demands, cultivation of vegetables, poultry and dairy products. On an average a household's production benefits increases very marginally. Annual incremental incomes, excluding the value of

family labour increase by BTN 107,660 at full development stage. Major driver of the economy is livestock, in particular milk dairy. There are also significant increases on demand on labour from the existing level of 527,700 person-days to 637,300 person-days, some 21%. See Annex-1.5 for details.

G. B. Risks and Sustainability

27. There are a number of risks associated with the project. These relate to farm technology, reluctance on the part of the farmers in continuing the demonstrated package of practices, inadequate extension support, inadequate market linkages and poor price margins, lack of input services and poor response from the private sector, poor coordination and institutional support. These issues and risks are discussed below:

| Table-7: Project Risks and Sustainability | | | | |
|--|---|----------------------------------|--|--|
| Risks | Risk description | Probability of occurrence | Mitigation measures provided and included in programme design | Comparative sensitivity analysis result (Proxy) |
| Institutional | Delay in technology transfer slowing down the uptake rates and production Weak inputs services | High | Vegetable groups and other production groups promoted and facilitated; Training and demonstrations of package of practices, | Benefits declined by 20%: IRR= 0% NPV= -450 million BCR= 0.91 |
| | Lack of financial capacity of farmers to invest in enterprises and other occupations | High | No project supported facilities for financial services | Decline in benefits by 15%: IRR=6% NPV=-176 million BCR= 0.96 |
| Market | Inadequate profit margins due to poor access, lack of transport and of market information Lack of capacities of producer groups to negotiate fair deals with traders and suppliers | High to Medium | Market information, improved technology advice. Improvement of local markets; training and capacity building; Facilities for linkages with schools and institutes for selling of vegetables | Decline in benefits and increases in cost by 10%: IRR=3% NPV=(386) million |
| | Lower market prices for commodities | Medium | Diversified production and production of ready to market commodities | BCR=0.93 |
| Policy | Lack of commitment to investing in the welfare development and slowing down funds flow | Small | The project investments are fully supported by RGoB and adequate funds were committed | Operating costs increase by 10%: IRR=13% NPV= 164 million BCR=1.03 |
| Others | Remoteness and difficulty of access due to bad connectivity conditions | High to Medium | Promotion of products that combine high farmer margin for small volumes and are easy to transport | Decline in benefits by 25%: IRR= % |
| | Climate change risks of droughts, frosts, snowfall, frequent storms, etc | High to Medium | Training farmers on climate change risks | NPV=-726 million BCR=0.85 |

ANNEX: EFA FRAMEWORK AT MTR: CARLEP, BHUTAN

BHUTAN CARLEP MTR EFA

| A) | | CROPS | Vegetables | Livestock | | | | | | | | |
|--|---------|---------|------------|-----------|-------|-------|-------|-------|-------|-------|-------|---|
| Net incremental benefits of Farm and Activity subproject models in 000 BTN | | | | | | | | | | | | |
| FINANCIAL ANALYSIS | PY1 | 0 | 902 | -29848.62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY2 | 1,885 | 3,554 | -27,925 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY3 | 13,295 | 7,737 | -23,633 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY4 | 18,448 | 13,877 | -58,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY5 | 26,325 | 19,737 | -84,094 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY6 | 35,401 | 33,086 | -146,776 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY7 | 43,393 | 45,443 | -190,474 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY8 | 43,393 | 58,590 | -286,304 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY9 | 43,393 | 64,573 | -273,754 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY10 | 43,393 | 65,996 | -268,354 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY11 | 43,393 | 64,525 | -250,597 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | PY12 | 43,393 | 63,382 | -239,953 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PY13 | 43,393 | 60,625 | -211,098 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY14 | 43,393 | 61,176 | -233,284 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY15 | 43,393 | 64,931 | -214,384 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY16 | 43,393 | 64,715 | -258,719 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY17 | 43,393 | 55,449 | -252,719 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY18 | 43,393 | 58,317 | -259,104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY19 | 43,393 | 64,493 | -261,904 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PY20 | 43,393 | 65,996 | -261,904 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| NPV (BTN, 000) | 201,620 | 244,722 | 919,613 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| NPV (USD 000) | 2,800.3 | 3,398.9 | 12,722.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| FIRR | #DIV/0! | #DIV/0! | 71% | #NUM! | #NUM! | #NUM! | #NUM! | #NUM! | #NUM! | #NUM! | #NUM! | |

D)

| BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES | | | | | | | | | |
|---|--|---------|---------|---------|---------|---------|---------|---------|--------|
| Project year | | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | Total |
| Project implementation period | | | | | | | | | |
| Adoption rates | | | | | | | | | |
| Interventions | | | | | | | | | |
| # of Food crops households (adopting hh) | | | | | | | | | |
| | | 0 | 113 | 797 | 1,106 | 1,564 | 2,022 | 2,451 | 2,451 |
| | | 0 | 113 | 797 | 1,106 | 1,564 | 2,022 | 2,451 | 2,451 |
| # of Dryland agriculture households (adopting hh) | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 300 | 600 | 900 | 900 |
| | | 0 | 0 | 0 | 0 | 300 | 600 | 900 | 900 |
| # of Vegetable crops households (adopting hh) | | | | | | | | | |
| | | 110 | 235 | 482 | 662 | 1,094 | 1,466 | 1,778 | 2,018 |
| | | 110 | 235 | 482 | 662 | 1,094 | 1,466 | 1,778 | 2,018 |
| # of Cattle dairy households (adopting hh) | | | | | | | | | |
| | | 105 | 334 | 829 | 1,054 | 1,454 | 1,554 | 1,654 | 1,654 |
| | | 105 | 334 | 829 | 1,054 | 1,454 | 1,554 | 1,654 | 1,654 |
| # of Mushroom growing households (adopting hh) | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 50 | 100 | 150 | 150 |
| | | 0 | 0 | 0 | 0 | 50 | 100 | 150 | 150 |
| # of poultry households (adopting hh) | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 100 | 200 | 300 | 300 |
| | | 0 | 0 | 0 | 0 | 100 | 200 | 300 | 300 |
| # of Milk chilling plants (adopting hh) | | | | | | | | | |
| | | 9 | 22 | 39 | 54 | 69 | 89 | 109 | 109 |
| | | 900 | 2,200 | 3,900 | 5,400 | 6,900 | 8,900 | 10,900 | 10,900 |
| (each plant caters to some 100 farmers) | | | | | | | | | |
| Deliberately 100% adoption rate is kept as data on more interventions are not available | | | | | | | | | |
| Total # of participating households | | | | | | | | | |
| | | 215 | 682 | 2,108 | 2,822 | 4,562 | 5,942 | 7,233 | 7,582 |
| Total # of adopting households | | | | | | | | | |
| | | 1,115 | 2,882 | 6,008 | 8,222 | 11,462 | 14,842 | 18,133 | 18,373 |

F)

| SENSITIVITY ANALYSIS (SA) | | | |
|---------------------------|------|---|------|
| | Δ% | Link with the risk matrix | IRR |
| Basecase scenario | | | 2.2% |
| Project benefits | -10% | | 13% |
| Project costs | 10% | | 164 |
| Project benefits | 10% | | 386 |
| 2 years lag in benefits | | | 10% |
| Project benefits | -20% | climate risks, frost, drought, flood, etc | 0% |
| Input prices | 10% | lack of policy commitment | 13% |
| | | | 164 |
| | | | |
| | | | |

1/ NPV is in million BTN discounted at 10%

B)

| PROJECT COSTS AND INDICATORS FOR LOGFRAME | | | | | | |
|---|--------------------|---|--------|-------------------------------------|----------------|----------|
| TOTAL PROJECT COSTS (in million USD) | 31.58 | Base costs | | 24.15 | PMU | 2.11 |
| Number of Beneficiaries | 20,315 Households | Producers | Groups | Enterprises | Districts | Villages |
| Cost per beneficiary (IFAD resources including grant= \$ 13.32 million) | 754 USD/ household | Direct Outreach | | 20,315 | Adoption rates | 100% |
| Components | Cost USD M | Outcomes | | Indicators | | |
| Market-led agricultural production | 17.35 | # of producer groups linked to market | | Increased access to market | | |
| Value-chain development | 11.59 | # of producers participating in value-chain | | Increased margins for producers | | |
| Institutional support | 0.53 | # significant policy proposals identified | | Farmer-friendly policies proposed | | |
| Project management | 2.11 | All project staff in place | | Efficient management of the project | | |
| Total | 31.58 | | | | | |

Source: Design Report; to be revised at the time of Additional Financing

| MAIN ASSUMPTIONS & SHADOW PRICES ¹ | | | | |
|---|----------------------------------|-----------------------|---|------------------------------|
| FINANCIAL | Output, production | Incremental value (%) | Price (in BTN) | Input prices |
| | Cereals | 30% | Paddy 37/kg | Fertilizer, average, per kg |
| | Maize | 20% | Maize 25/kg | Pesticides, average, per lit |
| | Vegetables | 25% | Vegetables 24/kg | organic /manure |
| | Potato | 25% | Potato 21/kg | Rural wage rate, pers. day |
| ECONOMIC | Onion | 20% | Milk 30/litre | Bullock pair |
| | Cabbage | 25% | Quinoa 100/kg | Chicken |
| | Official Exchange rate, Nov 2018 | 72 | Discount rate (opportunity cost of capital) | 10.0% |
| | Shadow Exchange rate | 72 | Long term bond rate, Central Bank rate | 10.0% |
| | Standard Conversion factor | 1.00 | Output conversion factor a/ | 0.85 |
| | Labour Conversion factor | 0.8 | Input Conversion factor a/ | 0.83 |

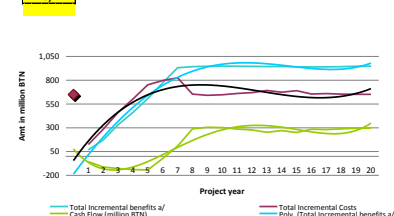
¹ All prices expressed in BTN Currency.

a/ estimated from data generated using farmod

E)

| NET INCREMENTAL BENEFITS (BTN million) | | | | | | | | | |
|--|-------|-------|-----|-------|------|-------|-----|-------|-------|
| NET INCREMENTAL COSTS (BTN million) | | | | | | | | | |
| Cash Flow (million BTN) | | | | | | | | | |
| Project year | | | | | | | | | |
| 1 | 0.00 | 0.96 | 0.0 | 66.5 | 0.0 | -0.6 | 0.0 | 66.5 | 33.4 |
| 2 | 1.18 | 3.68 | 0.0 | 169.2 | 0.0 | -1.9 | 0.0 | 172.2 | 94.7 |
| 3 | 8.34 | 10.10 | 0.0 | 318.4 | 0.0 | -4.6 | 0.0 | 332.2 | 127.0 |
| 4 | 11.57 | 16.21 | 0.0 | 438.5 | 1.9 | -6.7 | 0.0 | 462.0 | 212.7 |
| 5 | 17.25 | 24.76 | 1.2 | 567.8 | 5.4 | -8.8 | 0.0 | 607.9 | 248.3 |
| 6 | 22.94 | 35.75 | 3.4 | 710.9 | 9.4 | -9.9 | 0.0 | 722.8 | 319.3 |
| 7 | 28.33 | 45.86 | 6.0 | 850.5 | 11.3 | -10.5 | 0.0 | 931.4 | 416.2 |
| 8 | 28.33 | 53.71 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 941.8 | 431.7 |
| 9 | 28.33 | 58.37 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 946.5 | 441.5 |
| 10 | 28.33 | 60.01 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 948.2 | 446.4 |
| 11 | 28.33 | 58.98 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 946.9 | 440.0 |
| 12 | 28.33 | 58.08 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 946.0 | 436.0 |
| 13 | 28.33 | 55.58 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 943.7 | 432.0 |
| 14 | 28.33 | 55.94 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 944.1 | 432.0 |
| 15 | 28.33 | 51.71 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 939.8 | 420.2 |
| 16 | 28.33 | 51.46 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 939.4 | 414.4 |
| 17 | 28.33 | 51.97 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 939.9 | 418.1 |
| 18 | 28.33 | 53.71 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 941.9 | 431.7 |
| 19 | 28.33 | 58.37 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 946.5 | 451.5 |
| 20 | 28.33 | 60.01 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 948.2 | 451.5 |
| NPV at 10% (million) | | | | | | | | | |
| | | | | | | | | | |
| Long term Bond rate applied as Discount rate | | | | | | | | | |
| | | | | | | | | | |
| BCR | | | | | | | | | |
| | | | | | | | | | |
| FIRR | | | | | | | | | |
| | | | | | | | | | |

G)



ANNEX-A: NET INCREMENTAL BENEFITS OF SUBPROJECTS, FINANCIAL

| A) | | CROPS | Vegetables | Livestock | | | | | 0 |
|---------------------------|------|---|------------|-----------|-------|-------|-------|-------|---|
| FINANCIAL ANALYSIS | | Net incremental benefits of Farm and Activity subproject models in 000 BTN | | | | | | | |
| | PY1 | 0 | 902 | -29848.62 | 0 | 0 | 0 | 0 | 0 |
| | PY2 | 1,885 | 3,554 | - 27,925 | - | - | - | - | - |
| | PY3 | 13,295 | 7,737 | -23,633 | 0 | 0 | 0 | 0 | 0 |
| | PY4 | 18,449 | 13,677 | 58,500 | - | - | - | - | - |
| | PY5 | 26,925 | 19,737 | 84,094 | 0 | 0 | 0 | 0 | 0 |
| | PY6 | 35,401 | 33,066 | 146,776 | 0 | 0 | 0 | 0 | 0 |
| | PY7 | 43,393 | 45,443 | 190,474 | 0 | 0 | 0 | 0 | 0 |
| | PY8 | 43,393 | 58,590 | 286,304 | 0 | 0 | 0 | 0 | 0 |
| | PY9 | 43,393 | 64,573 | 273,754 | 0 | 0 | 0 | 0 | 0 |
| | PY10 | 43,393 | 65,995 | 268,354 | 0 | 0 | 0 | 0 | 0 |
| | PY11 | 43,393 | 64,525 | 250,597 | 0 | 0 | 0 | 0 | 0 |
| | PY12 | 43,393 | 63,382 | 239,953 | 0 | 0 | 0 | 0 | 0 |
| | PY13 | 43,393 | 60,625 | 211,098 | 0 | 0 | 0 | 0 | 0 |
| | PY14 | 43,393 | 61,176 | 233,284 | 0 | 0 | 0 | 0 | 0 |
| | PY15 | 43,393 | 54,931 | 214,384 | 0 | 0 | 0 | 0 | 0 |
| | PY16 | 43,393 | 54,715 | 258,719 | 0 | 0 | 0 | 0 | 0 |
| | PY17 | 43,393 | 55,449 | 252,719 | 0 | 0 | 0 | 0 | 0 |
| | PY18 | 43,393 | 58,317 | 259,104 | 0 | 0 | 0 | 0 | 0 |
| | PY19 | 43,393 | 64,493 | 261,904 | 0 | 0 | 0 | 0 | 0 |
| | PY20 | 43,393 | 65,995 | 261,904 | 0 | 0 | 0 | 0 | 0 |
| NPV (BTN, 000) | | 201,620 | 244,722 | 919,613 | 0 | 0 | 0 | 0 | 0 |
| NPV (USD 000) | | 2,800.3 | 3,398.9 | 12,772.4 | 0.0 | 0.0 | 0.0 | 0.0 | |
| FIRR | | #DIV/0! | #DIV/0! | 71% | #NUM! | #NUM! | #NUM! | #NUM! | |

ANNEX-B: PROJECT COSTS AND INDICATORS FOR LOGFRAME

| B) | | | | | | |
|---|--------------------|------------|---|-------------|-------------------------------------|----------|
| PROJECT COSTS AND INDICATORS FOR LOGFRAME | | | | | | |
| TOTAL PROJECT COSTS (in million USD) | | 31.58 | Base costs | 24.15 | PMU | 2.11 |
| Number of Beneficiaries | 20,315 Households | Producers | Groups | Enterprises | Districts | Villages |
| | | | | 109 | 6 | |
| Cost per beneficiary (IFAD resources including grant= \$ 15.32 million) | 754 USD/ household | | Direct Outreach | 20,315 | Adoption rates | 100% |
| Components | | Cost USD M | Outcomes | | Indicators | |
| Market-led agricultural production | | 17.35 | # of producer groups linked to market | | Increased access to market | |
| Value-chain development | | 11.59 | # of producers participating in value-chain | | Increased margins for producers | |
| Institutional support | | 0.53 | sinificant policy proposals identified | | Farmer-friendly policies proposed | |
| Project management | | 2.11 | All project staff in place | | Efficient management of the project | |
| Total | | 31.58 | | | | |

Source: Design Report; to be revised at the time of Additional Financing


ANNEX-C: MAIN ASSUMPTIONS AND SHADOW PRICES

| c) MAIN ASSUMPTIONS & SHADOW PRICES ¹ | | | | | |
|--|---------------------------------|-----------------------|------------------|---|-------------|
| FINANCIAL | Output, production | Incremental value (%) | Price (in BTN) | Input prices | Price (BTN) |
| | Cereals | 30% | Paddy 37/kg | Fertilizer, average, per kg | 13/kg |
| | Maize | 20% | Maize 25/kg | Pesticides, average, per lit | 700/lit |
| | Vefetables | 25% | Vegetables 24/kg | organic /manure | 1/kg |
| | Potato | 25% | Potato 21/kg | Rural wage rate, pers _day | 350/day |
| | Onion | 20% | Milk 30/litre | Bullock pair | 400/day |
| | Cabbage | 25% | Quinoa 100/kg | Chicken | 200/each |
| ECONOMIC | Official Exchange rate,Nov 2018 | 72 | | Discount rate (opportunity cost of capital) | 10.0% |
| | Shadow Exchange rate | 72 | | Long term bond rate, Central Bank rate | 10.0% |
| | Standard Conversion Factor | 1.00 | | Output conversion factor a/ | 0.85 |
| | Labour Conversion factor | 0.8 | | Input Conversion factor a/ | 0.83 |

¹ All prices expressed in BTN Currency.

a/ estimated from data generated using farmod

ANNEX-D BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES

| BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES | | | | | | | | | Adoption rates |
|--|-------------------------------|---------|---------|---------|---------|---------|---------|--------|----------------|
| Project year  | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2012/22 | Total | |
| Interventions | Project implementation period | | | | | | | | |
| # of Food crops households (adopting hh) | 0 | 113 | 797 | 1,106 | 1,564 | 2,022 | 2,451 | 2,451 | 100% |
| | 0 | 113 | 797 | 1,106 | 1,564 | 2,022 | 2,451 | 2,451 | |
| # of Dryland agriculture households (adopting hh) | 0 | 0 | 0 | 0 | 300 | 600 | 900 | 900 | 100% |
| | 0 | 0 | 0 | 0 | 300 | 600 | 900 | 900 | |
| # of Vegetable crops households (adopting hh) | 110 | 235 | 482 | 662 | 1,094 | 1,466 | 1,778 | 2,018 | 100% |
| | 110 | 235 | 482 | 662 | 1,094 | 1,466 | 1,778 | 2,018 | |
| # of Cattle dairy households (adopting hh) | 105 | 334 | 829 | 1,054 | 1,454 | 1,554 | 1,654 | 1,654 | 100% |
| | 105 | 334 | 829 | 1,054 | 1,454 | 1,554 | 1,654 | 1,654 | |
| # of Mushroom growing households (adopting hh) | 0 | 0 | 0 | 0 | 50 | 100 | 150 | 150 | 100% |
| | 0 | 0 | 0 | 0 | 50 | 100 | 150 | 150 | |
| # of poultry households (adopting hh) | 0 | 0 | 0 | 0 | 100 | 200 | 300 | 300 | 100% |
| | 0 | 0 | 0 | 0 | 100 | 200 | 300 | 300 | |
| # of Milk chilling plants (adopting hh) (each plant caters to some 100 farmers) | 9 | 22 | 39 | 54 | 69 | 89 | 109 | 109 | 100% |
| | 900 | 2,200 | 3,900 | 5,400 | 6,900 | 8,900 | 10,900 | 10,900 | |
| Deliberately 100% adoption rate is kept as data on more interventions are not available | | | | | | | | | |
| | | | | | | | | | |
| Total # of participating households | 215 | 682 | 2,108 | 2,822 | 4,562 | 5,942 | 7,233 | 7,582 | |
| Total # of adopting households | 1,115 | 2,882 | 6,008 | 8,222 | 11,462 | 14,842 | 18,133 | 18,373 | |

ANNEX-E: NET INCREMENTAL BENEFITS & IRR

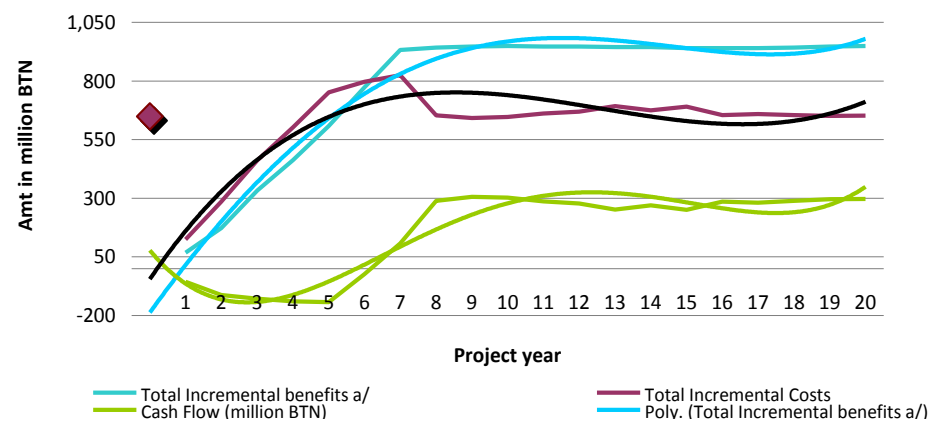
| ECONOMIC ANALYSIS | E) | NET INCREMENTAL BENEFITS (BTN million) | | | | | | | | NET INCREMENTAL COSTS (BTN million) | | | Cash Flow (million BTN) |
|-------------------|--------------|--|------------|----------|-------------------------|---------|------------------------|--|-------------------------------|-------------------------------------|--------------------------|-------------------------|----------------------------|
| | Project year | Cereal crops | Vegetables | Mushroom | Dairy & chilling plants | Poultry | Proxy values of labour | | Total Incremental benefits a/ | Economic investment Costs | Economic recurrent Costs | Total Incremental Costs | |
| | | | | | | | | | | | | | |
| | 1 | 0.00 | 0.96 | 0.0 | 66.5 | 0.0 | -0.6 | 0.0 | 66.9 | 33.4 | 90.0 | 123.4 | -56.6 |
| | 2 | 1.18 | 3.68 | 0.0 | 169.2 | 0.0 | -1.9 | 0.0 | 172.2 | 94.7 | 190.2 | 284.9 | -112.7 |
| | 3 | 8.34 | 10.10 | 0.0 | 318.4 | 0.0 | -4.6 | 0.0 | 332.2 | 127.0 | 334.4 | 461.5 | -129.3 |
| | 4 | 11.57 | 16.23 | 0.0 | 438.5 | 1.9 | -6.2 | 0.0 | 462.0 | 212.7 | 389.7 | 602.4 | -140.4 |
| | 5 | 17.25 | 24.76 | 1.2 | 567.8 | 5.6 | -8.8 | 0.0 | 607.9 | 248.1 | 503.6 | 751.7 | -143.8 |
| | 6 | 22.94 | 35.75 | 3.6 | 710.9 | 9.4 | -9.8 | 0.0 | 772.8 | 195.3 | 601.0 | 796.3 | -23.5 |
| | 7 | 28.33 | 45.86 | 6.0 | 850.5 | 11.3 | -10.5 | 0.0 | 931.4 | 116.2 | 708.5 | 824.7 | 106.7 |
| | 8 | 28.33 | 53.73 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 941.9 | 21.7 | 631.7 | 653.3 | 288.5 |
| | 9 | 28.33 | 58.37 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 946.5 | 0.0 | 641.5 | 641.5 | 305.0 |
| | 10 | 28.33 | 60.01 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 948.2 | 0.0 | 646.4 | 646.4 | 301.8 |
| | 11 | 28.33 | 58.98 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 946.9 | 0.0 | 660.5 | 660.5 | 286.4 |
| | 12 | 28.33 | 58.08 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 946.0 | | 669.1 | 669.1 | 277.0 |
| | 13 | 28.33 | 55.58 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 943.7 | | 692.1 | 692.1 | 251.6 |
| | 14 | 28.33 | 55.94 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 944.1 | | 674.2 | 674.2 | 269.9 |
| | 15 | 28.33 | 51.71 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 939.8 | | 690.2 | 690.2 | 249.7 |
| | 16 | 28.33 | 51.46 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 939.4 | | 654.4 | 654.4 | 285.0 |
| | 17 | 28.33 | 51.97 | 7.2 | 851.7 | 11.3 | -10.5 | 0.0 | 939.9 | | 659.1 | 659.1 | 280.8 |
| | 18 | 28.33 | 53.73 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 941.9 | | 653.7 | 653.7 | 288.2 |
| | 19 | 28.33 | 58.37 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 946.5 | | 651.1 | 651.1 | 295.4 |
| 20 | 28.33 | 60.01 | 7.2 | 851.7 | 11.5 | -10.5 | 0.0 | 948.2 | | 651.5 | 651.5 | 296.6 | |
| | | NPV at 10% ('million) | | | 649 | | | Long term Bond rate applied as Discount rate | | | | | |
| | | BCR | | | 1.13 | | | 5,502 | | | 4,853 | | |
| | | EIRR | | | 22% | | | | | | | | |

ANNEX-F SENSITIVITY ANALYSIS

| F) | | | | |
|--|------|--|-----|--------|
| SENSITIVITY ANALYSIS (SA) | | | | |
| | Δ% | Link with the risk matrix | IRR | NPV 1/ |
| Basecase scenario | | | 22% | 649 |
| | | | | |
| Project benefits | -10% | | 13% | 164 |
| Project costs | 10% | | 3% | - |
| Project benefits | 10% | | | |
| | | | | |
| 2 years lag in benefits | | | 10% | - |
| | | | | 34 |
| Project benefits | -20% | climate risks, frost, drought, floods, etc | 0% | - |
| | | | | |
| Input prices | 10% | lack of policy commitment | 13% | 164 |
| | | | | |
| | | | | |
| 1/ NPV is in million BTN discounted at 10% | | | | |

ANNEX-G GRAPH SHOWING INCREMENTAL INCOMES, COSTS AND NET INCOMES

G)



IV.PROJECT PERFORMANCE INDICATORS AND SENSITIVITY ANALYSIS:

V. ANNEX-1.1: PROJECT "INTERNAL RATE OF RETURN" & LAGGED BENEFITS

ECONOMIC ANALYSIS: CARLEP MTR

Country: BHUTAN Discount rate:DR 0.1 10.0%

Project: CARLEP MTR

(amount in million BTN)

| | Project Year | | | | | | | | | | | | | | | | | | | |
|--|--------------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Incremental benefits | | | | | | | | | | | | | | | | | | | | |
| Incremental benefits | 66.9 | 172.2 | 332.2 | 462.0 | 607.9 | 772.8 | 931.4 | 941.9 | 946.5 | 948.2 | 946.9 | 946.0 | 943.7 | 944.1 | 939.8 | 939.4 | 939.9 | 941.9 | 946.5 | 948.2 |
| Total Incremental benefits | 66.9 | 172.2 | 332.2 | 462.0 | 607.9 | 772.8 | 931.4 | 941.9 | 946.5 | 948.2 | 946.9 | 946.0 | 943.7 | 944.1 | 939.8 | 939.4 | 939.9 | 941.9 | 946.5 | 948.2 |
| Incremental costs | | | | | | | | | | | | | | | | | | | | |
| Investment costs | 33.4 | 94.7 | 127.0 | 212.7 | 248.1 | 195.3 | 116.2 | 21.7 | | | | | | | | | | | | |
| Operating costs, inputs & labour | 90.0 | 190.2 | 334.4 | 389.7 | 503.6 | 601.0 | 708.5 | 631.7 | 641.5 | 646.4 | 660.5 | 669.1 | 692.1 | 674.2 | 690.2 | 654.4 | 659.1 | 653.7 | 651.1 | 651.5 |
| Incremental costs | 123.4 | 284.9 | 461.5 | 602.4 | 751.7 | 796.3 | 824.7 | 653.3 | 641.5 | 646.4 | 660.5 | 669.1 | 692.1 | 674.2 | 690.2 | 654.4 | 659.1 | 653.7 | 651.1 | 651.5 |
| Incremental net benefits | -56.6 | -112.7 | -129.3 | -140.4 | -143.8 | -23.5 | 106.7 | 288.5 | 305.0 | 301.8 | 286.4 | 277.0 | 251.6 | 269.9 | 249.7 | 285.0 | 280.8 | 288.2 | 295.4 | 296.6 |
| Basecase results discounted: | 10.0% | | | | | | | | | | | | | | | | | | | |
| NPV of benefit streams discounted at | 10.0% | 5,502 | | | | | | | | | | | | | | | | | | |
| NPV of costs stream discounted at | 10.0% | 4,853 | | | | | | | | | | | | | | | | | | |
| NPV of project discounted at | 10.0% | 649 | | | | | | | | | | | | | | | | | | |
| BCR- discounted benefits & costs at | 10.0% | 1.13 | | | | | | | | | | | | | | | | | | |
| IRR | | 22% | | | | | | | | | | | | | | | | | | |
| Benefits lagged by 2 year DR at | 10.0% | | | | | | | | | | | | | | | | | | | |
| NPV of benefit streams discounted at | 10.0% | 4,818 | | | | | | | | | | | | | | | | | | |
| NPV of costs stream discounted at | 10.0% | 4,853 | | | | | | | | | | | | | | | | | | |
| NPV of project discounted at | 10.0% | -34 | | | | | | | | | | | | | | | | | | |
| BCR- discounted benefits & costs at | 10.0% | 0.99 | | | | | | | | | | | | | | | | | | |
| IRR | | 10% | | | | | | | | | | | | | | | | | | |

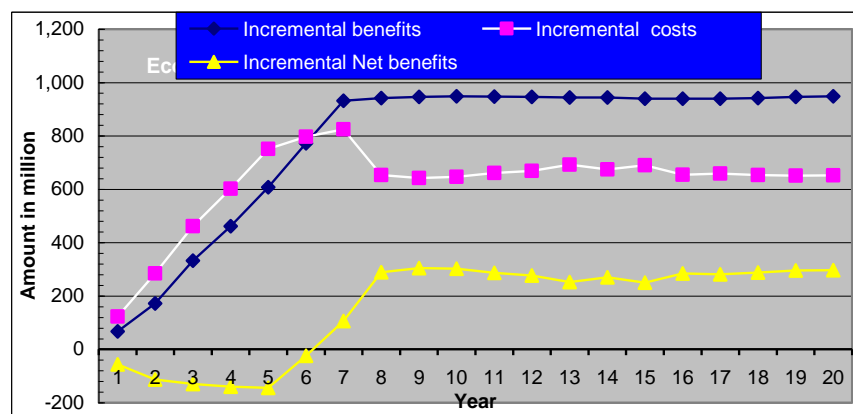
VI. ANNEX-1.2: SENSITIVITY TESTS: "SWITCHING VALUES" & BCR

Results of Sensitivity Analysis:

| Project Performance indicators | | Costs increased by | | | | Benefits down by | | | | Both cost increase & benefits down | | | |
|--------------------------------|-------|--------------------|------|------|------|------------------|------|------|---------|------------------------------------|---------|---------|---------|
| | | 10% | 15% | 20% | 25% | 10% | 15% | 20% | 25% | 10% | 15% | 20% | 25% |
| NPV of at discount rate of | 10.0% | 164 | -79 | -322 | -564 | 99 | -176 | -451 | -726 | -386 | -904 | -1,422 | -1,940 |
| BCR at discount rate of | 10.0% | 1.03 | 0.99 | 0.94 | 0.91 | 1.02 | 0.96 | 0.91 | 0.85 | 0.93 | 0.84 | 0.76 | 0.68 |
| IRR | | 13% | 9% | 5% | 0% | 12% | 6% | 0% | #DIV/0! | 3% | #DIV/0! | #DIV/0! | #DIV/0! |

Switching Value Analysis:

| Switching Value: | Appraisal | Switching value | % change |
|--------------------------|-----------|-----------------|----------|
| Total Benefits at 10% DR | 5,502 | 4,853 | -12 |
| Total Costs at 10% DR | 4,853 | 5,502 | 13 |



VII. ANNEX-1.3: PROJECT INVESTMENT COSTS (ECONOMIC) a/

| Kingdom of Bhutan CARLEP DESIGN COST ESTIMATES Expenditure Accounts by Years -- Base Costs | | | | | | | | | |
|--|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|----------------|
| | Base Cost (Local Million) | | | | | | | | |
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
| I. Investment Costs | | | | | | | | | |
| A. Works | 0.8 | 31.7 | 48.1 | 48.8 | 51.6 | 25.5 | 6.5 | 1.6 | 214.7 |
| B. Equipment and materials | 5.1 | 34.1 | 45.4 | 49.0 | 52.6 | 35.8 | 23.9 | 1.5 | 247.4 |
| C. Vehicles | 3.5 | - | - | - | - | - | - | - | 3.5 |
| D. Goods, services and inputs | 2.3 | 12.2 | 18.0 | 19.4 | 27.9 | 24.1 | 9.0 | 4.1 | 117.0 |
| E. Consultancies | 17.9 | 25.7 | 16.7 | 21.8 | 14.0 | 10.4 | 4.0 | 1.9 | 112.4 |
| F. Workshops | 2.9 | 3.3 | 3.3 | 3.3 | 3.1 | 3.1 | 3.1 | 0.6 | 22.5 |
| G. Trainings | 20.6 | 31.4 | 44.7 | 57.9 | 67.8 | 61.7 | 28.3 | 10.0 | 322.4 |
| H. Fund | - | 9.0 | 6.0 | 3.0 | - | - | - | - | 18.0 |
| Total Investment Costs | 53.2 | 147.4 | 182.1 | 203.2 | 217.0 | 160.6 | 74.7 | 19.6 | 1,057.8 |
| II. Recurrent Costs | | | | | | | | | |
| A. Operating costs | 3.5 | 6.1 | 8.6 | 9.3 | 9.8 | 10.2 | 10.9 | 0.8 | 59.3 |
| B. Salaries and allowances | 14.4 | 26.3 | 30.2 | 32.9 | 34.2 | 35.3 | 36.7 | 2.7 | 212.7 |
| Total Recurrent Costs | 17.9 | 32.4 | 38.8 | 42.2 | 44.0 | 45.5 | 47.6 | 3.5 | 271.9 |
| Total BASELINE COSTS | 71.1 | 179.8 | 220.9 | 245.4 | 261.0 | 206.1 | 122.3 | 23.1 | 1,329.7 |
| Physical Contingencies | 3.5 | 12.2 | 17.4 | 19.4 | 22.8 | 17.1 | 7.7 | 2.1 | 102.2 |
| Price Contingencies | | | | | | | | | |
| Subtotal Price Contingencies | 2.3 | 17.7 | 36.0 | 55.1 | 76.7 | 66.3 | 42.1 | 9.4 | 305.5 |
| Total PROJECT COSTS | 76.9 | 209.6 | 274.3 | 319.9 | 360.5 | 289.5 | 172.1 | 34.6 | 1,737.4 |
| Taxes | 2.9 | 12.4 | 18.9 | 21.8 | 26.4 | 19.9 | 10.8 | 2.2 | 115.2 |
| ECONOMIC COSTS | | | | | | | | | |
| Taxes | 2.9 | 12.4 | 18.9 | 21.8 | 26.4 | 19.9 | 10.8 | 2.2 | 115.2 |
| Price contingencies | 2.3 | 17.7 | 36.0 | 55.1 | 76.7 | 66.3 | 42.1 | 9.4 | 305.5 |
| Inputs | 0.8 | 4.1 | 6.0 | 6.5 | 9.3 | 8.0 | 3.0 | 1.4 | 39.0 |
| Fund | - | 9.0 | 6.0 | 3.0 | - | - | - | - | 18.0 |
| Sub-total | 6.0 | 43.1 | 66.8 | 86.4 | 112.3 | 94.2 | 55.9 | 12.9 | 477.7 |
| Economic costs | 70.915 | 166.497 | 207.446 | 233.509 | 248.124 | 195.279 | 116.246 | 21.668 | |

Above Table is derived from Design costtab; actual expenditures are as follow:

BTN 33,392,837 for 2015/16

BTN 94,685,185 for 2016/17

BTN 127,047,312 for 2017/18 and

BTN 212,664,400 for 2018/19 assumed at 65% of AWPB budget

VIII. ANNEX-1.4: PROJECT INCREMENTAL BENEFITS & COSTS STREAMS a/

Bhutan

CARLEP MTR

Project Summary

ECONOMIC BUDGET (AGGREGATE)

(In BTN Million)

| | April -- March | | | | | | | | | | | | | | | | | |
|-----------------------------------|----------------|----------------|--------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Without | | | | | | | | | | | | | | | | | |
| | Project | WP | Increments | | | | | | | | | | | | | | | |
| | 1 to 20 | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 20 |
| Main Production | | | | | | | | | | | | | | | | | | |
| Cereals & oilseeds | 97.7 | 126.1 | - | 1.2 | 8.3 | 11.6 | 17.3 | 22.9 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 |
| Vegetables | 198.2 | 258.2 | 1.0 | 3.7 | 10.1 | 16.2 | 24.8 | 35.7 | 45.9 | 53.7 | 58.4 | 60.0 | 59.0 | 58.1 | 55.6 | 55.9 | 51.7 | 60.0 |
| Mushroom | - | 7.2 | - | - | - | - | 1.2 | 3.6 | 6.0 | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 |
| Dairy products | - | 851.7 | 66.5 | 169.2 | 318.4 | 438.5 | 567.8 | 710.9 | 850.5 | 851.7 | 851.7 | 851.7 | 851.7 | 851.7 | 851.7 | 851.7 | 851.7 | 851.7 |
| Poultry products | - | 11.5 | - | - | - | 1.9 | 5.6 | 9.4 | 11.3 | 11.5 | 11.5 | 11.5 | 11.3 | 11.3 | 11.5 | 11.5 | 11.5 | 11.5 |
| Proxy labour | 10.5 | - | -0.6 | -1.9 | -4.6 | -6.2 | -8.8 | -9.8 | -10.5 | -10.5 | -10.5 | -10.5 | -10.5 | -10.5 | -10.5 | -10.5 | -10.5 | -10.5 |
| Sub-total Main Production | 306.5 | 1,254.6 | 66.9 | 172.2 | 332.2 | 462.0 | 607.9 | 772.8 | 931.4 | 941.9 | 946.5 | 948.2 | 946.9 | 946.0 | 943.7 | 944.1 | 939.8 | 948.2 |
| Production Cost | | | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | | | |
| Sub-total Investment Costs | 26.2 | 48.5 | 40.1 | 65.9 | 106.4 | 73.3 | 93.4 | 80.0 | 80.1 | 2.8 | 12.4 | 17.1 | 31.2 | 40.1 | 63.0 | 44.9 | 60.7 | 22.3 |
| Operating | | | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | | | |
| Sub-Total Purchased Inputs | 23.1 | 621.6 | 48.3 | 119.2 | 215.5 | 299.7 | 385.7 | 493.3 | 598.2 | 598.2 | 598.5 | 598.5 | 598.5 | 598.2 | 598.2 | 598.5 | 598.5 | 598.5 |
| Labor | | | | | | | | | | | | | | | | | | |
| Onfarm labour | 147.8 | 178.5 | 1.7 | 5.1 | 12.5 | 16.7 | 24.4 | 27.7 | 30.2 | 30.6 | 30.6 | 30.7 | 30.8 | 30.8 | 30.8 | 30.8 | 30.9 | 30.7 |
| Sub-total Operating Costs | 170.8 | 800.1 | 49.9 | 124.3 | 228.0 | 316.4 | 410.2 | 521.0 | 628.4 | 628.8 | 629.2 | 629.2 | 629.3 | 629.0 | 629.1 | 629.3 | 629.5 | 629.2 |
| Sub-Total Production Cost | 197.0 | 848.5 | 90.0 | 190.2 | 334.4 | 389.7 | 503.6 | 601.0 | 708.5 | 631.7 | 641.5 | 646.4 | 660.5 | 669.1 | 692.1 | 674.2 | 690.2 | 651.5 |
| Other Costs | | | | | | | | | | | | | | | | | | |
| Investment costs | - | - | 33.4 | 94.7 | 127.0 | 212.7 | 248.1 | 195.3 | 116.2 | 21.7 | - | - | - | - | - | - | - | - |
| OUTFLOWS | 197.0 | 848.5 | 123.4 | 284.9 | 461.5 | 602.4 | 751.7 | 796.3 | 824.7 | 653.3 | 641.5 | 646.4 | 660.5 | 669.1 | 692.1 | 674.2 | 690.2 | 651.5 |
| Cash Flow | 109.4 | 406.1 | -56.6 | -112.7 | -129.3 | -140.4 | -143.8 | -23.5 | 106.7 | 288.5 | 305.0 | 301.8 | 286.4 | 277.0 | 251.6 | 269.9 | 249.7 | 296.6 |

IRR = 22.4%, NPV = 649.10

a/ Source: Extracted from FARMOD file CARLEP.MOD

IX. ANNEX-1.5: PROJECT INCREMENTAL LABOUR REQUIREMENT a/

Bhutan
CARLEP MTR
Project Summary
LABOR BUDGET
(In Units '000)

| | | April -- March | | | | | | | | | | | | | | | | | |
|-------------------------------------|----------|-----------------|----------|------------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| | | Without Project | WP | Increments | | | | | | | | | | | | | | | |
| Unit | | 1 to 20 | 19 to 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 19 to 20 |
| Labor Requirements | | | | | | | | | | | | | | | | | | | |
| Land preparation | pers_day | 91.1 | 88.4 | - | -0.1 | -0.3 | -0.7 | -0.9 | -1.5 | -2.0 | -2.4 | -2.7 | -2.7 | -2.6 | -2.6 | -2.4 | -2.5 | -2.1 | -2.7 |
| Sowing | pers_day | 9.9 | 9.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Nursery preparation | pers_day | 2.7 | 2.7 | - | - | - | - | -0.0 | - | - | - | - | - | - | - | - | - | - | - |
| planting | pers_day | 24.7 | 23.0 | 0.0 | -0.1 | -0.2 | -0.4 | -0.5 | -0.9 | -1.2 | -1.4 | -1.6 | -1.6 | -1.5 | -1.5 | -1.4 | -1.5 | -1.3 | -1.6 |
| Weeding | pers_day | 96.7 | 90.3 | 0.1 | -0.2 | -2.2 | -3.1 | -4.3 | -5.5 | -6.6 | -6.5 | -6.5 | -6.5 | -6.5 | -6.5 | -6.5 | -6.5 | -6.5 | -6.5 |
| Cleaning, shelling | pers_day | 2.1 | 2.8 | - | - | - | - | 0.2 | 0.4 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Irrigating, watering | pers_day | 16.6 | 18.5 | 0.1 | 0.2 | 0.5 | 0.6 | 1.0 | 1.4 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| PPC application | pers_day | 0.3 | 0.3 | 0.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Fertiliser or manure application | pers_day | 33.2 | 36.8 | 0.2 | 0.4 | 0.8 | 1.1 | 1.9 | 2.6 | 3.2 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Transplanting | pers_day | 50.1 | 50.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Harvesting | pers_day | 74.4 | 87.5 | 0.3 | 0.9 | 2.8 | 3.9 | 6.8 | 9.5 | 12.0 | 12.9 | 13.0 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 |
| Threshing | pers_day | 31.9 | 35.8 | - | 0.2 | 1.3 | 1.8 | 2.5 | 3.2 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 |
| Grading, packing | pers_day | 15.1 | 16.5 | - | 0.0 | 0.1 | 0.2 | 0.4 | 0.6 | 0.9 | 1.1 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| Farm transportation | pers_day | 28.3 | 31.1 | 0.0 | 0.2 | 0.4 | 0.7 | 1.0 | 1.5 | 2.0 | 2.4 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 |
| Maintenance | pers_day | 6.0 | 99.2 | 5.3 | 16.7 | 41.5 | 55.7 | 79.2 | 87.7 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 |
| Fence maintenance | pers_day | 41.7 | 41.7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| drying | pers_day | 1.7 | 1.7 | - | - | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Dehusking | pers_day | 1.1 | 1.1 | - | - | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Sub-Total Labor Requirements | | 527.7 | 637.3 | 6.0 | 18.1 | 44.5 | 59.8 | 87.3 | 99.1 | 107.7 | 109.3 | 109.4 | 109.6 | 109.8 | 109.9 | 110.1 | 110.0 | 110.5 | 109.6 |

Incremental labour is 21%

a/ Source: Extracted from FARMOD file CARLEP.MOD

X. ANNEX-1.6: PROJECT PRODUCTION - TOTAL AND INCREMENTAL a/

Bhutan

CARLEP MTR

Project Summary

PRODUCTION AND INPUTS (

(In Units '000)

| Project Summary | | April -- March | | | | | | | | | | | | | | | | | Percentage | |
|-------------------------|----------|-----------------|---------|------------|-------|-------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|------------|----------------|------------|--|
| PRODUCTION AND INPUTS (| | Without Project | WP | Increments | | | | | | | | | | | | Present | Future | | Change | |
| (In Units '000) | Unit | 1 to 20 | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 1 | Without 20 | Future With 20 | % | |
| Main Production | | | | | | | | | | | | | | | | | | | | |
| Paddy | kg | 2,598.1 | 3,378.5 | - | 36.0 | 253.8 | 352.2 | 498.0 | 643.8 | 780.4 | 780.4 | 780.4 | 780.4 | 780.4 | 780.4 | 2,598.1 | 2,598.1 | 3,378.5 | 30.0 | |
| Maize, shelled | kg | 397.8 | 495.7 | - | - | - | - | 32.6 | 65.3 | 97.9 | 97.9 | 97.9 | 97.9 | 97.9 | 97.9 | 397.8 | 397.8 | 495.7 | 25.0 | |
| Quinoa | kg | 71.6 | 88.2 | - | 0.3 | 2.4 | 3.3 | 7.8 | 12.2 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 71.6 | 71.6 | 88.2 | 23.0 | |
| Mustard | kg | 176.5 | 245.1 | - | 3.2 | 22.3 | 31.0 | 43.8 | 56.6 | 68.6 | 68.6 | 68.6 | 68.6 | 68.6 | 68.6 | 176.5 | 176.5 | 245.1 | 39.0 | |
| Straw | kg | 5,098.1 | 5,686.3 | - | 27.1 | 191.3 | 265.4 | 375.4 | 485.3 | 588.2 | 588.2 | 588.2 | 588.2 | 588.2 | 588.2 | 5,098.1 | 5,098.1 | 5,686.3 | 12.0 | |
| Onion | kg | 490.4 | 588.4 | 5.3 | 11.4 | 23.4 | 32.2 | 53.2 | 71.2 | 86.4 | 98.1 | 98.1 | 98.1 | 98.1 | 98.1 | 490.4 | 490.4 | 588.4 | 20.0 | |
| Potato | kg | 817.3 | 1,048.9 | 12.6 | 27.0 | 55.3 | 76.0 | 125.5 | 168.2 | 204.0 | 231.6 | 231.6 | 231.6 | 231.6 | 231.6 | 817.3 | 817.3 | 1,048.9 | 28.0 | |
| Vegetables | kg | 1,960.8 | 2,451.0 | - | 22.6 | 159.4 | 221.2 | 312.8 | 404.4 | 490.2 | 490.2 | 490.2 | 490.2 | 490.2 | 490.2 | 1,960.8 | 1,960.8 | 2,451.0 | 25.0 | |
| Leafy vegetables | kg | 272.4 | 326.9 | 3.0 | 6.3 | 13.0 | 17.9 | 29.5 | 39.6 | 48.0 | 54.5 | 54.5 | 54.5 | 54.5 | 54.5 | 272.4 | 272.4 | 326.9 | 20.0 | |
| Asparagus | kg | 109.0 | 266.0 | -5.9 | -3.0 | -3.2 | 14.3 | 15.1 | 43.3 | 72.7 | 106.3 | 143.7 | 157.0 | 90.0 | 157.0 | 109.0 | 109.0 | 266.0 | 144.0 | |
| Green chilli | kg | 425.0 | 468.6 | 2.4 | 5.1 | 10.4 | 14.3 | 23.6 | 31.7 | 38.4 | 43.6 | 43.6 | 43.6 | 43.6 | 43.6 | 425.0 | 425.0 | 468.6 | 10.0 | |
| Cabbage | kg | 572.1 | 779.1 | 11.3 | 24.1 | 49.5 | 67.9 | 112.2 | 150.4 | 182.4 | 207.0 | 207.0 | 207.0 | 207.0 | 207.0 | 572.1 | 572.1 | 779.1 | 36.0 | |
| Cauliflower | kg | 435.9 | 563.9 | 7.0 | 14.9 | 30.6 | 42.0 | 69.4 | 93.0 | 112.8 | 128.0 | 128.0 | 128.0 | 128.0 | 128.0 | 435.9 | 435.9 | 563.9 | 29.0 | |
| Beans | kg | 425.0 | 510.0 | 4.6 | 9.9 | 20.3 | 27.9 | 46.1 | 61.7 | 74.9 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 425.0 | 425.0 | 510.0 | 20.0 | |
| Peas | kg | 209.8 | 267.0 | 3.1 | 6.7 | 13.7 | 18.8 | 31.0 | 41.6 | 50.4 | 57.2 | 57.2 | 57.2 | 57.2 | 57.2 | 209.8 | 209.8 | 267.0 | 27.0 | |
| Tomato | kg | 599.3 | 719.2 | 6.5 | 14.0 | 28.6 | 39.3 | 65.0 | 87.1 | 105.6 | 119.9 | 119.9 | 119.9 | 119.9 | 119.9 | 599.3 | 599.3 | 719.2 | 20.0 | |
| Radish | kg | 425.0 | 490.4 | 3.6 | 7.6 | 15.6 | 21.4 | 35.4 | 47.5 | 57.6 | 65.4 | 65.4 | 65.4 | 65.4 | 65.4 | 425.0 | 425.0 | 490.4 | 15.0 | |
| Shitake mushroom | kg | - | 12.9 | - | - | - | - | 2.2 | 6.5 | 10.8 | 12.9 | 12.9 | 12.9 | 12.9 | 12.9 | - | - | 12.9 | - | |
| Sale of milk | kg | - | 25,241 | 2,026 | 5,095 | 9,468 | 12,936 | 16,727 | 20,984 | 25,241 | 25,241 | 25,241 | 25,241 | 25,241 | 25,241 | - | - | 25,241 | - | |
| Butter | kg | - | 120.0 | 4.5 | 16.9 | 42.3 | 67.3 | 89.2 | 107.8 | 116.8 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | - | - | 120.0 | - | |
| Cheese | kg | - | 181.6 | 7.0 | 25.7 | 63.5 | 101.2 | 134.0 | 162.6 | 176.8 | 181.6 | 181.6 | 181.6 | 181.6 | 181.6 | - | - | 181.6 | - | |
| Egg production | each | - | 1,566.0 | - | - | - | 261.0 | 783.0 | 1,305.0 | 1,566.0 | 1,566.0 | 1,566.0 | 1,566.0 | 1,566.0 | 1,566.0 | - | - | 1,566.0 | - | |
| Sale of culled birds | bird | - | 1.5 | - | - | - | - | - | - | - | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | - | - | 1.5 | - | |
| WOP proxy labour | pers_day | 37.6 | - | -2.1 | -6.7 | -16.6 | -22.1 | -31.6 | -35.1 | -37.6 | -37.6 | -37.6 | -37.6 | -37.6 | -37.6 | 37.6 | 37.6 | - | - | |

a/ Source: Extracted from FARMOD file CARLEP.MOD

ANNEX-1.7: PROJECT INCREMENTAL BENEFITS & COSTS STREAMS (Financial)

Bhutan

CARLEP MTR

Project Summary

FINANCIAL BUDGET (AGGREGATED)

(In BTN Million)

| Project Summary FINANCIAL BUDGET (AGGREGATED) (In BTN Million) | | April -- March | | | | | | | | | | | | | | | | | |
|--|-------|----------------|-------|--------|------------|--------|--------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| | | WOP | | WP | Increments | | | | | | | | | | | | | | |
| | | 20 | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 20 |
| | | | | | | | | | | | | | | | | | | | |
| Main Production | | | | | | | | | | | | | | | | | | | |
| Cereals & oilseeds | 122.2 | 157.6 | - | 1.5 | 10.4 | 14.5 | 21.6 | 28.7 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 | 35.4 |
| Vegetables | 247.7 | 322.8 | 1.2 | 4.6 | 12.6 | 20.3 | 31.0 | 44.7 | 57.3 | 67.2 | 73.0 | 75.0 | 73.7 | 72.6 | 69.5 | 69.9 | 64.6 | 75.0 | |
| Mushroom | - | 9.0 | - | - | - | - | 1.5 | 4.5 | 7.5 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | |
| Dairy products | - | 1,064.6 | 83.1 | 211.5 | 398.0 | 548.2 | 709.8 | 888.6 | 1,063.1 | 1,064.6 | 1,064.6 | 1,064.6 | 1,064.6 | 1,064.6 | 1,064.6 | 1,064.6 | 1,064.6 | 1,064.6 | |
| Poultry products | - | 14.3 | - | - | - | 2.3 | 7.0 | 11.7 | 14.1 | 14.3 | 14.3 | 14.3 | 14.1 | 14.1 | 14.3 | 14.3 | 14.3 | 14.3 | |
| Proxy labour | 13.2 | - | -0.7 | -2.3 | -5.8 | -7.7 | -11.1 | -12.3 | -13.2 | -13.2 | -13.2 | -13.2 | -13.2 | -13.2 | -13.2 | -13.2 | -13.2 | -13.2 | |
| Sub-total Main Production | 383.1 | 1,568.3 | 83.6 | 215.3 | 415.2 | 577.5 | 759.8 | 966.0 | 1,164.3 | 1,177.3 | 1,183.1 | 1,185.2 | 1,183.7 | 1,182.6 | 1,179.7 | 1,180.1 | 1,174.8 | 1,185.2 | |
| Production Cost | | | | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | | | | |
| Sub-total Investment Costs | 27.8 | 55.8 | 50.1 | 82.4 | 133.0 | 91.7 | 116.7 | 100.0 | 100.2 | 3.7 | 15.6 | 21.6 | 39.2 | 50.2 | 78.9 | 56.2 | 75.9 | 28.0 | |
| Operating | | | | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | | | | |
| Sub-Total Purchased Inputs | 24.3 | 771.8 | 60.3 | 149.0 | 269.2 | 374.3 | 481.8 | 616.1 | 747.1 | 747.1 | 747.5 | 747.5 | 747.5 | 747.1 | 747.1 | 747.5 | 747.5 | 747.5 | |
| Labor | | | | | | | | | | | | | | | | | | | |
| Onfarm labour | 184.7 | 223.1 | 2.1 | 6.3 | 15.6 | 20.9 | 30.5 | 34.7 | 37.7 | 38.3 | 38.3 | 38.4 | 38.4 | 38.5 | 38.5 | 38.5 | 38.7 | 38.4 | |
| Sub-total Operating Costs | 209.0 | 994.9 | 62.4 | 155.4 | 284.8 | 395.3 | 512.3 | 650.8 | 784.8 | 785.4 | 785.8 | 785.9 | 786.0 | 785.6 | 785.7 | 786.0 | 786.2 | 785.9 | |
| Sub-Total Production Cost | 236.8 | 1,050.7 | 112.5 | 237.8 | 417.8 | 486.9 | 629.1 | 750.7 | 885.0 | 789.0 | 801.4 | 807.5 | 825.2 | 835.8 | 864.5 | 842.2 | 862.1 | 813.9 | |
| Other Costs | | | | | | | | | | | | | | | | | | | |
| Investment costs | - | - | 33.4 | 94.7 | 127.0 | 212.7 | 248.1 | 195.3 | 116.2 | 21.7 | - | - | - | - | - | - | - | - | |
| OUTFLOWS | 236.8 | 1,050.7 | 145.9 | 332.5 | 544.9 | 699.6 | 877.2 | 946.0 | 1,001.2 | 810.7 | 801.4 | 807.5 | 825.2 | 835.8 | 864.5 | 842.2 | 862.1 | 813.9 | |
| Cash Flow Before Financing | 146.3 | 517.6 | -62.3 | -117.2 | -129.6 | -122.0 | -117.4 | 20.0 | 163.1 | 366.6 | 381.7 | 377.7 | 358.5 | 346.7 | 315.1 | 337.9 | 312.7 | 371.3 | |

IRR = 146.3%, NPV = 2,166.78

a/ Source: Extracted from FARMOD file CARLEP.MOD

XI. ANNEX-1.8: PRICES ASSUMED IN EFA a/

| Bhutan | | | |
|--------------------------------------|----------|----------|-----------|
| CARLEP MTR | | | |
| ECONOMIC AND FINANCIAL PRICES | | | |
| (In BTN) | | | |
| | Unit | ECONOMIC | FINANCIAL |
| Outputs | | | |
| Cereals & oilseeds | | | |
| Paddy | kg | 29.6 | 37 |
| Maize, shelled | kg | 20 | 25 |
| Quinoa | kg | 80 | 100 |
| Soy bean | kg | 68 | 85 |
| Mustard | kg | 23.2 | 29 |
| Straw | kg | 0.6 | 0.75 |
| Vegetables | | | |
| Onion | kg | 52 | 65 |
| Potato | kg | 16.8 | 21 |
| Broccoli | kg | 40 | 50 |
| Vegetables | kg | 19.2 | 24 |
| Leafy vegetables | kg | 40 | 50 |
| Asparagus | kg | 124 | 155 |
| Ginger | kg | 35.2 | 44 |
| Garlic | kg | 76 | 95 |
| Green chilli | kg | 67.2 | 84 |
| Cabbage | kg | 16 | 20 |
| Cauliflower | kg | 40 | 50 |
| Beans | kg | 40 | 50 |
| Peas | kg | 32 | 40 |
| Bitter gourd | kg | 20 | 25 |
| Tomato | kg | 21.6 | 27 |
| Radish | kg | 12 | 15 |
| Carrot | kg | 32 | 40 |
| Mushroom | | | |
| Oyster | kg | 120 | 150 |
| Shitake mushroom | kg | 560 | 700 |
| Dairy products | | | |
| Sale of milk | kg | 32 | 40 |
| Butter | kg | 220.8 | 276 |
| Cheese | kg | 96 | 120 |
| Poultry products | | | |
| Egg production | each | 7.2 | 9 |
| Sale of culled birds | bird | 120 | 150 |
| Proxy labour | | | |
| WOP proxy labour | pers_day | 280 | 350 |

a/ Source: Extracted from FARMOD file "CARLEP.MOD; data provided by PMU, RAMCO & ARDC

| Bhutan | | | |
|---------------------------------------|--------------|----------|-----------|
| CARLEP MTR | | | |
| ECONOMIC AND FINANCIAL PRICES | | | |
| (In BTN) | | | |
| | Unit | ECONOMIC | FINANCIAL |
| Inputs | | | |
| Seeds & planting materials | | | |
| Paddy seeds | kg | 35 | 35 |
| Onion seeds | packet | 270 | 270 |
| Maize seeds | kg | 22 | 22 |
| Quinoa seed | kg | 100 | 100 |
| Potato seed | kg | 20 | 20 |
| Soy seeds | kg | 85 | 85 |
| Mustard seeds | kg | 90 | 90 |
| Chilli seeds | kg | 1,000 | 1,000 |
| Vegetable seeds | kg | 2,000 | 2,000 |
| Beans seed | pocket | 18 | 18 |
| Tomato seed | pocket | 16 | 16 |
| Cauliflower seed | pocket | 30 | 30 |
| Bitter gourd seed | pocket | 15 | 15 |
| Peas seed | pocket | 15 | 15 |
| Radish seed | pocket | 20 | 20 |
| Cabbage seed | pocket | 51 | 51 |
| Saag seeds | pocket | 12 | 12 |
| Asparagus crowns | each | 4 | 4 |
| Broccoli seeds | packet | 60 | 60 |
| Ginger planting materials | kg | 30 | 30 |
| Garlic planting materials | kg | 50 | 50 |
| Carrot seeds | pocket | 21 | 21 |
| Orange seedlings | each | 35 | 35 |
| Mushroom cultivation | | | |
| Spawn | bottle | 40 | 50 |
| Mushroom shed | each | 24,000 | 30,000 |
| Plastic sheets | unit | 320 | 400 |
| Logs for shitake mushroom | each | 8 | 10 |
| Billet /a | billet | 27.2 | 34 |
| Wax and resin /b | unit | 9.6 | 12 |
| Pipes and sprinklers | set | 2,400 | 3,000 |
| Miscellaneous | spawn bottle | 160 | 200 |
| Fertilisers & manure | | | |
| Urea | kg | 15.7 | 15.7 |
| Suphala | kg | 34 | 34 |
| SSP | kg | 14.5 | 14.5 |
| DAP | kg | 48 | 48 |
| MOP | kg | 28 | 28 |
| Fertiliser | kg | 13 | 13 |
| FYM /c | kg | 0.5 | 0.5 |
| FYM /d | basket | 9 | 9 |
| Butaclor /e | kg | 25 | 25 |
| PP chemicals | litre | 700 | 700 |
| Tools & implements | | | |
| Draught animal hiring | pair of oxes | 320 | 400 |
| Power tiller hiring | acre | 1,120 | 1,400 |
| Jute bags | each | 16 | 12 |
| | | | 20 |

| Bhutan | | | |
|--------------------------------------|-------------|----------|-----------|
| CARLEP MTR | | | |
| ECONOMIC AND FINANCIAL PRICES | | | |
| (In BTN) | | | |
| | Unit | ECONOMIC | FINANCIAL |
| Inputs | | | |
| Dairy support | | | |
| Milk cattle | cow | 43,200 | 54,000 |
| Cattle shed | each | 12,000 | 15,000 |
| Insurance | cattle/year | 400 | 500 |
| Drugs, equipment | cattle/year | 800 | 1,000 |
| Feed concentrate | kg | 12 | 15 |
| Green fodder | kg | 1.6 | 2 |
| Dry fodder | kg | 1.6 | 2 |
| Medicine | cattle | 800 | 1,000 |
| Silage feed | kg | 4 | 5 |
| Pasture development | acre | 7,200 | 9,000 |
| Choppers | each | 1,200 | 1,500 |
| Dairy processing | | | |
| chilling vat | each | 360,000 | 450,000 |
| Milk transport van | each | 640,000 | 800,000 |
| Separator | each | 42,400 | 53,000 |
| Other equipment | set | 28,000 | 35,000 |
| Driver's salary | year | 67,200 | 84,000 |
| Driver salary | year | 14,400 | 18,000 |
| Chairman | year | 14,400 | 18,000 |
| Secretary | year | 14,400 | 18,000 |
| Treasurer | year | 67,200 | 84,000 |
| Multi task assistant | year | 28,800 | 36,000 |
| Vehicle operating costs /f | year | 86,400 | 108,000 |
| Repairs and maintenance of VATs | year/VAT | 3,200 | 4,000 |
| Electricity and water | year | 14,400 | 18,000 |
| Purchase of milk from members | litre | 24 | 30 |
| Milk collection centre | each | 720,000 | 900,000 |
| Milk cans | each | 2,936 | 3,670 |
| Poultry support | | | |
| Pullets | each | 160 | 200 |
| Poultry shed | shed | 4,488 | 5,610 |
| Poultry equipment | set | 1,600 | 2,000 |
| Poultry feed | kg | 12 | 15 |
| Mortality rate | per unit | 152 | 190 |
| Labor | | | |
| Land preparation | pers_day | 280 | 350 |
| Sowing | pers_day | 280 | 350 |
| Nursery preparation | pers_day | 280 | 350 |
| planting | pers_day | 280 | 350 |
| Weeding | pers_day | 280 | 350 |
| Cleaning, shelling | pers_day | 280 | 350 |
| Irrigating, watering | pers_day | 280 | 350 |
| PPC application | pers_day | 280 | 350 |
| Fertiliser or manure application | pers_day | 280 | 350 |
| Spraying | pers_day | 280 | 350 |
| Pruning | pers_day | 280 | 350 |
| Transplanting | pers_day | 280 | 350 |
| Harvesting | pers_day | 280 | 350 |
| Threshing | pers_day | 280 | 350 |
| Grading, packing | pers_day | 280 | 350 |
| Farm transportation | pers_day | 280 | 350 |
| Maintenance | pers_day | 280 | 350 |
| Fence maintenance | pers_day | 280 | 350 |
| drying | pers_day | 280 | 350 |
| Dehusking | pers_day | 280 | 350 |
| Washing rhizomes | pers_day | 280 | 350 |

SUBPROJECT MODELS

XII. ANNEX-2.1: Cereal and other food crops subproject, economic budget (3,350 households)

Bhutan
CARLEP MTR
Cereal crops households Subproject Model
ECONOMIC BUDGET (AGGREGATED)
(In BTN '000)

| | April -- March | | | | | | | | | | | | | | |
|-----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | Without Project | With Project | | | | | | | Increments | | | | | | |
| | 1 to 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 to 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 to 20 |
| Main Production | | | | | | | | | | | | | | | |
| Cereals & oilseeds | 97,743.0 | 97,743.0 | 98,924.8 | 106,078.2 | 109,309.8 | 114,997.3 | 120,684.8 | 126,069.0 | - | 1,181.8 | 8,335.2 | 11,566.8 | 17,254.3 | 22,941.8 | 28,325.9 |
| Vegetables | 37,647.4 | 37,647.4 | 38,081.3 | 40,707.8 | 41,894.4 | 43,653.1 | 45,411.8 | 47,059.2 | - | 433.9 | 3,060.5 | 4,247.0 | 6,005.8 | 7,764.5 | 9,411.8 |
| Sub-total Main Production | 135,390.4 | 135,390.4 | 137,006.1 | 146,786.1 | 151,204.2 | 158,650.4 | 166,096.6 | 173,128.2 | - | 1,615.7 | 11,395.7 | 15,813.9 | 23,260.0 | 30,706.2 | 37,737.8 |
| Production Cost | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | |
| Seeds & planting materials | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | - | - | - | - | - | - | - |
| Fertilisers & manure | 1,102.2 | 1,102.2 | 1,107.9 | 1,142.1 | 1,157.5 | 1,231.4 | 1,305.3 | 1,377.8 | - | 5.7 | 39.9 | 55.3 | 129.2 | 203.1 | 275.6 |
| Tools & implements | 705.4 | 705.4 | 705.4 | 705.4 | 705.4 | 705.4 | 705.4 | 705.4 | - | - | - | - | 0.0 | 0.0 | 0.0 |
| Sub-total Investment Costs | 1,972.9 | 1,972.9 | 1,978.6 | 2,012.8 | 2,028.2 | 2,102.1 | 2,176.0 | 2,248.5 | - | 5.7 | 39.9 | 55.3 | 129.2 | 203.1 | 275.6 |
| Operating | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | |
| Seeds & planting materials | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | - | - | - | - | - | - | - |
| Fertilisers & manure | 3,332.5 | 3,332.5 | 3,439.8 | 4,089.3 | 4,382.7 | 4,897.7 | 5,412.7 | 5,900.1 | - | 107.3 | 756.8 | 1,050.3 | 1,565.2 | 2,080.2 | 2,567.7 |
| Tools & implements | 3,338.6 | 3,338.6 | 3,355.9 | 3,461.0 | 3,508.5 | 3,588.6 | 3,668.7 | 3,744.4 | - | 17.4 | 122.4 | 169.9 | 250.0 | 330.2 | 405.8 |
| Sub-Total Purchased Inputs | 17,350.5 | 17,350.5 | 17,475.2 | 18,229.8 | 18,570.7 | 19,165.8 | 19,760.9 | 20,324.1 | - | 124.7 | 879.3 | 1,220.1 | 1,815.3 | 2,410.4 | 2,973.5 |
| Labor | | | | | | | | | | | | | | | |
| Onfarm labour | 75,682.0 | 75,682.0 | 75,682.0 | 75,682.0 | 75,682.0 | 75,796.2 | 75,910.5 | 76,024.7 | - | - | - | - | 114.2 | 228.5 | 342.7 |
| Sub-total Operating Costs | 93,032.5 | 93,032.5 | 93,157.2 | 93,911.8 | 94,252.7 | 94,962.0 | 95,671.4 | 96,348.8 | - | 124.7 | 879.3 | 1,220.1 | 1,929.5 | 2,638.9 | 3,316.2 |
| Sub-Total Production Cost | 95,005.5 | 95,005.5 | 95,135.8 | 95,924.6 | 96,280.9 | 97,064.2 | 97,847.4 | 98,597.3 | - | 130.3 | 919.1 | 1,275.4 | 2,058.7 | 2,842.0 | 3,591.8 |
| OUTFLOWS | 95,005.5 | 95,005.5 | 95,135.8 | 95,924.6 | 96,280.9 | 97,064.2 | 97,847.4 | 98,597.3 | - | 130.3 | 919.1 | 1,275.4 | 2,058.7 | 2,842.0 | 3,591.8 |
| Cash Flow | 40,384.9 | 40,384.9 | 41,870.3 | 50,861.5 | 54,923.3 | 61,586.2 | 68,249.2 | 74,530.9 | - | 1,485.4 | 10,476.6 | 14,538.4 | 21,201.3 | 27,864.3 | 34,146.0 |

IRR = None, NPV = 189,911.13

XIII. ANNEX-2.2: Cereal and other food crops subproject, financial budget (3,350 households)

| | | | | | | | | | | | | | | | | |
|---------------------------------------|------------------|------------------|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Bhutan | | | | | | | | | | | | | | | | |
| CARLEP MTR | | | | | | | | | | | | | | | | |
| Cereal crops households Subproject Mo | | | | | | | | | | | | | | | | |
| FINANCIAL BUDGET (AGGREGATED) | | | | | | | | | | | | | | | | |
| (In BTN '000) | | | | | | | | | | | | | | | | |
| April -- March | | | | | | | | | | | | | | | | |
| | WOP | | With Project | | | | | | | Increments | | | | | | |
| | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 to 20 | 2 | 3 | 4 | 5 | 6 | 7 | 8 to 20 |
| Main Production | | | | | | | | | | | | | | | | |
| Cereals & oilseeds | 122,178.8 | 122,178.8 | 123,656.0 | 132,597.8 | 136,637.3 | 143,746.6 | 150,856.0 | 157,586.2 | 157,586.2 | 1,477.2 | 10,419.0 | 14,458.5 | 21,567.9 | 28,677.2 | 35,407.4 | 35,407.4 |
| Vegetables | 47,059.2 | 47,059.2 | 47,601.6 | 50,884.8 | 52,368.0 | 54,566.4 | 56,764.8 | 58,824.0 | 58,824.0 | 542.4 | 3,825.6 | 5,308.8 | 7,507.2 | 9,705.6 | 11,764.8 | 11,764.8 |
| Sub-total Main Production | 169,238.0 | 169,238.0 | 171,257.6 | 183,482.6 | 189,005.3 | 198,313.0 | 207,620.8 | 216,410.2 | 216,410.2 | 2,019.6 | 14,244.6 | 19,767.3 | 29,075.1 | 38,382.8 | 47,172.2 | 47,172.2 |
| Production Cost | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | |
| Seeds & planting materials | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | 165.3 | - | - | - | - | - | - | - |
| Fertilisers & manure | 1,102.2 | 1,102.2 | 1,107.9 | 1,142.1 | 1,157.5 | 1,231.4 | 1,305.3 | 1,377.8 | 1,377.8 | 5.7 | 39.9 | 55.3 | 129.2 | 203.1 | 275.6 | 275.6 |
| Tools & implements | 881.8 | 881.8 | 881.8 | 881.8 | 881.8 | 881.8 | 881.8 | 881.8 | 881.8 | - | - | - | 0.0 | 0.0 | 0.0 | 0.0 |
| Sub-total Investment Costs | 2,149.3 | 2,149.3 | 2,154.9 | 2,189.1 | 2,204.6 | 2,278.5 | 2,352.4 | 2,424.8 | 2,424.8 | 5.7 | 39.9 | 55.3 | 129.2 | 203.1 | 275.6 | 275.6 |
| Operating | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | |
| Seeds & planting materials | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | 10,679.5 | - | - | - | - | - | - | - |
| Fertilisers & manure | 3,332.5 | 3,332.5 | 3,439.8 | 4,089.3 | 4,382.7 | 4,897.7 | 5,412.7 | 5,900.1 | 5,900.1 | 107.3 | 756.8 | 1,050.3 | 1,565.2 | 2,080.2 | 2,567.7 | 2,567.7 |
| Tools & implements | 4,200.4 | 4,200.4 | 4,222.1 | 4,353.5 | 4,412.8 | 4,513.0 | 4,613.1 | 4,707.7 | 4,707.7 | 21.7 | 153.0 | 212.4 | 312.5 | 412.7 | 507.3 | 507.3 |
| Sub-Total Purchased Inputs | 18,212.4 | 18,212.4 | 18,341.4 | 19,122.2 | 19,475.0 | 20,090.2 | 20,705.3 | 21,287.4 | 21,287.4 | 129.0 | 909.9 | 1,262.6 | 1,877.8 | 2,492.9 | 3,075.0 | 3,075.0 |
| Labor | | | | | | | | | | | | | | | | |
| Onfarm labour | 94,602.5 | 94,602.5 | 94,602.5 | 94,602.5 | 94,602.5 | 94,745.3 | 94,888.1 | 95,030.9 | 95,030.9 | - | - | - | 142.8 | 285.6 | 428.4 | 428.4 |
| Sub-total Operating Costs | 112,814.9 | 112,814.9 | 112,943.9 | 113,724.7 | 114,077.5 | 114,835.4 | 115,593.4 | 116,318.3 | 116,318.3 | 129.0 | 909.9 | 1,262.6 | 2,020.6 | 2,778.5 | 3,503.4 | 3,503.4 |
| Sub-Total Production Cost | 114,964.2 | 114,964.2 | 115,098.8 | 115,913.9 | 116,282.1 | 117,113.9 | 117,945.8 | 118,743.1 | 118,743.1 | 134.7 | 949.7 | 1,317.9 | 2,149.8 | 2,981.6 | 3,778.9 | 3,778.9 |
| OUTFLOWS | 114,964.2 | 114,964.2 | 115,098.8 | 115,913.9 | 116,282.1 | 117,113.9 | 117,945.8 | 118,743.1 | 118,743.1 | 134.7 | 949.7 | 1,317.9 | 2,149.8 | 2,981.6 | 3,778.9 | 3,778.9 |
| Cash Flow Before Financing | 54,273.8 | 54,273.8 | 56,158.8 | 67,568.7 | 72,723.2 | 81,199.1 | 89,675.0 | 97,667.1 | 97,667.1 | 1,885.0 | 13,294.9 | 18,449.4 | 26,925.3 | 35,401.2 | 43,393.3 | 43,393.3 |

IRR = None, NPV = 226,573.34

XIV. ANNEX-2.3: Vegetables subproject, ECONOMIC budget (2,168 households)

| Bhutan | | | | | | | | | | | | | | | | | | | |
|---------------------------------------|--------------------|------------------|--------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--|
| CARLEP MTR | | | | | | | | | | | | | | | | | | | |
| Vegetable households Subproject Model | | | | | | | | | | | | | | | | | | | |
| ECONOMIC BUDGET (AGGREGATE) | | | | | | | | | | | | | | | | | | | |
| (In BTN '000) | | | | | | | | | | | | | | | | | | | |
| | Without Project | WP | Increments | | | | | | | | | | | | | | | | |
| | 1 to 20 | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 20 | |
| Main Production | | | | | | | | | | | | | | | | | | | |
| Vegetables | 160,546.3 | 211,149.2 | 960.7 | 3,249.4 | 7,043.0 | 11,984.9 | 18,755.3 | 27,983.8 | 36,443.9 | 44,315.4 | 48,955.7 | 50,602.9 | 49,565.1 | 48,669.5 | 46,171.0 | 46,527.6 | 42,293.2 | 50,602.9 | |
| Mushroom | - | 7,224.0 | - | - | - | - | 1,204.0 | 3,612.0 | 6,020.0 | 7,224.0 | 7,224.0 | 7,224.0 | 7,224.0 | 7,224.0 | 7,224.0 | 7,224.0 | 7,224.0 | 7,224.0 | |
| Proxy labour | 420.0 | - | - | - | - | - | -140.0 | -280.0 | -420.0 | -420.0 | -420.0 | -420.0 | -420.0 | -420.0 | -420.0 | -420.0 | -420.0 | -420.0 | |
| Sub-total Main Production | 160,966.3 | 218,373.2 | 960.7 | 3,249.4 | 7,043.0 | 11,984.9 | 19,819.3 | 31,315.8 | 42,043.9 | 51,119.4 | 55,759.7 | 57,406.9 | 56,369.1 | 55,473.5 | 52,975.0 | 53,331.6 | 49,097.2 | 57,406.9 | |
| Production Cost | | | | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | | | | |
| Seeds & planting materials | 13,099.8 | 11,570.1 | 5.7 | -76.9 | -165.3 | -356.0 | -479.4 | -809.9 | -1,095.0 | -1,335.3 | -1,529.7 | -1,529.7 | -1,440.6 | -1,428.4 | -1,329.6 | -1,383.9 | -1,179.8 | -1,529.7 | |
| Mushroom cultivation | - | 601.0 | - | - | - | - | 1,817.7 | 1,869.4 | 1,921.0 | 155.0 | 155.0 | 601.0 | 601.0 | 601.0 | 155.0 | 155.0 | 601.0 | 601.0 | |
| Fertilisers & manure | 5,356.0 | 6,006.0 | 35.4 | 75.7 | 155.3 | 213.2 | 352.4 | 472.2 | 572.7 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | |
| Tools & implements | 5,753.7 | 5,753.7 | - | - | -0.0 | -0.0 | -0.0 | - | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | |
| Sub-total Investment Costs | 24,209.5 | 23,930.9 | 41.1 | -1.2 | -10.0 | -142.8 | 1,690.7 | 1,531.6 | 1,398.7 | -530.2 | -724.6 | -278.6 | -189.5 | -177.4 | -524.6 | -578.8 | 71.3 | -278.6 | |
| Operating | | | | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | | | | |
| Seeds & planting materials | 2,924.3 | 2,924.3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Fertilisers & manure | 1,427.5 | 1,483.1 | 3.0 | 6.5 | 13.3 | 18.2 | 30.1 | 40.4 | 49.0 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | |
| Tools & implements | 1,373.0 | 1,373.0 | - | - | -0.0 | -0.0 | -0.0 | - | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | |
| Sub-Total Purchased Inputs | 5,724.8 | 5,780.4 | 3.0 | 6.5 | 13.3 | 18.2 | 30.1 | 40.4 | 49.0 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | |
| Labor | | | | | | | | | | | | | | | | | | | |
| Onfarm labour | 72,085.0 | 76,754.4 | 203.7 | 402.0 | 850.8 | 1,142.6 | 2,289.7 | 3,231.7 | 4,147.4 | 4,596.0 | 4,606.0 | 4,669.5 | 4,736.0 | 4,745.1 | 4,818.8 | 4,778.3 | 4,930.7 | 4,669.5 | |
| Sub-total Operating Costs | 77,809.8 | 82,534.9 | 206.8 | 408.5 | 864.1 | 1,160.8 | 2,319.8 | 3,272.0 | 4,196.3 | 4,651.6 | 4,661.5 | 4,725.0 | 4,791.6 | 4,800.6 | 4,874.4 | 4,833.9 | 4,986.3 | 4,725.0 | |
| Sub-Total Production Cost | 102,019.3 | 106,465.7 | 247.9 | 407.3 | 854.0 | 1,018.0 | 4,010.5 | 4,803.7 | 5,595.0 | 4,121.3 | 3,936.9 | 4,446.4 | 4,602.0 | 4,623.2 | 4,349.9 | 4,255.1 | 5,057.6 | 4,446.4 | |
| OUTFLOWS | 102,019.3 | 106,465.7 | 247.9 | 407.3 | 854.0 | 1,018.0 | 4,010.5 | 4,803.7 | 5,595.0 | 4,121.3 | 3,936.9 | 4,446.4 | 4,602.0 | 4,623.2 | 4,349.9 | 4,255.1 | 5,057.6 | 4,446.4 | |
| Cash Flow | 58,947.0 | 111,907.5 | 712.8 | 2,842.1 | 6,189.0 | 10,966.9 | 15,808.8 | 26,512.2 | 36,448.9 | 46,998.1 | 51,822.8 | 52,960.5 | 51,767.0 | 50,850.2 | 48,625.2 | 49,076.5 | 44,039.6 | 52,960.5 | |

IRR = None, NPV = 237,938.50

xv. ANNEX-2.4: Vegetable subproject, financial budget (2,168 households)

| Bhutan | | | | | | | | | | | | | | | | | | |
|---------------------------------------|------------------|------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| CARLEP MTR | | | | | | | | | | | | | | | | | | |
| Vegetable households Subproject Model | | | | | | | | | | | | | | | | | | |
| FINANCIAL BUDGET (AGGREGATED | | | | | | | | | | | | | | | | | | |
| (In BTN '000) | | | | | | | | | | | | | | | | | | |
| | WOP | WP | Increments | | | | | | | | | | | | | | | |
| | 20 | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 20 |
| Main Production | | | | | | | | | | | | | | | | | | |
| Vegetables | 200,682.8 | 263,936.5 | 1,200.9 | 4,061.7 | 8,803.8 | 14,981.1 | 23,444.1 | 34,979.8 | 45,554.9 | 55,394.2 | 61,194.6 | 63,253.7 | 61,956.3 | 60,836.8 | 57,713.8 | 58,159.5 | 52,866.5 | 63,253.7 |
| Mushroom | - | 9,030.0 | - | - | - | - | 1,505.0 | 4,515.0 | 7,525.0 | 9,030.0 | 9,030.0 | 9,030.0 | 9,030.0 | 9,030.0 | 9,030.0 | 9,030.0 | 9,030.0 | 9,030.0 |
| Proxy labour | 525.0 | - | - | - | - | - | -175.0 | -350.0 | -525.0 | -525.0 | -525.0 | -525.0 | -525.0 | -525.0 | -525.0 | -525.0 | -525.0 | -525.0 |
| Sub-total Main Production | 201,207.8 | 272,966.5 | 1,200.9 | 4,061.7 | 8,803.8 | 14,981.1 | 24,774.1 | 39,144.8 | 52,554.9 | 63,899.2 | 69,699.6 | 71,758.7 | 70,461.3 | 69,341.8 | 66,218.8 | 66,664.5 | 61,371.5 | 71,758.7 |
| Production Cost | | | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | | | |
| Seeds & planting materials | 13,099.8 | 11,570.1 | 5.7 | -76.9 | -165.3 | -356.0 | -479.4 | -809.9 | -1,095.0 | -1,335.3 | -1,529.7 | -1,529.7 | -1,440.6 | -1,428.4 | -1,329.6 | -1,383.9 | -1,179.8 | -1,529.7 |
| Mushroom cultivation | - | 751.3 | - | - | - | - | 2,272.1 | 2,336.7 | 2,401.3 | 193.8 | 193.8 | 751.3 | 751.3 | 751.3 | 193.8 | 193.8 | 751.3 | 751.3 |
| Fertilisers & manure | 5,356.0 | 6,006.0 | 35.4 | 75.7 | 155.3 | 213.2 | 352.4 | 472.2 | 572.7 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 | 650.0 |
| Tools & implements | 7,215.0 | 7,215.0 | - | - | -0.0 | -0.0 | -0.0 | - | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| Sub-total Investment Costs | 25,670.8 | 25,542.4 | 41.1 | -1.2 | -10.0 | -142.8 | 2,145.1 | 1,999.0 | 1,879.0 | -491.5 | -685.9 | -128.4 | -39.3 | -27.1 | -485.8 | -540.1 | 221.5 | -128.4 |
| Operating | | | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | | | |
| Seeds & planting materials | 2,924.3 | 2,924.3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Fertilisers & manure | 1,427.5 | 1,483.1 | 3.0 | 6.5 | 13.3 | 18.2 | 30.1 | 40.4 | 49.0 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 |
| Tools & implements | 1,722.8 | 1,722.8 | - | - | -0.0 | -0.0 | -0.0 | - | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| Sub-Total Purchased Inputs | 6,074.6 | 6,130.2 | 3.0 | 6.5 | 13.3 | 18.2 | 30.1 | 40.4 | 49.0 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 |
| Labor | | | | | | | | | | | | | | | | | | |
| Onfarm labour | 90,106.2 | 95,943.0 | 254.7 | 502.5 | 1,063.5 | 1,428.2 | 2,862.1 | 4,039.6 | 5,184.2 | 5,745.0 | 5,757.4 | 5,836.8 | 5,920.0 | 5,931.3 | 6,023.6 | 5,972.9 | 6,163.4 | 5,836.8 |
| Sub-total Operating Costs | 96,180.9 | 102,073.3 | 257.7 | 509.0 | 1,076.8 | 1,446.5 | 2,892.2 | 4,080.0 | 5,233.2 | 5,800.5 | 5,813.0 | 5,892.4 | 5,975.6 | 5,986.9 | 6,079.1 | 6,028.5 | 6,219.0 | 5,892.4 |
| Sub-Total Production Cost | 121,851.7 | 127,615.7 | 298.9 | 507.8 | 1,066.7 | 1,303.7 | 5,037.3 | 6,078.9 | 7,112.1 | 5,309.1 | 5,127.1 | 5,764.0 | 5,936.3 | 5,959.8 | 5,593.3 | 5,488.4 | 6,440.5 | 5,764.0 |
| OUTFLOWS | 121,851.7 | 127,615.7 | 298.9 | 507.8 | 1,066.7 | 1,303.7 | 5,037.3 | 6,078.9 | 7,112.1 | 5,309.1 | 5,127.1 | 5,764.0 | 5,936.3 | 5,959.8 | 5,593.3 | 5,488.4 | 6,440.5 | 5,764.0 |
| Cash Flow Before Financing | 79,356.2 | 145,350.8 | 902.1 | 3,554.0 | 7,737.0 | 13,677.4 | 19,736.7 | 33,065.8 | 45,442.8 | 58,590.2 | 64,572.5 | 65,994.6 | 64,525.0 | 63,382.1 | 60,625.4 | 61,176.1 | 54,931.0 | 65,994.6 |

IRR = None, NPV = 291,636.42

xvi. ANNEX-2.5: Livestock households subproject, economic budget (1,954 households)

| Bhutan CARLEP MTR Livestock households Subproject Model ECONOMIC BUDGET (AGGREGATED) (In BTN '000) | | | | | | | | | | | | | | | | | | |
|---|--------------------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Without Project | WP | Increments | | | | | | | | | | | | | | | |
| | 1 to 20 | 19 to 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 19 to 20 |
| Main Production | | | | | | | | | | | | | | | | | | |
| Dairy products | - | 851,657.5 | 66,504.9 | 169,234.5 | 318,402.0 | 438,539.9 | 567,839.3 | 710,915.8 | 850,490.2 | 851,657.5 | 851,657.5 | 851,657.5 | 851,657.5 | 851,657.5 | 851,657.5 | 851,657.5 | 851,657.5 | 851,657.5 |
| Poultry products | - | 11,455.2 | - | - | - | 1,879.2 | 5,637.6 | 9,396.0 | 11,275.2 | 11,455.2 | 11,455.2 | 11,455.2 | 11,275.2 | 11,275.2 | 11,455.2 | 11,455.2 | 11,455.2 | 11,455.2 |
| Proxy labour | 10,102.4 | - | -588.0 | -1,870.4 | -4,642.4 | -6,182.4 | -8,702.4 | -9,542.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 | -10,102.4 |
| Sub-total Main Production | 10,102.4 | 863,112.7 | 65,916.9 | 167,364.1 | 313,759.6 | 434,236.7 | 564,774.5 | 710,769.4 | 851,663.0 | 853,010.3 | 853,010.3 | 853,010.3 | 852,830.3 | 852,830.3 | 853,010.3 | 853,010.3 | 853,010.3 | 853,010.3 |
| Production Cost | | | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | | | |
| Dairy support | - | 3,096.3 | 10,654.6 | 23,433.6 | 50,853.9 | 24,383.1 | 42,561.9 | 12,869.1 | 13,056.3 | 3,096.3 | 3,096.3 | 3,096.3 | 12,168.3 | 22,881.9 | 45,864.3 | 22,536.3 | 37,656.3 | 3,096.3 |
| Dairy processing | - | 19,200.0 | 29,410.6 | 42,481.9 | 55,553.3 | 49,017.6 | 49,017.6 | 65,356.8 | 65,356.8 | - | 9,720.0 | 14,040.0 | 18,993.6 | 17,115.2 | 17,396.8 | 22,656.0 | 22,656.0 | 19,200.0 |
| Sub-total Investment Costs | - | 22,296.3 | 40,065.1 | 65,915.6 | 106,407.2 | 73,400.7 | 91,579.5 | 78,225.9 | 78,413.1 | 3,096.3 | 12,816.3 | 17,136.3 | 31,161.9 | 39,997.1 | 63,261.1 | 45,192.3 | 60,312.3 | 22,296.3 |
| Operating | | | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | | | |
| Dairy support | - | 24,426.3 | 1,550.6 | 4,932.5 | 12,242.7 | 15,565.5 | 21,472.7 | 22,949.5 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 | 24,426.3 |
| Dairy processing | - | 565,710.0 | 46,710.0 | 114,180.0 | 202,410.0 | 280,260.0 | 358,110.0 | 461,910.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 | 565,710.0 |
| Poultry support | - | 5,378.2 | - | - | - | 2,614.9 | 4,301.0 | 5,987.0 | 5,058.2 | 5,058.2 | 5,378.2 | 5,378.2 | 5,378.2 | 5,058.2 | 5,058.2 | 5,378.2 | 5,378.2 | 5,378.2 |
| Sub-Total Purchased Inputs | - | 595,514.5 | 48,260.6 | 119,112.5 | 214,652.7 | 298,440.4 | 383,883.6 | 490,846.5 | 595,194.5 | 595,194.5 | 595,514.5 | 595,514.5 | 595,514.5 | 595,194.5 | 595,194.5 | 595,514.5 | 595,514.5 | 595,514.5 |
| Labor | | | | | | | | | | | | | | | | | | |
| Onfarm labour | - | 25,676.0 | 1,470.0 | 4,676.0 | 11,606.0 | 15,596.0 | 22,036.0 | 24,276.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 | 25,676.0 |
| Sub-total Operating Costs | - | 621,190.5 | 49,730.6 | 123,788.5 | 226,258.7 | 314,036.4 | 405,919.6 | 515,122.5 | 620,870.5 | 620,870.5 | 621,190.5 | 621,190.5 | 621,190.5 | 620,870.5 | 620,870.5 | 621,190.5 | 621,190.5 | 621,190.5 |
| Sub-Total Production Cost | - | 643,486.8 | 89,795.8 | 189,704.1 | 332,665.8 | 387,437.0 | 497,499.1 | 593,348.4 | 699,283.6 | 623,966.8 | 634,006.8 | 638,326.8 | 652,352.4 | 660,867.6 | 684,131.6 | 666,382.8 | 681,502.8 | 643,486.8 |
| OUTFLOWS | - | 643,486.8 | 89,795.8 | 189,704.1 | 332,665.8 | 387,437.0 | 497,499.1 | 593,348.4 | 699,283.6 | 623,966.8 | 634,006.8 | 638,326.8 | 652,352.4 | 660,867.6 | 684,131.6 | 666,382.8 | 681,502.8 | 643,486.8 |
| Cash Flow | 10,102.4 | 219,625.9 | -23,878.9 | -22,340.0 | -18,906.3 | 46,799.7 | 67,275.4 | 117,421.0 | 152,379.4 | 229,043.5 | 219,003.5 | 214,683.5 | 200,477.9 | 191,962.7 | 168,878.7 | 186,627.5 | 171,507.5 | 209,523.5 |
| IRR = 71.1%, NPV = 904,617.15 | | | | | | | | | | | | | | | | | | |

XVII. *ANNEX-2.6: Livestock households subproject, financial budget (1,954 households)*

XVIII.

Bhutan
CARLEP MTR
Livestock households Subproject Model
FINANCIAL BUDGET (AGGREGATED)
(In BTN '000)

| Without Project | | WP | Increments | | | | | | | | | | | | | | | | |
|----------------------------|-------------|-------------|------------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--|--|
| 1 to 20 | 20 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 20 | | |
| Main Production | | | | | | | | | | | | | | | | | | | |
| Dairy products | - | 1,064,571.9 | 83,131.1 | 211,543.1 | 398,002.5 | 548,174.9 | 709,799.1 | 888,644.7 | 1,063,112.7 | 1,064,571.9 | 1,064,571.9 | 1,064,571.9 | 1,064,571.9 | 1,064,571.9 | 1,064,571.9 | 1,064,571.9 | 1,064,571.9 | | |
| Poultry products | - | 14,319.0 | - | - | - | 2,349.0 | 7,047.0 | 11,745.0 | 14,094.0 | 14,319.0 | 14,319.0 | 14,319.0 | 14,094.0 | 14,094.0 | 14,319.0 | 14,319.0 | 14,319.0 | | |
| Proxy labour | 12,628.0 | - | -735.0 | -2,338.0 | -5,803.0 | -7,728.0 | -10,878.0 | -11,928.0 | -12,628.0 | -12,628.0 | -12,628.0 | -12,628.0 | -12,628.0 | -12,628.0 | -12,628.0 | -12,628.0 | -12,628.0 | | |
| Sub-total Main Production | | | | | | | | | | | | | | | | | | | |
| 12,628.0 | 1,078,890.9 | 82,396.1 | 209,205.1 | 392,199.5 | 542,795.9 | 705,968.1 | 888,461.7 | 1,064,578.7 | 1,066,262.9 | 1,066,262.9 | 1,066,262.9 | 1,066,037.9 | 1,066,037.9 | 1,066,262.9 | 1,066,262.9 | 1,066,262.9 | 1,066,262.9 | | |
| Production Cost | | | | | | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | | | | | | |
| Dairy support | - | 3,870.4 | 13,318.2 | 29,292.1 | 63,567.4 | 30,478.9 | 53,202.4 | 16,086.4 | 16,320.4 | 3,870.4 | 3,870.4 | 3,870.4 | 15,210.4 | 28,602.4 | 57,330.4 | 28,170.4 | 47,070.4 | | |
| Dairy processing | - | 24,000.0 | 36,763.2 | 53,102.4 | 69,441.6 | 61,272.0 | 61,272.0 | 81,696.0 | 81,696.0 | - | 12,150.0 | 17,550.0 | 23,742.0 | 21,394.0 | 21,746.0 | 28,320.0 | 24,000.0 | | |
| Sub-total Investment Costs | | | | | | | | | | | | | | | | | | | |
| - | 27,870.4 | 50,081.4 | 82,394.5 | 133,009.0 | 91,750.9 | 114,474.4 | 97,782.4 | 98,016.4 | 3,870.4 | 16,020.4 | 21,420.4 | 38,952.4 | 49,996.4 | 79,076.4 | 56,490.4 | 75,390.4 | 27,870.4 | | |
| Operating | | | | | | | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | | | | | | | |
| Dairy support | - | 30,532.8 | 1,938.3 | 6,165.6 | 15,303.3 | 19,456.8 | 26,840.8 | 28,686.8 | 30,532.8 | 30,532.8 | 30,532.8 | 30,532.8 | 30,532.8 | 30,532.8 | 30,532.8 | 30,532.8 | 30,532.8 | | |
| Dairy processing | - | 707,137.5 | 58,387.5 | 142,725.0 | 253,012.5 | 350,325.0 | 447,637.5 | 577,387.5 | 707,137.5 | 707,137.5 | 707,137.5 | 707,137.5 | 707,137.5 | 707,137.5 | 707,137.5 | 707,137.5 | 707,137.5 | | |
| Poultry support | - | 6,722.8 | - | - | - | 3,268.6 | 5,376.2 | 7,483.8 | 6,322.8 | 6,322.8 | 6,722.8 | 6,722.8 | 6,722.8 | 6,322.8 | 6,722.8 | 6,722.8 | 6,722.8 | | |
| Sub-Total Purchased Inputs | | | | | | | | | | | | | | | | | | | |
| - | 744,393.1 | 60,325.8 | 148,890.6 | 268,315.8 | 373,050.4 | 479,854.5 | 613,558.1 | 743,993.1 | 743,993.1 | 744,393.1 | 744,393.1 | 744,393.1 | 743,993.1 | 743,993.1 | 744,393.1 | 744,393.1 | 744,393.1 | | |
| Labor | | | | | | | | | | | | | | | | | | | |
| Onfarm labour | - | 32,095.0 | 1,837.5 | 5,845.0 | 14,507.5 | 19,495.0 | 27,545.0 | 30,345.0 | 32,095.0 | 32,095.0 | 32,095.0 | 32,095.0 | 32,095.0 | 32,095.0 | 32,095.0 | 32,095.0 | 32,095.0 | | |
| Sub-total Operating Costs | | | | | | | | | | | | | | | | | | | |
| - | 776,488.1 | 62,163.3 | 154,735.6 | 282,823.3 | 392,545.4 | 507,399.5 | 643,903.1 | 776,088.1 | 776,088.1 | 776,488.1 | 776,488.1 | 776,488.1 | 776,088.1 | 776,088.1 | 776,488.1 | 776,488.1 | 776,488.1 | | |
| Sub-Total Production Cost | | | | | | | | | | | | | | | | | | | |
| - | 804,358.5 | 112,244.7 | 237,130.1 | 415,832.3 | 484,296.3 | 621,873.9 | 741,685.5 | 874,104.5 | 779,958.5 | 792,508.5 | 797,908.5 | 815,440.5 | 826,084.5 | 855,164.5 | 832,978.5 | 851,878.5 | 804,358.5 | | |
| OUTFLOWS | | | | | | | | | | | | | | | | | | | |
| - | 804,358.5 | 112,244.7 | 237,130.1 | 415,832.3 | 484,296.3 | 621,873.9 | 741,685.5 | 874,104.5 | 779,958.5 | 792,508.5 | 797,908.5 | 815,440.5 | 826,084.5 | 855,164.5 | 832,978.5 | 851,878.5 | 804,358.5 | | |
| Cash Flow Before Financing | | | | | | | | | | | | | | | | | | | |
| 12,628.0 | 274,532.4 | -29,848.6 | -27,925.0 | -23,632.8 | 58,499.6 | 84,094.2 | 146,776.2 | 190,474.2 | 286,304.4 | 273,754.4 | 268,354.4 | 250,597.4 | 239,953.4 | 211,098.4 | 233,284.4 | 214,384.4 | 261,904.4 | | |

IRR = 286.9%, NPV = 2,331,939.60

AREA AND HOUSEHOLD MODELS

XIX. ANNEX-3.1: Irrigated crops household (1.6 acre/household)

| Bhutan | | | | | | | | |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| CARLEP MTR | | | | | | | | |
| Irrigated agriculture area | | | | | | | | |
| FINANCIAL BUDGET (DETAILED) | | | | | | | | |
| (In BTN) | | | | | | | | |
| | April – March | | | | | | | |
| | thout Project | | With Project | | | Increments | | |
| | 1 to 19 | 20 | 1 | 2 to 19 | 20 | 1 | 2 to 19 | 20 |
| Main Production | | | | | | | | |
| Paddy | 39,220 | 39,220 | 51,001 | 51,001 | 51,001 | 11,781 | 11,781 | 11,781 |
| Quinoa | 1,300 | 1,300 | 1,600 | 1,600 | 1,600 | 300 | 300 | 300 |
| Mustard | 2,088 | 2,088 | 2,900 | 2,900 | 2,900 | 812 | 812 | 812 |
| Straw | 1,560 | 1,560 | 1,740 | 1,740 | 1,740 | 180 | 180 | 180 |
| Vegetables | 19,200 | 19,200 | 24,000 | 24,000 | 24,000 | 4,800 | 4,800 | 4,800 |
| Sub-total Main Production | 63,368 | 63,368 | 81,241 | 81,241 | 81,241 | 17,873 | 17,873 | 17,873 |
| Production Cost | | | | | | | | |
| Investment | | | | | | | | |
| Quinoa seed | 30 | 30 | 30 | 30 | 30 | - | - | - |
| FYM | 200 | 200 | 250 | 250 | 250 | 50 | 50 | 50 |
| Draught animal hiring | 160 | 160 | 160 | 160 | 160 | - | - | - |
| Sub-total Investment Costs | 390 | 390 | 440 | 440 | 440 | 50 | 50 | 50 |
| Operating | | | | | | | | |
| Purchased Inputs | | | | | | | | |
| Paddy seeds | 280 | 280 | 280 | 280 | 280 | - | - | - |
| Mustard seeds | 36 | 36 | 36 | 36 | 36 | - | - | - |
| Vegetable seeds | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | - | - | - |
| Urea | - | - | 628 | 628 | 628 | 628 | 628 | 628 |
| Fertiliser | 156 | 156 | 198 | 198 | 198 | 42 | 42 | 42 |
| FYM | 1,110 | 1,110 | 1,150 | 1,150 | 1,150 | 40 | 40 | 40 |
| Butaclor | - | - | 240 | 240 | 240 | 240 | 240 | 240 |
| Draught animal hiring | 960 | 960 | 960 | 960 | 960 | - | - | - |
| Land taxes | 10 | 10 | 10 | 10 | 10 | - | - | - |
| Jute bags | 468 | 468 | 660 | 660 | 660 | 192 | 192 | 192 |
| Sub-Total Purchased Inputs | 7,020 | 7,020 | 8,161 | 8,161 | 8,161 | 1,142 | 1,142 | 1,142 |
| Labor | | | | | | | | |
| Land preparation | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | - | - | - |
| Sowing | 350 | 350 | 350 | 350 | 350 | - | - | - |
| planting | 840 | 840 | 840 | 840 | 840 | - | - | - |
| Weeding | 5,635 | 5,635 | 4,515 | 4,515 | 4,515 | -1,120 | -1,120 | -1,120 |
| Irrigating, watering | 700 | 700 | 700 | 700 | 700 | - | - | - |
| Fertiliser or manure application | 420 | 420 | 420 | 420 | 420 | - | - | - |
| Transplanting | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 | - | - | - |
| Harvesting | 5,355 | 5,355 | 5,915 | 5,915 | 5,915 | 560 | 560 | 560 |
| Threshing | 4,200 | 4,200 | 4,760 | 4,760 | 4,760 | 560 | 560 | 560 |
| Grading, packing | 560 | 560 | 560 | 560 | 560 | - | - | - |
| Farm transportation | 700 | 700 | 700 | 700 | 700 | - | - | - |
| Fence maintenance | 1,680 | 1,680 | 1,680 | 1,680 | 1,680 | - | - | - |
| drying | 70 | 70 | 70 | 70 | 70 | - | - | - |
| Dehusking | 70 | 70 | 70 | 70 | 70 | - | - | - |
| Sub-Total Hired Labor | 32,480 | 32,480 | 32,480 | 32,480 | 32,480 | - | - | - |
| Sub-total Operating Costs | 39,500 | 39,500 | 40,641 | 40,641 | 40,641 | 1,142 | 1,142 | 1,142 |
| Sub-Total Production Cost | 39,890 | 39,890 | 41,081 | 41,081 | 41,081 | 1,192 | 1,192 | 1,192 |
| OUTFLOWS | 39,890 | 39,890 | 41,081 | 41,081 | 41,081 | 1,192 | 1,192 | 1,192 |
| Cash Flow Before Financing | 23,478 | 23,478 | 40,160 | 40,160 | 40,160 | 16,681 | 16,681 | 16,681 |
| IRR = None, NPV = 123,658.88 | | | | | | | | |

Benefits cost ratio = 3.82

XX.ANNEX-3.2: Dryland crops household model (0.75 acre/hh)

| Bhutan | | | | | | | | |
|------------------------------------|-----------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|
| CARLEP MTR | | | | | | | | |
| Dryland cultivation area | | | | | | | | |
| FINANCIAL BUDGET (DETAILED) | | | | | | | | |
| (In BTN '000) | | | | | | | | |
| | April -- March | | | | | | | |
| | Without Project | | With Project | | | Increments | | |
| | 1 to 19 | 20 | 1 | 2 to 19 | 20 | 1 | 2 to 19 | 20 |
| Main Production | | | | | | | | |
| Maize, shelled | 11.05 | 11.05 | 13.77 | 13.77 | 13.77 | 2.72 | 2.72 | 2.72 |
| Quinoa | 4.42 | 4.42 | 5.44 | 5.44 | 5.44 | 1.02 | 1.02 | 1.02 |
| Sub-total Main Production | 15.47 | 15.47 | 19.21 | 19.21 | 19.21 | 3.74 | 3.74 | 3.74 |
| Production Cost | | | | | | | | |
| Investment | | | | | | | | |
| Quinoa seed | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | - | - | - |
| FYM | 0.68 | 0.68 | 0.85 | 0.85 | 0.85 | 0.17 | 0.17 | 0.17 |
| Draught animal hiring | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | - | - | - |
| Sub-total Investment Costs | 1.33 | 1.33 | 1.50 | 1.50 | 1.50 | 0.17 | 0.17 | 0.17 |
| Operating | | | | | | | | |
| Purchased Inputs | | | | | | | | |
| Maize seeds | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | - | - | - |
| Urea | - | - | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 |
| FYM | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | - | - | - |
| Draught animal hiring | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | - | - | - |
| Land taxes | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Jute bags | 0.20 | 0.20 | 0.24 | 0.24 | 0.24 | 0.04 | 0.04 | 0.04 |
| Sub-Total Purchased Inputs | 1.12 | 1.12 | 1.43 | 1.43 | 1.43 | 0.31 | 0.31 | 0.31 |
| Labor | | | | | | | | |
| Land preparation | 2.38 | 2.38 | 2.38 | 2.38 | 2.38 | - | - | - |
| Sowing | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | - | - | - |
| Weeding | 6.07 | 6.07 | 6.07 | 6.07 | 6.07 | - | - | - |
| Cleaning, shelling | 0.83 | 0.83 | 1.07 | 1.07 | 1.07 | 0.24 | 0.24 | 0.24 |
| Fertiliser or manure application | 0.24 | 0.24 | 0.36 | 0.36 | 0.36 | 0.12 | 0.12 | 0.12 |
| Harvesting | 2.50 | 2.50 | 2.62 | 2.62 | 2.62 | 0.12 | 0.12 | 0.12 |
| Threshing | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | - | - | - |
| Maintenance | 1.79 | 1.79 | 1.79 | 1.79 | 1.79 | - | - | - |
| drying | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | - | - | - |
| Dehusking | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | - | - | - |
| Sub-Total Hired Labor | 16.66 | 16.66 | 17.14 | 17.14 | 17.14 | 0.48 | 0.48 | 0.48 |
| Sub-total Operating Costs | 17.78 | 17.78 | 18.56 | 18.56 | 18.56 | 0.78 | 0.78 | 0.78 |
| Sub-Total Production Cost | 19.11 | 19.11 | 20.06 | 20.06 | 20.06 | 0.95 | 0.95 | 0.95 |
| OUTFLOWS | 19.11 | 19.11 | 20.06 | 20.06 | 20.06 | 0.95 | 0.95 | 0.95 |
| Cash Flow Before Financing | -3.64 | -3.64 | -0.85 | -0.85 | -0.85 | 2.79 | 2.79 | 2.79 |

IRR = None, NPV = 20.06

XXI. ANNEX-3.4: Vegetable crops household model, (1.35 acre/household)

| Bhutan | | | | | | | | | | | | |
|------------------------------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| CARLEP MTR | | | | | | | | | | | | |
| Vegetable households area | | | | | | | | | | | | |
| FINANCIAL BUDGET (DETAILED) | | | | | | | | | | | | |
| (In BTN) | | | | | | | | | | | | |
| | WOP | WP | Increments | | | | | | | | | |
| | 20 | 20 | 1 | 2 | 3 | 4 to 9 | 10 | 11 | 12 | 13 | 14 to 19 | 20 |
| Main Production | | | | | | | | | | | | |
| Onion | 15,795 | 18,954 | 3,159 | 3,159 | 3,159 | 3,159 | 3,159 | 3,159 | 3,159 | 3,159 | 3,159 | 3,159 |
| Potato | 8,505 | 10,915 | 2,410 | 2,410 | 2,410 | 2,410 | 2,410 | 2,410 | 2,410 | 2,410 | 2,410 | 2,410 |
| Leafy vegetables | 6,750 | 8,100 | 1,350 | 1,350 | 1,350 | 1,350 | 1,350 | 1,350 | 1,350 | 1,350 | 1,350 | 1,350 |
| Asparagus | 8,370 | 20,925 | -8,370 | 5,231 | 8,370 | 12,555 | 12,555 | -8,370 | 5,231 | 8,370 | 12,555 | 12,555 |
| Green chilli | 17,690 | 19,505 | 1,814 | 1,814 | 1,814 | 1,814 | 1,814 | 1,814 | 1,814 | 1,814 | 1,814 | 1,814 |
| Cabbage | 5,670 | 7,722 | 2,052 | 2,052 | 2,052 | 2,052 | 2,052 | 2,052 | 2,052 | 2,052 | 2,052 | 2,052 |
| Cauliflower | 10,800 | 13,973 | 3,173 | 3,173 | 3,173 | 3,173 | 3,173 | 3,173 | 3,173 | 3,173 | 3,173 | 3,173 |
| Beans | 10,530 | 12,636 | 2,106 | 2,106 | 2,106 | 2,106 | 2,106 | 2,106 | 2,106 | 2,106 | 2,106 | 2,106 |
| Peas | 4,158 | 5,292 | 1,134 | 1,134 | 1,134 | 1,134 | 1,134 | 1,134 | 1,134 | 1,134 | 1,134 | 1,134 |
| Tomato | 8,019 | 9,623 | 1,604 | 1,604 | 1,604 | 1,604 | 1,604 | 1,604 | 1,604 | 1,604 | 1,604 | 1,604 |
| Radish | 3,159 | 3,645 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 |
| Sub-total Main Production | 99,446 | 131,289 | 10,917 | 24,519 | 27,657 | 31,842 | 31,842 | 10,917 | 24,519 | 27,657 | 31,842 | 31,842 |
| Production Cost | | | | | | | | | | | | |
| Sub-total Investment Costs | 12,721 | 12,285 | 374 | -436 | -436 | -436 | -436 | 374 | -436 | -436 | -436 | -436 |
| Operating | | | | | | | | | | | | |
| Sub-Total Purchased Inputs | 3,010 | 3,038 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| Labor | | | | | | | | | | | | |
| Sub-Total Hired Labor | 44,651 | 46,919 | 2,315 | 1,937 | 2,268 | 2,268 | 2,268 | 3,024 | 2,268 | 2,268 | 2,268 | 2,268 |
| Sub-total Operating Costs | 47,661 | 49,957 | 2,343 | 1,965 | 2,296 | 2,296 | 2,296 | 3,052 | 2,296 | 2,296 | 2,296 | 2,296 |
| Sub-Total Production Cost | 60,382 | 62,242 | 2,717 | 1,529 | 1,860 | 1,860 | 1,860 | 3,426 | 1,860 | 1,860 | 1,860 | 1,860 |
| OUTFLOWS | 60,382 | 62,242 | 2,717 | 1,529 | 1,860 | 1,860 | 1,860 | 3,426 | 1,860 | 1,860 | 1,860 | 1,860 |
| Cash Flow Before Financing | 39,064 | 69,047 | 8,201 | 22,990 | 25,798 | 29,983 | 29,983 | 7,492 | 22,659 | 25,798 | 29,983 | 29,983 |

IRR = None, NPV = 185,158.48

XXII. ANNEX-3.4: Mushroom cultivation household model

| Bhutan | | | | | | | | | | | | | | |
|------------------------------------|--------------------|------|------------|--------|------|------|--------|------|------|----------|------|------|----------|------|
| CARLEP MTR | | | | | | | | | | | | | | |
| Mushroom households activity | | | | | | | | | | | | | | |
| FINANCIAL BUDGET (DETAILED) | | | | | | | | | | | | | | |
| (In BTN '000) | | | | | | | | | | | | | | |
| | Without Project | WP | Increments | | | | | | | | | | | |
| | 1 to 20 | 20 | 1 | 2 to 4 | 5 | 6 | 7 to 9 | 10 | 11 | 12 to 14 | 15 | 16 | 17 to 19 | 20 |
| Main Production | | | | | | | | | | | | | | |
| Shitake mushroom | - | 60.2 | 30.1 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| WOP proxy labour | 3.5 | - | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 |
| Sub-total Main Production | 3.5 | 60.2 | 26.6 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 | 56.7 |
| Production Cost | | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | | |
| Spawn | - | - | 1.3 | - | - | 1.3 | - | - | 1.3 | - | - | 1.3 | - | - |
| Mushroom shed | - | - | 30.0 | - | - | - | - | - | - | - | - | - | - | - |
| Plastic sheets | - | - | 0.4 | - | - | 0.4 | - | - | 0.4 | - | - | 0.4 | - | - |
| Logs for shitake mushroom | - | - | 9.5 | - | - | 9.5 | - | - | 9.5 | - | - | 9.5 | - | - |
| Billet | - | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Wax and resin | - | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Pipes and sprinklers | - | - | 3.0 | - | - | - | - | - | - | - | - | - | - | - |
| Miscellaneous | - | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| Sub-total Investment Costs | - | 1.3 | 45.4 | 1.3 | 1.3 | 12.4 | 1.3 | 1.3 | 12.4 | 1.3 | 1.3 | 12.4 | 1.3 | 1.3 |
| Operating | | | | | | | | | | | | | | |
| Harvesting | - | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| Grading, packing | - | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| Maintenance | - | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Sub-total Operating Costs | - | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 |
| Sub-Total Production Cost | - | 9.7 | 53.8 | 9.7 | 9.7 | 20.8 | 9.7 | 9.7 | 20.8 | 9.7 | 9.7 | 20.8 | 9.7 | 9.7 |
| OUTFLOWS | - | 9.7 | 53.8 | 9.7 | 9.7 | 20.8 | 9.7 | 9.7 | 20.8 | 9.7 | 9.7 | 20.8 | 9.7 | 9.7 |
| Cash Flow Before Financing | 3.5 | 50.5 | -27.2 | 47.0 | 47.0 | 35.9 | 47.0 | 47.0 | 35.9 | 47.0 | 47.0 | 35.9 | 47.0 | 47.0 |
| IRR = 125.8%, NPV = 265.23 | | | | | | | | | | | | | | |

XXIII. ANNEX-3.5: Dairy household model (2 cattle unit /household)

| | | | | | | | | | | | | | |
|---------------------------------|-----------------|--------------|--------|-------|-------|----------|-------|------------|--------|------|-------|----------|------|
| Bhutan | | | | | | | | | | | | | |
| CARLEP MTR | | | | | | | | | | | | | |
| Milk cattle households activity | | | | | | | | | | | | | |
| FINANCIAL BUDGET (DETAILED) | | | | | | | | | | | | | |
| (In BTN '000) | | | | | | | | | | | | | |
| April -- March | | | | | | | | | | | | | |
| | Without Project | With Project | | | | | | Increments | | | | | |
| | 1 to 20 | 1 | 2 to 9 | 10 | 11 | 12 to 19 | 20 | 1 | 2 to 9 | 10 | 11 | 12 to 19 | 20 |
| Main Production | | | | | | | | | | | | | |
| Sale of milk | - | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 |
| Butter | - | 8.8 | 17.7 | 17.7 | 17.7 | 17.7 | 17.7 | 8.8 | 17.7 | 17.7 | 17.7 | 17.7 | 17.7 |
| Cheese | - | 5.5 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 5.5 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 |
| WOP proxy labour | 7.0 | - | - | - | - | - | - | -7.0 | -7.0 | -7.0 | -7.0 | -7.0 | -7.0 |
| Sub-total Main Production | 7.0 | 88.0 | 102.5 | 102.5 | 102.5 | 102.5 | 102.5 | 81.0 | 95.5 | 95.5 | 95.5 | 95.5 | 95.5 |
| Production Cost | | | | | | | | | | | | | |
| Investment | | | | | | | | | | | | | |
| Milk cattle | - | 108.0 | - | - | 108.0 | - | - | 108.0 | - | - | 108.0 | - | - |
| Cattle shed | - | 15.0 | - | - | - | - | - | 15.0 | - | - | - | - | - |
| Insurance | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Silage feed | - | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Choppers | - | 1.5 | - | - | - | - | - | 1.5 | - | - | - | - | - |
| Sub-total Investment Costs | - | 126.8 | 2.3 | 2.3 | 110.3 | 2.3 | 2.3 | 126.8 | 2.3 | 2.3 | 110.3 | 2.3 | 2.3 |
| Operating | | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | | |
| Feed concentrate | - | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Green fodder | - | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Dry fodder | - | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Medicine | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Sub-Total Purchased Inputs | - | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 |
| Labor | | | | | | | | | | | | | |
| Maintenance | - | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| Sub-total Operating Costs | - | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 |
| Sub-Total Production Cost | - | 162.8 | 38.3 | 38.3 | 146.3 | 38.3 | 38.3 | 162.8 | 38.3 | 38.3 | 146.3 | 38.3 | 38.3 |
| OUTFLOWS | - | 162.8 | 38.3 | 38.3 | 146.3 | 38.3 | 38.3 | 162.8 | 38.3 | 38.3 | 146.3 | 38.3 | 38.3 |
| Cash Flow Before Financing | 7.0 | -74.8 | 64.2 | 64.2 | -43.8 | 64.2 | 64.2 | -81.8 | 57.2 | 57.2 | -50.8 | 57.2 | 57.2 |
| IRR = 46.3%. NPV = 238.39 | | | | | | | | | | | | | |

XXIV. ANNEX-3.6: Backyard poultry model, 20 birds unit/household

| | | | | | | | | | | | | |
|------------------------------------|-------------------|---------------|-------------|-------------|---------------|-------------|-------------|-----------------|-------------|-------------|-----------------|-------------|
| Bhutan | | | | | | | | | | | | |
| CARLEP MTR | | | | | | | | | | | | |
| Household poultry activity | | | | | | | | | | | | |
| FINANCIAL BUDGET (DETAILED) | | | | | | | | | | | | |
| (In BTN '000) | | | | | | | | | | | | |
| | Increments | | | | | | | | | | | |
| | 1 | 2 to 4 | 5 | 6 | 7 to 9 | 10 | 11 | 12 to 14 | 15 | 16 | 17 to 19 | 20 |
| Main Production | | | | | | | | | | | | |
| Egg production | 23.5 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 |
| Sale of culled birds | - | - | 2.3 | - | - | 2.3 | - | - | 2.3 | - | - | 2.3 |
| WOP proxy labour | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 | -3.5 |
| Sub-total Main Production | 20.0 | 43.5 | 45.7 | 43.5 | 43.5 | 45.7 | 43.5 | 43.5 | 45.7 | 43.5 | 43.5 | 45.7 |
| Production Cost | | | | | | | | | | | | |
| Purchased Inputs | | | | | | | | | | | | |
| Pullets | 4.0 | - | - | 4.0 | - | - | 4.0 | - | - | 4.0 | - | - |
| Poultry shed | 5.6 | - | - | - | - | - | - | - | - | - | - | - |
| Poultry equipment | 2.0 | - | - | - | - | - | - | - | - | - | - | - |
| Poultry feed | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 |
| Mortality rate | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Sub-Total Purchased Inputs | 32.7 | 21.1 | 21.1 | 25.1 | 21.1 | 21.1 | 25.1 | 21.1 | 21.1 | 25.1 | 21.1 | 21.1 |
| Labor | | | | | | | | | | | | |
| Maintenance | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| Sub-Total Production Cost | 43.2 | 31.6 | 31.6 | 35.6 | 31.6 | 31.6 | 35.6 | 31.6 | 31.6 | 35.6 | 31.6 | 31.6 |
| OUTFLOWS | 43.2 | 31.6 | 31.6 | 35.6 | 31.6 | 31.6 | 35.6 | 31.6 | 31.6 | 35.6 | 31.6 | 31.6 |
| Cash Flow Before Financing | -23.2 | 11.9 | 14.2 | 7.9 | 11.9 | 14.2 | 7.9 | 11.9 | 14.2 | 7.9 | 11.9 | 14.2 |
| IRR = 21.0%, NPV = 31.01 | | | | | | | | | | | | |

XXV. ANNEX-3.7: Milk chilling plant unit (1000 lit/day model)

Bhutan

CARLEP MTR

Milk chilling unit activity

FINANCIAL BUDGET (DETAILED)

(In BTN '000)

| | Increments | | | | | | | | |
|-----------------------------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | 1 | 2 to 7 | 8 | 9 | 10 | 11 | 12 to 14 | 15 | 16 |
| Main Production | | | | | | | | | |
| Sale of milk | 8,146.0 | 8,146.0 | 8,146.0 | 8,146.0 | 8,146.0 | 8,146.0 | 8,146.0 | 8,146.0 | 8,146.0 |
| Butter | 35.9 | 35.9 | 35.9 | 35.9 | 35.9 | 35.9 | 35.9 | 35.9 | 35.9 |
| Cheese | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 |
| Sub-total Main Production | 8,210.7 | 8,210.7 | 8,210.7 | 8,210.7 | 8,210.7 | 8,210.7 | 8,210.7 | 8,210.7 | 8,210.7 |
| Production Cost | | | | | | | | | |
| Investment | | | | | | | | | |
| chilling vat | 1,350.0 | - | - | 1,350.0 | - | - | - | - | - |
| Milk transport van | 1,600.0 | - | - | - | - | - | - | - | 1,600.0 |
| Separator | 53.0 | - | - | - | - | 53.0 | - | - | - |
| Other equipment | 35.0 | - | - | - | - | 35.0 | - | - | - |
| Milk collection centre | 900.0 | - | - | - | - | - | - | - | - |
| Milk cans | 146.8 | - | - | - | - | - | - | - | - |
| Sub-total Investment Costs | 4,084.8 | - | - | 1,350.0 | - | 88.0 | - | - | 1,600.0 |
| Operating | | | | | | | | | |
| Driver's salary | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 |
| Chairman | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| Secretary | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| Treasurer | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 | 84.0 |
| Multi task assistant | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 |
| Vehicle operating costs | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 |
| Repairs and maintenance of VATs | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Electricity and water | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| Purchase of milk from members | 6,109.5 | 6,109.5 | 6,109.5 | 6,109.5 | 6,109.5 | 6,109.5 | 6,109.5 | 6,109.5 | 6,109.5 |
| Sub-total Operating Costs | 6,487.5 | 6,487.5 | 6,487.5 | 6,487.5 | 6,487.5 | 6,487.5 | 6,487.5 | 6,487.5 | 6,487.5 |
| Sub-Total Production Cost | 10,572.3 | 6,487.5 | 6,487.5 | 7,837.5 | 6,487.5 | 6,575.5 | 6,487.5 | 6,487.5 | 8,087.5 |
| OUTFLOWS | 10,572.3 | 6,487.5 | 6,487.5 | 7,837.5 | 6,487.5 | 6,575.5 | 6,487.5 | 6,487.5 | 8,087.5 |
| Cash Flow Before Financing | -2,361.6 | 1,723.2 | 1,723.2 | 373.2 | 1,723.2 | 1,635.2 | 1,723.2 | 1,723.2 | 123.2 |

IRR = 18.0%, NPV = 3,238.29

Appendix 4.3 Technical Paper: Investments in infrastructure Post MTR

Irrigation Channels Rehabilitation

Progress During the review period CARLEP has supported the rehabilitation of irrigation channels in TrahiYangtse (consisting of 2 separate systems drawing water from the same stream at two locations) and in Lhuentse, both included in the 2018-19 AWPB. These investments are valued at USD 150,000 in aggregate and are geared to cover 504 acres and serve 312HHs. The OPM reports that the total outreach of the irrigation rehabilitation activities carried out by CARLEP since its start covers 1795 acres of paddyland and 1100 HHs, which would already represent a 149% (in terms of area) of the target set in the PDR (for both phases), while absorbing only 28% of the allocated budget for this activity. While noting that these investments are generally effective at solving the beneficiary farmers' most pressing constraints for paddy rice cultivation, the mission review of the documentation and the field visits underlined that: i) there continue to be inconsistencies in the reporting of the command area between the technical documentation and the project output level database, which may have resulted in overreporting of the command area; and ii) the works mainly consist of rehabilitation with no upgrading features in terms of improving climate resilience or boosting crop intensification. Both issues were noted by previous IFAD supervision and ISM missions.

It is noted that the additional works for the upgrade of the Metothang scheme in Samdrup Jonkhar agreed during the previous supervision mission and budgeted for in the FY 2017-18 have not been implemented nor technical designs have been yet developed by the concerned Gewog engineer. On the other hand, designs are being developed for the renovation 4 additional irrigation schemes (Aguruthang, Yayung, Kampara and Zenghti) across 3 Dzonghags (Samdrup Jonkhar, Mongar and Trashigang) which are scheduled for implementation during the 2018-19 FY and valued at about USD 220,000 in aggregate. The preliminary information available shows evidence of improved quality in terms of number of water control structures, yet lacking a full documentation including layout plans and profiles, the concerns on the accuracy and comprehensiveness of the designs are not fully addressed.

Overall, existing irrigation schemes targeted for rehabilitation were originally developed to provide supplementary irrigation for monsoon rice cultivation in terraced slopes. These are based on a plot-to-plot distribution system that poses a major limitation to the choice of crops to be cultivated and to individual farmers' initiatives for on farm development (e.g. establishment of drip irrigation for vegetables) and crop diversification, therefore their upgrading entails the development of site specific design solutions to overcome (at least in part) such limitations.

Way forward There is widespread demand for continued investment in irrigation channel rehabilitation in the project area, but the current approaches need improvement and a shift from mere rehabilitation and emergency repairs to *"Channel systems upgrading"* as shown in the revised post MTR cost tabs. The issues noted during the field visit are: i) lack of proper foundations up to bedrock level at the intake site; ii) risk of collapse at a critical channel section and at the inlet of a stream crossing structure; and iii) lack of grooves for wooden planks at water control structures. Such aspects need to be properly addressed during design and construction of future irrigation rehabilitation works. Moreover, the technical upgrade options to be included in new designs as well as to retrofit already completed schemes include: i) elevated piped crossings in critical channel

sections prone to damage from concentrated runoff from side catchments, including solutions with steel trusses bolted or welded on site, allowing longer spans compared to support poles/stone masonry supports; and ii) use of piped distribution lines with break-pressure tanks and hydrants along the maximum slope gradient in terraced lands to ensure adequate coverage and equitable access to water by middle and tail end users through direct hose connection. In order to ensure durability of the HDPE piped sections, it is recommended to make the availability of butt welding equipment (and qualified operators) a mandatory qualification requirement for bidders whenever non-coiled HDPE pipe laying works are foreseen.

Water efficient irrigation

Progress During the review period CARLEP has continued providing beneficiaries engaging in vegetable cultivation with on farm irrigation equipment consisting of: i) 119 sprinklers, ii) 87 syntax tanks with HDPE pipes; and ii) only 1 set for drip irrigation. This represents a considerable leap forward (+373 acres and 549HHs) in terms of outreach and coverage. The aggregate area reported under either sprinklers, drippers and tanks/HDPE pipes supported by CARLEP since its start is a sizeable 551 acres of private land. However, field observations show that the preference given to sprinklers (55%) and hose-tank systems (34%) is not always optimal as drippers provide opportunities for improved performance both in terms of water saving and yield increase. The MTR mission could not gather evidence of the uptake of project supported on farm irrigation practices by non-beneficiary farmers.

In addition to on farm irrigation, the project has initiated the development of 2 off farm piped networks, for Land Use Certificate (LUC) and areas with potential for commercial vegetables production. This is noted as a good initiative with potential for upscaling. The design documentation developed to date for the Thonglingbi HDPE pipe network in Lunthse planned for implementation in FY 2018-19 includes details of washouts and air valves. The lack of these structures caused operational problems in the piped systems completed in previous years (e.g. the one at Waichur in Mongar visited by the mission), when CARLEP have supplied only pipes and materials to the communities undertaking the works based on approximate measurements of quantities. While the mission notes the project efforts to improve quality and durability of the works by mobilizing the services of the Gewog engineers and contractors, the importance of carrying out comprehensive designs including details of the layouts and specifications for HDPE joints and connectors for all piped schemes still needs to be emphasized.

In spite of good progress, the assessment of the impacts of activities carried out as “water efficient irrigation” is undermined by the fact that the project reporting system is not capturing the different nature of investments, which have included both on farm and off farm investments as well as simple repairs of rehabilitation nature with no distinct features in terms of improved efficiency.

Way forward. Both investments in on farm and off farm piped irrigation are highly relevant in the programme areas as effective means of improving irrigation water use efficiency. However, in order to allow a comparative analysis of project investments, budgeting and reporting of project interventions shall clearly distinguish between the off-farm (typically public) and on-farm (typically private) domain.

Under the new dedicated budget line *“Piped networks in dryland (up to field edge)”* CARLEP will finance the construction of fully piped irrigation networks, including intakes/spring capping, transmission lines, storage tanks and small hydraulic structures. Particular attention will be given to the provision of washouts, air valves and to the use of appropriate equipment for HDPE pipes joining (mechanical compression joints for the smaller diameters and butt welding for larger diameters). The works will be undertaken exclusively through contractors meeting the qualification requirements (including the availability of equipment for butt welding of HDPE pipes). Site specific solutions will need to be developed by the concerned Gewog Engineers, who will also map and provide georeferencing coordinates of available water sources. In specific cases, subject to the availability of excess water at the source, the project may also support the upgrading (e.g. by combining additional sources or providing additional storage) of domestic water supply networks currently used as Multiple Use facilities including livestock watering and irrigation.

The provision of 100% financing for on farm irrigation (in private land) under the dedicated budget line *“On-farm demonstrations (water efficient technologies)”* which includes (but not limited to) sprinklers, drip, plastic tanks and rainwater harvesting, will be restricted to strategically planned locations (e.g. Lead Farmers or LUC groups) to sustain the uptake of these technologies in wider neighbouring areas. Such interventions are still required, particularly for the case of drip irrigation, which is still a fairly new technology in project areas that needs to be further promoted by the project.

However, in order to ensure genuine participation and sustainability, subsequent support for on farm irrigation development will be delivered through a dedicated matching grant facility, complemented by support for the expansion of the retail and installation service for relevant equipment, particularly by the youth. Considerable preparatory works need to be done at the OPM to set up the applicable procedures for the delivery of these matching grants (including both *“On farm water efficient technologies (MGF)”* under Component 1 and *“Support to input/equipment suppliers”* under Component 2) included in the post MTR revised budget and set to be operational from FY 2019-2020.

Pumped irrigation schemes

Progress In line with the AWPB and with the PDR, during the review period CARLEP has undertaken a study on the feasibility of small scale pumped irrigation systems at 6 sites across 5 Dzongkhags. The study was carried out by ARDC engineers who have collected relevant data at each site and made use of appropriate mapping and computation tools for site assessment⁵. A multicriteria scoring grid for the prioritization of investments is also included in the study, yet some key aspects to complete the assessment still need to be covered, mainly: i) pump sizing in relation with the computed Crop Water Requirement; ii) an estimate of the cost of pumping and cost recovery mechanism; iii) the computation of the incremental returns for farmers based on the projected cropping patterns; iv) the need for additional investment on the distribution network and hydraulic structures.

⁵ In the context of Bhutan, maximum attention shall be given to the impact of atmospheric pressure (i.e. elevation) on the pumps suction head.

Way forward. Subject to adequately addressing the issues noted above, the project may proceed with the development of detailed designs for priority schemes under the budget line *“Pump irrigation network (up to field edge)”*. Technical assistance may be mobilized as required both to complete the feasibility studies and to carry out the detailed design under the budget line *“Feasibility studies and surveys”*. While careful attention shall be given to financial (cost recovery) and technical (capacity of pump operators) sustainability, the option of pumping schemes has still a relatively wide degree of potential for scaling up, particularly at the valley bottoms nearby permanent streams. Alternative technical options such as floating pumps on pontoons, sump-mounted pumps or infiltration wells shall be considered to address the common issues with pumps mounted in flood prone areas.

Capacity building for Engineers

Progress During the review period, in the context of an IFAD ISM, the project has organized onsite training for a total of 15 Engineers (mainly Gewog Engineers, but also one District Engineer and 2 Engineers from ARDC) to upgrade their skills on the principles of climate-resilient irrigation design. In this context a reference guideline on the use of freeware software and smartphone apps has been developed to support the site assessments, feasibility studies and design of irrigation schemes. These works are in several instances carried out by a single engineer not necessarily having a specific background in irrigation that can quickly upgrade his/her capacity and quality of deliverables by using these readily available and user friendly tools. A community of practice with an online sharing platform for technical references, photos, drawing and BOQs has also been established among the engineers involved in the implementation of CARLEP financed works. However, the potential benefits deriving from the platform have been hampered by the lack of a focal person to feed contents, follow up and stimulate its use.

Way forward. In parallel with a relative increased complexity of the designs (e.g. for the case of piped schemes) the mission emphasises the need to ensure coordination and continued backstopping and capacity building for Gewog Engineers, also in light of their frequent turnover. In the post MTR period, the uploading of technical designs in the online platform (accessible to all members of the community of practice and to IFAD) will be mandatory prior to submitting the tender documents for works which are subject to IFAD prior review. The proposed TORs for a dedicated Engineer at the OPM (see below) are geared to cover these aspects. Capacity building for Engineers will be financed under Component 3 – Output 3.1. Strengthening of district and gewog level staff, as *“Infrastructure related CB”*.

Capacity building for irrigation water users

Progress Functional water users groups are reportedly active in the 12 command areas in which CARLEP has supported the rehabilitation of the irrigation channels. The capacity of the groups has been supported through non-formal training on the need to organize appropriate maintenance. Gewog Engineers, Extension Officers and ARDC staff contributed to providing water users with basic information and advice. Given the scale and the relatively low complexity of the schemes, the current approach of not requiring the groups to register as WUAs, but rather to include the irrigation water delivery function within the mandate of e.g. producers’ groups or cooperatives, is in most cases appropriate. The mission observed a positive example of application of an irrigation water fee by a vegetables growers’ group at the small scale piped irrigation system at Waichur in Mongar.

Way forward. Piped schemes provide additional untapped opportunities for improved on farm water management (e.g. by using drip irrigation), for which a suitable scheduling with shorter rotation turns need to be developed. While the institutional mandate for support to irrigation water management rests with the Dzongkhags general engineering services, typically the concerned engineers and the extension officers have limited knowledge about irrigation scheduling. Both capacity building for engineers and extension officers as well as in-country exposure visits for farmers groups involved in irrigation can be supported under the budget line “WUA development, training and exposure visits”.

Other issues on irrigation investments

Financial Analysis. The lack of a basic financial analysis and IRR calculation to support investments in irrigation (both renovation, “water efficient” piped and pumped schemes) remains a constraint to making informed decisions about the optimal allocation of CARLEP funding across Dzongkhags and about the viability of comparatively higher investment cost/acre (currently about USD 500/acre) required to ensure more comprehensive coverage and sustained impact. During the post MTR period these aspects are to be covered by the OPM Engineer in collaboration with the OPM Marketing/Business Development specialist. A basic Economic and Financial analysis shall be an integral part of the Infrastructure Info sheet to be compiled upon request of IFAD “no objection” for all investments in irrigation.

Cost estimates, BOQs and designs. The AWPB allocations for each sub-project are based on generic cost estimates that are subsequently intended as the ceiling for each investment, regardless of the technical requirements emerged during file verification and design. A 2-years implementation process for irrigation works is recommended in order to ensure that the AWPB allocation reflects supported cost estimates based on comprehensive designs (reviewed by the OPM Engineer(s)) to be developed the year before implementation. It is also recommended to harmonize the approach across Dzongkhags to compute and account for the cost of construction supervision and training for WUAs. This is only in some instances recorded and occasionally included in the priced BOQs submitted to the OPM.

Land development

Progress. The mission visited one site (Dongkhar in Luentse Dzongkhag) where CARLEP supported widening of 40 acres of agricultural terraces in the FY 2016-2017. Beneficiaries report up to 50% savings in labour cost, which in turn, have triggered demand for land development by other neighbouring farmers, which is currently under implementation with RGoB support. The success and the relevance of the pilots carried out by CARLEP (covering 128 acres in total) is also reflected in the subsequent development of detailed guidelines⁶ defining the application process, technical approaches and levels of beneficiary co-financing applicable to Land Development works promoted by the RGoB. It is noted that the guidelines include a pro-poor targeting mechanism (e.g. full support for beneficiaries under the Targeted Household Poverty Programme (THPP)).

⁶ DoA, 2017. Agriculture Land Development Guidelines (ALDG). Department of Agriculture, Ministry of Agriculture and Forests, Royal Government of Bhutan, Thimphu

Way forward. Investments in Land development (as defined by the RGoB guidelines, primarily consisting of terracing and widening of existing narrow terraces) are aligned with the 12FYP and with CARLEP objective of supporting crop intensification and vegetable production aiming at higher profitability and environmental sustainability. The MTR mission concurs with the RGoB proposal to consider such investments eligible for CARLEP financing in the post MTR period. While in principle RGoB guidelines (including application process, works execution techniques and beneficiary financing ratios) will apply, CARLEP's budgetary provision will allow not only execution of the works with RGoB's own equipment from the Central Machinery Unit (CMU), but also hiring equipment and operators from the private sector. This will offset the risk of delayed deployment and relatively frequent breakdown of RGoB's equipment. To this effect, the share of IFAD financing for this activity will vary from an estimated 20% (in the case of availability of CMU's equipment) up to 80% (in case of hired equipment). The budget allocation for "*Land development Terracing / Consolidation / SLM*" is based on the assumption that 50% of the sites will be implemented with CMU's equipment. Provisions are made in the post MTR budget (Component 3 – "*Infrastructure related CB*") also for training of machine operators particularly in respect to: i) piling up and subsequent spreading of topsoil to reduce the potentially negative impact of the works on the yields for the first 1-2 cropping seasons; and ii) new instruments for precision levelling (e.g. laser controlled levellers).

Electric Fencing

Progress. Crop losses from wildlife were widely reported during the MTR mission field visits among the key constraints faced by farmers, ultimately resulting in abandoning patches of terraced agricultural land even if irrigation is available⁷. ARDC has supported the installation of solar powered eclectic fencing systems in partnership with the Bhutan Trust Fund for Environmental Conservation (BT FEC). While the technology is progressively being refined by the ARDC (e.g. by testing bio-acoustic equipment or different types of poles) there is already enough consolidated evidence of its effectiveness for upscaling post MTR.

Way forward. Investments in eclectic fencing are also aligned with the 12FYP and with CARLEP objective of supporting crop intensification and vegetable production aiming at higher profitability and environmental sustainability. Fencing will typically encircle the settlement areas, protecting both the houses and the adjacent fields. The budgetary allocation under "*Electric fencing*" is based on a cost-sharing arrangement in which IFAD funding would cover the cost of hardware (solar panel, energizer, wire and insulation etc.), valued at approximately 45% of the total cost, while the beneficiaries would contribute with wooden poles and labour for the installation valued at 55% of total. In case of using poles of different materials being evaluated by ARDC, the financing ratios may change.

Rural roads.

Progress. In spite of considerable experience gained under MAGIP and available financing under CARLEP for the upgrade of rural roads, these works are currently suspended⁸ by resolution of the steering committee, pending the finalization of RGoB guidelines to harmonize approaches to road rehabilitation works undertaken under various initiatives. Notwithstanding, evidence from the field shows that inadequate drainage may result into major damage to essential road sections for CARLEP

⁷ 20% of irrigable land is fallow according to the Agricultural Statistics RGoB Ministry of Agriculture and Forests of 2017

⁸ This applies to 3 road sections included in the 2018-2019 AWPB

beneficiaries. This problem is exacerbated by the increasing occurrence of extreme storm events anticipated by the climate change scenarios.

Way forward. Upon release of the relevant guidelines, selected investments in the upgrading and extension of farm roads will be also considered for the post-MTR period to remove the bottlenecks to production and commercialization as may be identified by the project with the concerned producers' groups. While in general climate proofing and upgrading of farm roads follow a "spot improvement" approach (focused on critical sections requiring e.g. the construction of a structures such as culverts, retaining walls etc), the provision of adequate longitudinal drains along the cut slope roadside is deemed equally critical. The post MTR budget allocation "*Upgrading and extension of farm roads*" is in fact based on the cost of construction of a continuous lined side ditch along 75% of the road length. For the case of slope stabilization, the project will promote the application of bioengineering and use of more flexible gabions and mattresses as compared to the traditional stone masonry walls. The availability of corrugated HDPE drainage pipes in the market need also to be explored for use in cross drainage structures.

General approach to "Production Related Infrastructure"

After the MTR, all CARLEP support measures for investments in infrastructure supporting primary production will be included under a single sub component "*Production related infrastructure*" under the project Component 1-Market-led Agricultural production. The approach proposed will be flexible and demand driven, hence the distribution of funding amongst different types of investments e.g. irrigation, land development, fencing etc. reported in the post MTR costabs is to be intended as indicative only. This approach is geared to foster integrated planning with the other CARLEP supports for crop intensification (mainly vegetables) and livestock production, to address site specific infrastructure needs as emerged in consultation with the groups formed and strengthened by CARLEP. This involves a re-consideration of the sub-project identification process to address the risk of scattering CARLEP support and sub-optimal phasing of investments. In order to achieve this, the OPM needs to be strengthened with a full time additional staff (or preferably two part-time, TORs below) to support the investment planning process with engineering know how, providing coordination and harmonization of approaches across the concerned Gewog engineers. A dedicated Matching Grant Facility (MGF) will be established to foster the uptake of on-farm water efficient irrigation by individual farmers willing to co-invest in e.g. drip irrigation, sprinklers and piped irrigation. The launch of this MGF will follow a first phase of demonstrations of relevant technologies (e.g. through Lead Farmers or LUCs) and a dedicated awareness campaign about the application process and the levels of available project support.

Production-Related Infrastructure (Output 1.4) - Budget, outreach and targets

| CARLEP- POST MTR REVISED BUDGET STRUCTURE | | Quantity | Beneficiary HHs | Unit USD | USD 3 yrs | IFAD | Govt/ben | CAT |
|---|---|-----------|-----------------|----------|-----------|------------|-----------|-------------------|
| Component 1 | Market-led agricultural production | | | | | | | |
| Output 1.4: | Production-related infrastructure | | | | | | | |
| 1.4.1 | Irrigation | | | | | | | |
| 1.4.1.1 | Feasibility studies and surveys | lps | 1 | | 40.000 | 40.000 | 40.000 | 0 WORKS |
| 1.4.1.2 | Pump irrigation newwork (up to field edge) | acre | 20 | 20 | 4.000 | 80.000 | 80.000 | 0 WORKS |
| 1.4.1.3 | Channel systems upgrading | acre | 2200 | 2200 | 1.500 | 3.300.000 | 3.300.000 | 0 WORKS |
| 1.4.1.4 | Piped networks in dryland (up to field edge) | acre | 550 | 550 | 2.000 | 1.100.000 | 1.100.000 | 0 WORKS |
| 1.4.1.5 | On-farm demonstrations (water efficient technologies) | units | 250 | 250 | 1.000 | 250.000 | 250.000 | 0 EQUIPMENT |
| 1.4.1.6 | On-farm water efficient technologies (MGF) | units | 1250 | 1250 | 1.000 | 1.250.000 | 1.000.000 | 250.000 FUND |
| 1.4.1.7 | WUA development, training and exposure visits | trainings | 30 | | 500 | 15.000 | 15.000 | 0 TRAINING |
| 1.4.1.8 | Other investments in irrigation systems upgrading | LPS | 1 | | 50 | 50 | 50 | 0 WORKS |
| 1.4.2 | Electric fencing | | | | | | | 0 |
| 1.4.2.1 | Electric fencing | acre | 550 | 550 | 450 | 247.500 | 111.375 | 136.125 EQUIPMENT |
| 1.4.3 | Land development | | | | | | | 0 |
| 1.4.3.1 | Land development Terracing / Consolidation / SLM | acre | 900 | 900 | 5000 | 4.500.000 | 2.250.000 | 2.250.000 WORKS |
| 1.4.4 | Farm roads improvements | | | | | | | |
| 1.4.4.1 | Upgrading and extension of farm roads | km | 50 | 625 | 10.000 | 500.000 | 500.000 | WORKS |
| SUB TOTAL Output 1.4 | | | | 6345 | | 11.282.550 | 8.646.425 | 2.636.125 |

* including retrofitting of rehabilitated schemes for improved climate resilience

Reporting on benefits and relevant Log frame indicators for “Production-Related Infrastructure”

Besides reporting on the output level/physical progress for each activity line included Output 1.4 *Production-related infrastructure* (e.g. area under canal systems upgrading or under piped system, area under land development or protected by electric fencing, etc.), investments in production related infrastructure should be analysed both in terms of increased climate resilience and contribution to raising the incomes of targeted farmers. The latter would be preliminarily assessed with the financial analysis to be carried out prior to implementation of any investment, consisting on a computation of the Internal Rate of Return (IRR) where the benefit streams (net incremental farmers’ income) are typically computed over a 20-years return period. The IRR would then be re-assessed after completion of the works based on actual benefit streams and updated projections of changes in cropping patterns and market prices.

The PDR considers that investments in irrigation rehabilitation fully overlap with the areas of support for the vegetable group members, hence these investments were not meant to contribute to CARLEP’s overall outreach target (28,975 HH). Evidence from the field at MTR shows that this assumption is overly restrictive as many of the beneficiaries of irrigation scheme renovation (de facto focusing on paddyland) so far did not benefit from other project support. However, with the recommended intensification of project activities and with the proposed integrated planning approach, this gap is going to be substantially reduced.

On the other hand, the current progress against the Logframe Development Objective indicator “≥ 20,000 HH in vulnerable areas with increased water availability for agriculture production” is estimated by the MTR mission to 5% only (1086 HH)⁹. However, this DO target is deemed non realistic as it appears to be based on an overly optimistic assumption of the uptake of water saving technologies promoted by the project by additional HHs mobilizing own resources. The MTR mission proposes revising this target to a more reasonable 7,500 HH (still a sizeable 30% of the total rural population across the 6 targeted Dzongkhags). Proposed measures to achieve this objective include:

⁹ Computed as the sum of i) beneficiaries of investments in improved on farm irrigation efficiency (i.e. sprinklers, drippers, tank+hose irrigation) directly financed by CARLEP; and ii) HH benefitting from (off-farm) irrigation renovation that did not benefit from CARLEP support for improved on farm irrigation, estimated as estimated 75% of the total.

i) additional financing for all off farm investments; ii) a dedicated matching grant facility to foster the uptake of on farm water saving technologies; iii) support for the expansion of retail and installation of relevant water saving technologies in the project area; and iv) tailoring the M&E system and the Annual Outcome survey to support an estimate of the uptake by non-direct beneficiaries.

The lack of technical upgrading and climate resilience features on irrigation rehabilitation works carried out to date undermine the contribution of these investments to the output level Logframe indicator “*≥ 23 000 (of which 50% are women) smallholder HH supported in coping with the effects of climate change with sustainable land management practices*”, which is also directly linked to the RIMS/ASAP indicator “*Land area under climate resilient practices*”. While the target set in the PDR needs also to be reduced to a more realistic 20,000 HHs, (of which about 8,000 HH directly benefitting from CARLEP investments in improved irrigation and land development), this is still an ambitious 80% of the rural population across the 6 Eastern Dzongkhags. The measures to sustain the achievement of this objective will include: i) enhanced focus on irrigation system upgrading (including provision for retrofitting already completed schemes); ii) scaling up of investments in Land Development; and iii) widening the scope of the activities for “Climate Smart Villages” to the whole project area. As a means of measuring the combined effectiveness of project investments in irrigation, fencing and land development, the project shall also report on the reduction of previously abandoned fallow land against the current national baseline of 20%.

Detailed recommendations for “Production Related Infrastructure”

| Actions | Responsibility | Deadline | Status |
|--|------------------------------------|---------------|------------|
| OPM Engineer Mobilize full time additional ARDC staff (or preferably two part-time) to support the investment planning process with engineering know how, providing coordination and harmonization of approaches across the concerned Gewog engineers | OPM, ARDC | January/ 2019 | [agreed] |
| Irrigation investments Ensure comprehensive coverage and technical upgrade features in all CARLEP financed investments in irrigation, to be supported by an economic and financial analysis and developed over a 2-years timeframe | OPM, Gewog Engineers | January/ 2019 | [proposed] |
| Disaggregate reporting between off farm and on farm investments | OPM | January/ 2019 | [proposed] |
| Finalize feasibility study on pumped schemes to include: i) pump sizing; ii) an estimate of the cost of pumping and cost recovery mechanism; iii) incremental returns for farmers; iv) the need for additional investment on the distribution network and hydraulic structures | OPM/ARDC | June/ 2019 | [proposed] |
| Other Investments Broaden the scope of future investments to include Land Development, Electric Fencing and Rural roads if found critical to production and commercialization by the concerned producers' groups | OPM, Dzongkhags | June/ 2019 | [agreed] |
| Capacity building for WUA Intensify capacity building for Water Users Groups for improved irrigation water management | OPM, Gewog Engineers and Extension | January/ 2019 | [proposed] |
| Mapping of water sources In the context of the development of piped irrigation systems the available water sources shall be identified, georeferenced and their capacity assessed to serve as a basis for the design | OPM, Gewog Engineers | January/ 2019 | [agreed] |
| Matching grants for irrigation Procedures are developed and a matching grant facility is established for individuals undertaking on-farm irrigation development with water saving technologies (drip, sprinklers, hose+tank etc.), prioritizing support for poor farmers. | OPM | 12/2019 | [agreed] |
| Target on access to irrigation water availability and climate resilience Revise the LF DO target on increased water availability for agriculture production and the output level target on climate resilience and ensure consistent reporting | IFAD/OPM | January/ 2019 | [agreed] |
| Fallow land area reduction Report on reduction of fallow land as a result of project investments in production related infrastructure (e.g. Irrigation, Land Development, Fencing) | OPM | June 2019 | [proposed] |
| Prior review documentation for production related infrastructure All prior review procurements will be submitted with the information sheet (template provided to OPM) with an economic and financial analysis for the investment and a satellite image with the system layout. The uploading of technical designs in the online platform (accessible to all members of the community of practice and to IFAD) will be mandatory prior to receiving IFAD no-objection to announcing the tenders for works subject to prior review. | OPM | 03/ 2019 | [agreed] |
| Technical specifications for HDPE pipes installation Make the availability of butt welding equipment (and qualified operators) a mandatory qualification requirement for bidders whenever non-coiled HDPE pipe laying works are foreseen | OPM, Gewog Engineers | January/ 2019 | [proposed] |

Appendix 4.4 Terms of Reference for Additional OPM Staff Post MTR

Terms of Reference for CARLEP OPM Project Manager

The Project Manager will be a full time person with postgraduate degree, preferably in management and with at least five years' project management experience. S/he will report to the National Programme Director (NPD). His/her key responsibilities will be:

- Provide professional support to the NPD on critical aspects of project planning, management, and accountability
- In consultation with the OPM Component Managers, Partner Agencies and Dzongkhags develop a systematic planning methodology and formats for preparing AWPB aligned with CARLEP Objectives and Dzongkhags' development strategies
- Jointly with the Business Development and Marketing Focal Point, develop simple formats for preparing investment proposals (sub-projects) with detailed business plans
- Integrate AWPB preparation by working closely with OPM Component Managers/Focal Points, the Dzongkhag Focal Points and Partner Agencies as per AWPB guidelines and CARLEP Objectives
- Conduct six-monthly review of AWPB and provide feedback to all implementing units
- Develop partnerships with financial institutions to facilitate credit to groups and entrepreneurs
- Ensure compliance to reporting requirements related to the programme activities including preparation of Annual Progress reports, quarterly progress reports and M&E requirements.
- Manage schedule of meetings and ensure that the minutes of the meeting(s) are prepared and transmitted as per requirements
- Organize management meetings, portfolio performance reviews, AWPB planning and review meetings and other review meetings.
- Identify areas of advocacy and policy influencing and work with other project staff and components for pursuing the agenda on advocacy and policy influencing
- Any other tasks as assigned by the NPD

Terms of Reference (ToR) for CARLEP OPM Engineer

The OPM Engineer will be mobilized and seconded to the OPM from the ARDC in Wengkhari. He/she shall hold at least a Diploma in Engineering (Agricultural, Environmental or Civil) and preferably have undertaken training/courses on irrigation and climate change. Two part-time positions in place of one full time will be a preferred option (each responsible for 3 Eastern Dzongkhags), in light of higher likelihood of sustainability and building up capacity within ARDC. The key functions of a OPM Engineer will be:

- Maintain and stimulate the use of the file sharing platform for "Climate Resilient Engineers of Bhutan", by adding new members as progressively involved in project activities and ensuring that relevant documents (technical references and designs) are uploaded timely (prior to requesting IFAD no Objection to the bidding documents);
- Support the investment planning process with engineering know how, providing coordination and harmonization of approaches across the concerned Dzongkhag/Gewog engineers;
- In collaboration with the OPM Marketing/Business Development specialist carry out a basic financial analysis of production-related infrastructure investments financed under CARLEP to be updated after implementation on the basis of field data (in collaboration with the OPM M&E/KM responsible staff.
- Ensure completeness of the design documentation prepared by the technical staff of the concerned Dzongkhags (i.e. layouts, profiles and details of structures) and inclusion of upgrading features (e.g. comprehensive coverage to ensure equitable access to irrigation water, improved resilience to floods at intakes and at runoff from side catchments) in the designs prepared by the Dzongkhag/Gewog engineers;

- Review BOQ and technical specifications included in the bidding documents for construction works financed under CARLEP, ensuring consistency and use of appropriate technologies;
- Carry out field visits during feasibility studies, design and supervision in support of the Dzongkhag/Gewog Engineers to identify optimal technical solutions for each site;
- Support the concerned Dzongkhag/Gewog Engineers on the principles of climate-resilient irrigation design and on the use of freeware software and smartphone apps to carry out site assessments, feasibility studies and design of irrigation schemes, as per the Guidelines developed by IFAD during the May 2018 ISM;
- Maintain a database on CARLEP financed Production-Related Infrastructure investments, including key physical data (e.g. area under canal systems upgrading or under piped systems upgrading, area under land development or protected by electric fencing, number of beneficiaries etc.). The database shall also include georeferenced layouts in .kmz (Google Earth) format highlighting the sections of the works financed under CARLEP and clearly marking the boundaries of the targeted areas;
- Consolidate the information on available water sources in targeted villages being collected by the Gewog engineers in a georeferenced database.
- Identify areas of advocacy and policy influencing and work with other project staff and components for pursuing the agenda on advocacy and policy influencing
- Any other tasks as assigned by the NPD

Terms of Reference for CARLEP PMO Component Manager Marketing

The Component Manager for Marketing and Business Development will be responsible to manage the activities under Component 2. S/he will be responsible for the overall coordination of all the activities under Component 2. The incumbent will preferably have a degree in management and prior experience of handling the market development and marketing function in a development project. S/he may be deputed from RAMCO or recruited on contract. His/her key responsibilities will be:

- Overall coordination of the activities under Component 2
- Prepare a strategy for vegetable marketing through systematic involvement of the private sector for domestic and export markets
- Prepare a roster of wholesalers and transporters engaged in vegetable trade within the country and for exports
- Pilot the Multi Stakeholder Platforms (MSP) approach developed under the IFAD supported HVAP
- Prepare a matching grant manual to provide support to private sector players in vegetable marketing based on the examples of other IFAD-funded projects and obtain IFAD no-objection for the same
- Prepare guidelines and formats for approving co-financing proposals by vegetable producer groups to set up marketing infrastructure at Gowog levels and by individuals and Youth Groups to set up
- Prepare guidelines and formats for approving matching grant proposals by individuals and Youth Groups to set up enterprises
- Prepare ToT materials and organize training for Gowog and Dzongkhag Extension Officers in preparing Business Plans
- Support Groups in preparing business plans jointly with Institutional Development Focal Point and Gowog and Dzongkhag Extension Officers
- Identifying areas of advocacy and policy influencing and work with other staff and partners for pursuing the agenda on advocacy and policy.
- Any other task assigned by the NPD

Terms of Reference for CARLEP OPM Climate Change Adaptation Focal Point

The Climate Change Adaptation Focal Point will be a full time person deputed from the ARDC. S/he will have a postgraduate degree in Agriculture with specialisation/advanced training in sustainable agriculture and at least five years of experience in action-research and extension.

- Coordinate development and implementation of proven activities pertaining to climate smart farming
- Developing training materials for the training of extension staff in proven climate resilient farming systems across the project Dzongkhags
- Training Dzongkhag and Gowog Extension Staff in climate resilient production and processing in RNR sectors
- Document proven climate resilient production and processing activities for wider dissemination
- Identifying areas of advocacy and policy influencing and work with other staff and partners for pursuing the agenda on advocacy and policy.
- Any other task assigned by the NPD

Terms of Reference for CARLEP OPM Institutional Development Focal Point

The Institutional Development Focal Point will be a full time person contracted by the OPM. S/he will have a postgraduate degree in Social Work or Management and at least five years of experience in community mobilisation.

- Preparing guidelines for mobilization of community institutions (Producer Groups and Cooperatives)
- Developing training materials for the training of extension staff in mobilisation and development of groups, including internal governance, group cohesion, administrative systems, financial management, business development, etc.
- Training Gowog Extension Staff in group formation and development
- Designing administrative systems for groups, including record keeping, accounts, etc.
- Facilitating registration of groups with RAMCO
- Designing systems for rating of groups
- Organising periodic review and rating of groups
- Developing MIS for OPM to collect data regarding groups and cooperatives
- Identifying areas of advocacy and policy influencing and work with other staff and partners for pursuing the agenda on advocacy and policy.
- Any other task assigned by the NPD

Partnership-Building

| Partner Name (may also include networks, multi-stakeholder partnerships etc.) | Details of partnership <i>Indicate whether NGO, INGO, UN agency, Government agency etc. Is the partnership based on written agreement? Provide any additional details about the partnership</i> |
|--|---|
| Cofinancing partnerships | |
| Royal Government of Bhutan (MOAF and Dzongkhags) | RoGB is the lead cofinancier and through MOAF is well engaged and committed to CARLEP's success. While there has been low utilization of government funds from CARLEP both at AWPB and expenditure level the Dzongkhags: showed clear cases of complementary district interventions as part of CARLEP activities that reached CARLEP beneficiaries but were not budgeted under the project. |
| Beneficiary cofinancing | Noting that the mission found considerably more cofinancing on the ground as opposed to what was targeted or has been recorded to date and should increase further over the next three years. Beneficiary contributions not included to date are |

| | |
|--|--|
| | loans they have taken to establish their enterprises showing a clear commitment to making their investments work |
| KM and Policy partners | |
| ARDC | ARDC is an active partner supporting new agricultural technologies and passing these on to farmers working closely with them and OPM. They are also investigating the possibility to increase seed production to a level that would make seed processing and packaging viable. To a small degree policy areas that impact on agriculture are discussed and shared with MOALF |
| Private Sector | |
| KIL | KIL has shown itself to be committed to ensuring that farmers get a fair price, they have also invested strongly in the development of increased production and have put resources towards equipment and access to collection centres. They have also supported the farmers organisations to participate in decision making (e.g. price for milk) and have a plan once the FOs are strong enough to bring them in as shareholders. |
| Youth Groups (Mongar) | CARLEP has piloted two co-investments in YG initiatives (one of young women processing dairy products and one with young men producing baked goods, through a call for proposals, The process needs further refinement but is encouraging and has received support from RAMCO. Such initiatives also need further support in business planning and to broaden their access to wider markets. |
| Coordination/Implementing Partners | |
| RAMCO | RAMCO is the government agency supporting the development of vegetable marketing by groups, market related infrastructure, though it has very limited staff. They are also in a position to support the strengthening and formalization of FOs. |
| Multi-stakeholder partnerships | These are to be developed further as they are at the initial stage and should show growth over the next two years. They need to further develop competitiveness by engaging with more traders |
| NSC | The NSC engagement with CARLEP is growing and they are to investigate opportunities to establish a vegetable seed processing and packaging plant linked to seed producers' network |
| FCBL | As FCBL is now mandated to focus on exports and bulk marketing and has not implemented VC activities implementation arrangements will be reviewed to shift the focus on supporting the role of the private sector to commercialise agriculture. In this situation the partnership MoU with FCBL will be revised reflecting their withdrawal from CARLEP.. |
| Bhutan Trust Fund for Environmental Conservation | BT FEC with ARDC has supported the installation of solar powered electric fencing systems for protection against wildlife intrusion. |

Bhutan

Commercial Agriculture and Resilient Livelihoods Enhancement Programme Mid-term Review

Appendix 5: Mission preparation and planning, TORs, schedules, people met

Mission Dates: 24 November – 7 December 2018
Document Date: 16/02/2019
Project No. 1100001739
Report No. 4990-BT

Asia and the Pacific Division
Programme Management Department

Appendix 5: Mission Preparation and Planning, TORs, Schedules, People met.

TERMS OF REFERENCE FOR CONSULTANTS AND OTHER PERSONS HIRED BY IFAD TO PARTICIPATE IN MISSIONS UNDER A NON-STAFF CONTRACT

COUNTRY OF ASSIGNMENT/LOCATION: Bhutan Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP) [IFAD Loan No: 2000000627; IFAD Grant No: 2000000838; ASAP Grant No: 2000000872], Mid Term Review

MISSION NAME: Mid-Term review mission

MISSION START AND END DATES: 24 November – 7 December 2018

REPORT TO: Ms Louise McDonald, Country Programme Manager, APR/PMD
(name, title, Division/Department)

MISSION COMPOSITION: (Team members full name and specialization)

| | Name | Thematic areas |
|---|--|--|
| 1 | Deep Joshi, IFAD Consultant | Mission Leader; Programme Management; Value Chains, Institutions |
| 2 | Mr A. Alam, IFAD Consultant | EFA |
| 3 | Emmanule Jouve, IFAD Consultant | ASAP; Climate Change |
| 4 | Carlo Marcello Spinello, IFAD Consultant | Financial Management |
| 5 | Mehri Ismaili, IFAD, Rome | M&E & KM; Gender, MIS |
| 6 | Michele Pirazzoli, IFAD Consultant | Infrastructure |
| 7 | Louise McDonald, CPM Bhutan | Partnerships |
| 8 | Elisa Festa, IFAD Rome | Stories from the field |
| 9 | Nilda Rosana Hidalgo, IFAD Rome | Stories from the Field |

BACKGROUND:

1. The Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP) aims to facilitate the transformation of a subsistence-based rural agricultural economy into a sustainable value chain and market driven productive sector by promoting climate smart approaches in agriculture and strengthening capacities of communities and local institutions. It builds on prior and on-going IFAD interventions focused on increased agricultural production and makes a basic shift in approach towards marketing and climate resilient farming practices.
2. The programme will target selected Gewogs in six eastern Dzongkhags (Lhuentse, Mongar, Pergatshel, Samdrup Jongkhar, Trashiyangtse and Trashigang) with high production and marketing potential in the selected value chains. The programme will benefit 28,975 smallholder households, of which 7,115 HH will directly benefit from vegetable and dairy value chains. The objective is “increased returns to smallholder farmers through climate resilient production of crops and livestock in nationally organized value chains and marketing systems.” The total programme cost of USD 30.357 million will be financed over seven years by IFAD (USD 19.25 million), the ASAP (USD 5 million), RGoB (USD 5.64 million), FCBL (USD 4.80 million) and beneficiaries (USD 0.66 million).
3. CARLEP has three programme components, in addition to Programme Management. The components are interlinked and will be implemented in close coordination and phased across the programme lifetime.

- Component 1. Market-led sustainable agriculture production would lead to sustainable increase in resilient agricultural production by rural households.
- Component 2. Value chain development and marketing focuses on instituting organised value chains and marketing systems by establishing networks of farmer groups to facilitate marketing of vegetable and dairy products
- Component 3. Institutional support and policy development aims at strengthening agricultural institutions and policies for improved and resilient agricultural and marketing practices.

The programme became effective from 11 December 2015.

MISSION OBJECTIVES AND OUTPUTS:

The objective of the mission is to review current performance, provide guidance or new solutions for on-going challenges and to ensure that it is in line with the Government's new Development Plan. The Key Outputs include:

- An Aide Memoire
- The full MTR as per the IFAD Guidelines
- Draft Management Letter

INDIVIDUAL RESPONSIBILITIES, EXPECTED OUTPUTS AND REQUIRED COMPLETION DATES

Mr Deep Joshi will lead the mid-term review of CARLEP and in addition, he will be responsible for carrying out a thorough review of Programme Management; Value Chains, Institutions with the team specialists. More specifically, he will:

- Review overall progress of the project, especially on the agreed actions of the last supervision mission in 2017.
- Assess the coherence of project components based on the analysis of physical and financial progress, coordination among component heads and field teams, and results on the ground.
- Review the implementation procedures for CARLEP and carry out an analysis of strengths and weaknesses as well as the relevance of the adopted procedures to the context and stated outcomes of CARLEP.
- Review the baseline study, the value chain studies and the cluster delimitation.
- Assess the capacity of state, district and block level staff to coordinate and implement the activities planned.
- Review the management structure of the project, the staff allocation and the delegation of powers to component heads as well as district/block units and assess whether improvements are observed as a result of the implementation of the 2017 supervision mission recommendations in this regard.
- Recommend changes to the project structure in terms of components/ activities, implementation approach, institutional set-up and revise with inputs from MTR team and CARLEP PMU the targets for the project outputs and outcomes for the remainder of the project implementation period.
- Coordinate with the Economist the revision of the project cost tables and updating of the project's EFA.
- Revise the project logframe.
- Lead the drafting and finalize the Aide memoire in discussion with the Mission members, project team and inputs provided by the Government at the wrap up meeting.
- Prepare the draft Management letter to be issued post MTR.

Lead the drafting of the MTR report for CARLEP.

Mr M. A. Alam will participate in the mid-term review mission of CARLEP as the Economist of the mission. He will be responsible for the revision of the project costs and the update of the economic and financial analysis of the project. He will be responsible for:

- Work with the financial management specialist of the mission on determining project expenditures by component/ category of expenditure and financier and work out the balance of financing resources for the various financiers of the project.
- Review the financial reporting of the project and analyze the profile of expenditures.
- Analyze the relationship between physical and financial progress in terms of change in unit costs, change in scale of interventions, change in mobilization of funds from IFAD, RGoB and other financiers.
- Update the farm and enterprise models based on information provided by mission members, PMU and field visits. In this regard, assess the validity of the assumptions made at design for the C/B analysis and calculation of EIRR.
- Assess the financial viability of these interventions based on the C/B analysis and the adoption rates by farmers.
- Assess whether the project is on target to achieve the planned EIRR In close coordination with the mission leader, revise the project COSTAB based on the recommendations of the MTR agreed with project and governments.
- Indicate whether any loan reallocation would be required.
- Contribute to the drafting of the aide mémoire of the mission;

Prepare two annexes: (i) the updated financial and economic analysis of the project; (ii) the projects costs post MTR.

Mr Michele Pirazzoli will participate in the mid-term review mission of CARLEP as the Civil engineer of the mission reviewing all civil works constructed/ renovated under the project. He will work closely with the mission leader and the value chain specialist and will be responsible to:

- Review the design and supervision of a sample of civil works under components 1 and 2. The review will cover design plans, supervision of works, and average unit costs, etc.
- Determine whether the civil works are of good quality and within acceptable costs.
- Review the operation and maintenance arrangements for all civil works and infrastructure constructed by the project.
- Review the progress made in the achievement of road construction activities for production and marketing and to market development.
- Recommend measures to improve effectiveness of the design, implementation and supervision of civil works and revise the project outputs and outcomes as appropriate.
- Work with the Economist of the mission to update the costs of the project activities.
- Contribute to the aide mémoire.
- Contribute a guidance note on design, implementation and supervision of civil works, as well as operation and maintenance arrangements.

Mr. Emmanuel Jouve Climate Change and Environment Specialist, will provide suitable implementation support and recommendations as well as assess to what extent the development goal, objective, outcomes and outputs have been achieved on core environment and climate related aspects of the Programme. The assessment will include:

- Review Programme initiatives in implementing innovative practices and technologies for adaptation and resilience building of smallholder farmers (including considerations for indigenous best practices extension, market linkages, infrastructure development).
- Review implementation modalities under interventions in Vegetable and Dairy Value chains and climate smart villages (CSV) and assess to what extent climate change adaptation capacity has been enhanced.
- Review measures taken to improve climate proofing of infrastructures including irrigation schemes and propose improvements where required.
- Assess the participatory local level planning processes, and provide suggestions on mainstreaming climate risk analysis, including investment prioritisation with considerations for future climate scenarios.
- Review capacity building needs of the Programme staff, Dzongkhag officials and implementing partners to address core environment and climate change aspects in the Programme activities.
- Provide technical and operational inputs on the design and management of activities related to climate resilient agriculture as well as infrastructure, and share lessons learned as appropriate.
- Review project interventions in renewable energy and permaculture and assess the potential for further scaling-up of models and technologies. This will include discussions with key staff, including PD and Component Managers to observe progress for pilot testing the flexi biogas units (piloted under the IFAD supported Adaptation for Smallholders in Hilly Areas (ASHA) project in Nepal). Based on the last SM, other technologies' potential will be reviewed for further replication under post-harvest management such as biogas in communal cow sheds, solar energy for drying etc.
- Contribute in the aide memoire in consultation with the ML and prepare a WP providing technical inputs on environment management and climate change adaptation that need to be addressed by the Programme.

Ms Mehry Ismaili Monitoring & Evaluation (M&E) Specialist works in guidance of the Mission Leader closely with the other members of the team and the OPM staff responsible for M&E and MIS. Specific responsibilities include:

M&E and MIS

- Review the M&E and MIS system to assess the level of adequacy of data and information contained; identify gaps and suggest measures to mitigate the gaps to ensure that required data and information is available;
- Ensure consistency of data and information recorded in the project database; carry out a few sample test during the field visit to ensure the level of accuracy;
- Provide guidance for RIMS Endline survey to ensure that required data and information is collected to report to the key logframe indicators;
- Guide the project in consolidating the data and information required to assess the project's effectiveness
- on i) project target and output delivery, ii) project outcomes and impact, and iii) targeting and outreach;
- Review of the logframe and validate the RIMS data;
- Contribute to mission aide memoire and main report in consultation with the ML;
- Any other tasks that may be assigned by the ML and CPM.

KM

- Review the projects KM strategy, action plan and resourcing.
- Review the implementation of KM part in view of the Project's KM Strategy and adopted approach and guide the project to identify innovations, best practices and lessons learned through the implementation of various value chains;
- Provide guidance in documenting the influences of the project's innovations, best practices and lessons learned to similar development projects/programmes in the country and beyond
- Provide guidance to prepare a full list of the priority KM themes and KM products to be prepared in the coming 12 months - including operational documents to be prepared (published/unpublished) by the project and to upload all these documents in the project website for the benefit of wider audiences;
- Support the project in identifying the innovative tools, best practices/case studies developed and successfully applied that can help accelerate CARLEP implementation
- Provide guidance to prepare a full list of the KM products including operational documents prepared (published/unpublished) by the project and to upload all these documents in the project website for the benefit of wider audiences;
- Support the project in identifying the innovative tools, best practices/case studies developed and successfully applied; provide guidance in consolidating and compiling them
- Any other tasks that may be assigned by the ML and CPM.

Mr Carlo Marcello Spinello, FM Specialist, Using the IFAD FMAQ as the basis to collect the relevant information, the FM specialist will assess strengths and weaknesses of FM systems, internal controls and financial reporting to ensure that they satisfy IFAD's fiduciary requirements and comply with the Financing Agreement, LTB and applicable financial/ accounting manual. He will:

- Based on the financial reports prepared by the project, assess financial performance to date by expenditure category and component against (i) appraisal and (ii) approved AWPBs since project start. Review the cumulative status of funds by category of expenditure, approved AWPB and project commitments (contracts signed not paid) in order to estimate the adequacy of funds and potential requirement for category reallocations;
- Review financial execution of current AWPB and obtain explanations for significant budget-to-actual variances, identifying actual or potential bottlenecks. Comment on the project's budget monitoring system;
- Review the functionality and efficiency of accounting and financial reporting systems (including Government reporting); identify accounting basis and standards used; report differences with international standards. Specify accounting software used, whether budget is posted, indicate the software's capacity to generate automated reports and any limitations. Assess timeliness of recording transactions, budget posting and reconciliations. Comment on suitability of chart of accounts;
- Review availability of counterpart funds, beneficiary and co-financier contributions (as relevant), identifying bottlenecks if any. Ensure that in kind contributions from government and beneficiaries, as applicable, are estimated and recorded by the project;
- Assess the project's treasury planning; confirm adequacy of DA authorised allocation with respect to projected expenditure requirements. Assess regularity of withdrawal application preparation. If the project's disbursement performance is less than satisfactory, recommend concrete financial or operational measures for improvement;
- Review the financial situation and FM capacity of field offices and implementing partners receiving funds for the project and assessing the quality and regularity of their financial reporting to the central coordination unit;
- On a sample basis, review SOEs prepared since the last field review to verify adequacy, completeness and validity of claims by performing a system walk-through. For this mission, sampling should be done on 30% basis, across all expenditure categories. Document findings using IFAD's SOE review template, highlight any ineligible expenditures and any internal control weaknesses noted in the expenditure approval process. Comment on the organisation of financial records and adequacy of filing systems;
- Ascertain status of preparation and submission to IFAD of unaudited annual financial statements if relevant for the period; review draft as applicable. Validate the latest Interim Financial Report (IFR), if applicable;
- Describe banking arrangements (central and sub-levels if applicable). Verify effectiveness and frequency of reconciliation procedures for the project's designated and other accounts. Review the project's current designated account reconciliation. Validate closing balances against bank statements and clarify the status of reconciling items (if any);
- Assess contract management; verify maintenance of contract register, contract monitoring forms, register of advances; highlight outstanding advances (ageing analysis); verify compliance with audit requirements foreseen in contracts and/or MOUs, as applicable;
- Review project's financial management procedures as regards travel, vehicles/fuel and IT. Verify accounting for assets, maintenance of fixed asset register and inventory procedures – check latest inventory report;

- Describe internal audit arrangements including reporting lines, methodology/procedures, audit work plan and status/follow up on past recommendations; review IA reports if available, describe findings;
- Review latest external audit report and project's audit log, assess status of implementation of management letter recommendations and audit action plan. Verify status of preparation of upcoming audit and make recommendations as appropriate for extending the scope of audit to specific implementing entities, physical checks, performance audit, transaction list or other;
- Report to mission leader on any breach of financial covenants in the legal agreement or General Conditions;
- Review action taken to address recommendations of previous FM-related mission;
- Contribute to relevant sections of the mission Aide Memoire and SM report including data, field observations, project results, findings and recommendations, in line with deadline agreed with Team Leader, following ORMS structure and FMA guidelines.

Ms Elisa Festa and Ms Nilda Rosana Hidalgo will assist the mission with the following tasks:

- Assist the M&E Specialist on the review of the Programme logframe and annual achievements, review the annual RIMS reporting and support the M&E Specialist in the validation of the data;
- Assist the M&E Specialist to review the achievements of core IFAD indicators against targets; Review the Agreed action from the previous supervision mission and monitor the status;
- Review the status and the functioning of the geo-reference information to be translated into maps;
- Analyze the Programme KM strategy and action plans, scout innovation and learning under the various components that can be scaled up and provide suitable recommendations;
- Propose outline for communication strategy; Report stories from the field;
- Any other related tasks as may be assigned by the Mission Leader and by the Country Programme Manager.

DOCUMENTATION

The following documentation will be made available to consultants prior to the assignment:

IFAD MTR Guidelines
 Financing Agreement
 Project design report
 Supervision mission report
 AWPBs
 COSTAB

Programme in the field

| Date/Day | Program |
|---------------------|--|
| 23 Nov, (Friday) | OPM receive IFAD Mission at Bhutan entry gate, Samdrup Jongkhar via Guwahati, India |
| 24 Nov, (Saturday) | <ul style="list-style-type: none"> Progress Update by OPM Finalization of the field programme at Hotel, Samdrup Jongkhar Visit to Regional Office Samdrup Jongkhar (Optional) Courtesy dinner to Dasho Dzongdag, Samdrup Jongkhar (Optional) |
| 25 Nov, (Sunday) | <ul style="list-style-type: none"> Visit to Samdrupcholing (Vegetable group, Martang, dairy group) |
| 26 Nov, (Monday) | Group -1: Travel to Pemagatshel <ul style="list-style-type: none"> Visit the Lead Farmer Field at Shumar (Aum Sangay) Visit Seed producer at Nangkor |
| | Group-2: Travel to Kangpara (Climate Smart Village, Irrigation renovation with Climate proofing activity) |
| 27 Nov, (Tuesday) | Group -1: <ul style="list-style-type: none"> Visit to RLDC Kanglung Courtesy dinner to Dasho Dzongdag, Trashigang (Optional) |
| | Group-2: <ul style="list-style-type: none"> Visit to Ranshikhar MCC and meet with dairy farmers. Courtesy dinner to Dasho Dzongdag, Trashigang (Optional) |
| 28 Nov, (Wednesday) | Travel to Trashiyangtse <ul style="list-style-type: none"> Visit to Koufuku, Dairy processing plant, Chenarey, en-route to T/Yangtse Grp 1. Visit Kinzang Wangdi dairy farm at Chungdu Grp 2. Visit Milk Processing and Yogurt Plant at Yangtse Courtesy dinner to Dasho Dzongdag, Trashiyangtse (Optional) |
| 29 Nov, (Thursday) | Group-1: Travel to Mongar (En-route visit Ballam vegetable group) <ul style="list-style-type: none"> Visit to water efficient, Yadi |
| | Group-2: <ul style="list-style-type: none"> Visit to Land Use Certificate (LUC) group Tshendung Visit Rabkhar-Tshotsang Irrigation Channel at Khamdang, en-route to Mongar |
| 30 Nov, (Friday) | Travel to Lhuentse <ul style="list-style-type: none"> Visit Jagorbee youth group at Metsho Courtesy dinner to Dasho Dzongdag, Lhuentse (Optional) |
| 1 Dec, (Saturday) | Travel to Mongar and Visit RAMCO <ul style="list-style-type: none"> Visit to milk sale counter at Vegetable market, Mongar Visit to Food processing group at Trailing Visit Themnangbee Community-based Artificial Insemination Technician (CAIT) |
| 2 Dec, Sunday | <ul style="list-style-type: none"> Visit ARDC, OPM Travel to Younphala/Thimphu (Two IFAD HQ staff) |
| 3 Dec, (Monday) | Pre wrap-up meeting |
| 4 - 5 Dec | Travel to Thimphu |
| 6 Dec | Report Writing |
| 7 Dec, (Friday) | Morning - Report writing Evening - Wrap-up meeting |
| 8 Dec, (Saturday) | Mission departure |

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LIST OF PERSONS MET

| DATE | NAME OF OFFICIALS | DESIGNATION | PLACE WHERE OFFICIAL MET | DZONGKHAG |
|------------|-------------------------|--------------------------------------|---|------------------|
| 25.11.2018 | Dasho Therchen Lhendrup | Dzongdag | Samdrup Jongkhar | Samdrup Jongkhar |
| | Mr. Rinchen Dorji | Gewog Administration Officer | Orong | Samdrup Jongkhar |
| | Mr. Yeshe Wangpo | Livestock Extension | Orong | Samdrup Jongkhar |
| | Mrs. Pelden Tshomo | Agriculture Extension | Orong | Samdrup Jongkhar |
| | Mr. B.N Sharma | Dzongkhag Livestock Officer | Orong | Samdrup Jongkhar |
| | Mr. Chorten Gyeltshen | Dzongkhag Agriculture Officer | Orong | Samdrup Jongkhar |
| | Mr. Yeshe Jatsho | Livestock Production Officer | Orong | Samdrup Jongkhar |
| 26.11.2018 | Mr. Rinzin Namgay | Livestock Extension | Kangpara | Trashigang |
| | Mr. Pema Dorji | Agriculture Extension | Kangpara | Trashigang |
| | Dasho Phuntsho | Dzongdag | Pema Gatshel | Pema Gatshel |
| | Mr. Tashi Phuntsho | Dzongkhag Agriculture Officer | Pema Gatshel | Pema Gatshel |
| | Mr. Thinley Rabten | Dzongkhag Livestock Officer | Pema Gatshel | Pema Gatshel |
| | Mr. Sha Bahadur | Agriculture Extension | Pema Gatshel | Pema Gatshel |
| | Mr. Tshering Dorji | Asst. Dzongkhag Agriculture Officer | Pema Gatshel | Pema Gatshel |
| | Mr. Sangay Tenzin | Asst. Dzongkhag Livestock Officer | Pema Gatshel | Pema Gatshel |
| 27.11.2018 | Mr. Kinga Dechen | Asistant Dzongkhag Livestock Officer | Trashigang | Trashigang |
| | Mr. Pema Mashok | Livestock Extension | Samkhar | Trashigang |
| | Mr. Karma Jamtsho | Accountant | Regional Livestock Development centre, Kanglung | Trashigang |
| | Mr. Younten | Livestock Production Asst. | Regional Livestock Development centre, Kanglung | Trashigang |
| | Mr. Tsundru Zangpo | Livestock Extension | Regional Livestock Development centre, Kanglung | Trashigang |
| 28.11.2018 | Mr. N.S Tamang | Dzongkhag Livestock Officer | KOUFUKU, Chenangri | Trashigang |
| | Mr. Karma Tenzin | Livestock Production Officer | KOUFUKU, Chenangri | Trashigang |
| | Mr. Ugyen Dendup | Chief Executive Officer | KOUFUKU, Chenangri | Trashigang |
| | Mr. Sabjok Bishwa Karma | Manager | KOUFUKU, Chenangri | Trashigang |
| 28.11.2108 | Dasho Thuji Tshering | Dzongdag | Tashi Yangtse | Tashi Yangtse |
| | Mr. Kuenzang Peldon | Dzongkhag Agriculture Officer | Tashi Yangtse | Tashi Yangtse |
| | Mr. Phurpa Tshering | Dzongkhag Livestock Officer | Tashi | Tashi Yangtse |

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| | | | | |
|------------|------------------------|-------------------------------------|--|---------------|
| | | | Yangtse | |
| | Mr. Dawa Dem | Agriculture Extension | Tashi Yangtse | Tashi Yangtse |
| | Mr. Sangay Cheda | Livestock Production Officer | Tashi Yangtse | Tashi Yangtse |
| | Mr. Chimi Drakpa | Asst. Dzongkhag Agriculture Officer | Tashi Yangtse | Tashi Yangtse |
| | Mr. Cheki | Asst. Dzongkhag Livestock Officer | Tashi Yangtse | Tashi Yangtse |
| | Mrs. Kunzang Peldon | Dzongkhag Agriculture Officer | Tashi Yangtse | Tashi Yangtse |
| 29.11.2018 | Mr. Sonam Norbu | Livestock Extension | Yadi | Mongar |
| | Mr. Sonam Phuntsho | Agriculture Extension | Balam | Mongar |
| | Mr. Khampa | Dzongkhag Agriculture Officer | Balam | Mongar |
| 30.11.2018 | Mr. Phurpa Tshering | Dzongkhag Livestock Officer | Tangmachu | Lhuntse |
| | Mr. Dawa Dorji | Livestock Production Officer | Tangmachu | Lhuntse |
| | Mr. Sonam Phuntsho | Livestock Extension | Tangmachu | Lhuntse |
| | Mr. Kinzang Thinley | Asst. Dzongkhag Agriculture Officer | Menji | Lhuntse |
| | Mr. Pema Khando | Agriculture Extension | Menji | Lhuntse |
| | Mr. Sherub Gyeltshen | Gewog Administration Officer | Menji | Lhuntse |
| | Ngawang Dorji | Accountant | Lhuntse | Lhuntse |
| 1.12.2018 | Dasho Cheda Jamtsho | Dzongrab | Mongar | Mongar |
| | Mr. Thinlay | Dzongkhag Planning Officer | Mongar | Mongar |
| 2.12.2018 | Mr. Lhab Dorji | Program Director | ARDC, Wengkharchu | Mongar |
| | Mr. Sonam Gyeltshen | Research Officer | ARDC, Wengkharchu | Mongar |
| | Ms. Pema Lhaden | Agriculture Supervisor | ARDC, Wengkharchu | Mongar |
| | Ms. Sonam Peldon | Agriculture Supervisor | ARDC, Wengkharchu | Mongar |
| | Mr. Sonam Rinchen | Agriculture Supervisor | ARDC, Wengkharchu | Mongar |
| | Mr. Karma Tenzin | Research Asst | ARDC, Wengkharchu | Mongar |
| | Mr. Sangay Jamtsho | Research Asst | ARDC, Wengkharchu | Mongar |
| 3.12.2018 | Mr. Dorji Rinchen | Specialist | RAMCO | Mongar |
| | Mr. Karma Tenzin | Asst. Marketing Officer | RAMCO | Mongar |
| | Mr. Tek Bdr. Tamang | Asst. Marketing Officer | RAMCO | Mongar |
| | Mr. Tshering Gyeltshen | Asst. Marketing Officer | RAMCO | Mongar |
| | Dr. Tshering Dorjee | Regional Program Director | RLDC | Trashigang |
| 7.12.2018 | Dasho Rinzin Dorji | Secretary | MoAF | Thimphu |
| | Dasho Ugyen Penjore | Director General | Department of Marketing and Corporatives | Thimphu |
| | Mr. Naiten Wangchuk | CEO | FCBL | Phuntsholing |
| | Dr. Timsina | Specialist | Department of Livestock | Thimphu |
| | Mr. Wangda Drukpa | Chief Research Officer | Department of Agriculture | Thimphu |
| | Mr. Kencho Thinley | Chief PPD | MOAF | Thimphu |
| | Mr. Dorji Phuntsho | Sr. Finance Officer | DMEA, MOF | Thimphu |
| | Mr. Nima Sherpa | Sr. Planning Officer | MOAF | Thimphu |

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From 23 November to 7 December the OPM staff members listed below accompanied the mission

| | | | |
|--------------------|------------------|---------------|--------|
| Mr. Dorji Wangchuk | Program Director | OPM, Wengkhar | Mongar |
| Mr. Karma Tenzin | M&E | OPM, Wengkhar | Mongar |
| Mr. Ugyen Wangdi | CM, Agriculture | OPM, Wengkhar | Mongar |
| Mr. Sangay Choeda | CM, Value Chain | OPM, Wengkhar | Mongar |
| Mr. Jigme | Finance Officer | OPM, Wengkhar | Mongar |
| Mr. Ugyen Wangchuk | Accountant | OPM, Wengkhar | Mongar |
| Mr. Sangay Choeda | PSO | OPM, Wengkhar | Mongar |