Executive Board

Report to the President
Proposed additional financing to
Republic of Liberia
Tree Crops Extension Project II (TCEP-II)

Project ID: 2000001543

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Action: According to the delegation of authority procedure approved by the Executive Board at its 126th session and detailed in document EB 2019/126/R.48/Rev.2, the President is invited to approve the recommendation for the proposed additional financing contained in paragraph 57.

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Financing summary

Initiating institution:	IFAD
Borrower/recipient:	Republic of Liberia
Executing agency:	Ministry of Agriculture
Total project cost:	US$47.6 million
Amount of original IFAD loan:	US$11.9 million
Amount of original IFAD Debt: Sustainability Framework (DSF) grant	US$11.9 million
Terms of original IFAD financing:	Highly concessional: 40 years, including a grace period of 10 years, with a service charge of 0.75 per cent per annum and DSF grant
Amount of additional IFAD loan:	US$7.2 million
Terms of additional IFAD financing:	The Loan is granted on Ordinary terms, Category 1 will be free of service charge and shall be provided with interest consisting of a market-based variable reference rate, a variable spread, and a maturity premium differentiated by the country income and classification. The loan is payable semi-annually in the Loan Service Payment Currency. The Loan shall have a maturity period of up to thirty-five (35) years, including a grace period of up to ten (10) years starting from the date of approval of the Loan with an average maturity of up to twenty (20) years. The principal of the Loan will be repaid with fixed repayments of the principal amounts once the grace period elapses.
Contribution of borrower/recipient:	US$2.5 million
Contribution of private sector	US$3.4 million
Contribution of beneficiaries:	US$1.8 million
Financing gap:	US$7.0 million
Cooperating institution:	IFAD

I. Background and project description

A. Background

1. The Tree Crops Extension Project II (TCEP-II) was approved by IFAD's Executive Board through the Lapse-of-Time procedure on 1 December 2018 (EB 2018/LOT/P.16). The Financing Agreement was ratified in country on 17 September 2019 and the first disbursement was effectuated on 11 February 2020. The original completion date of the project is 30 September 2025, which will not be changed with the additional financing.

2. The project was designed with a financing gap of US$16.2 million, of which US$9.2 million aimed to finance the rehabilitation of rural roads and farm tracks in the project area and US$7 million to finance climate-smart investments under the project.

3. On 10 August 2020, IFAD approved a US$2 million additional financing to the project, to partially fill the financing gap on rural road and farm track rehabilitation and maintenance activities. The amendment of the financing agreement was ratified by the Government of Liberia on 08 June 2022. The project financing gap for rural infrastructure activities remains in the amount of US$7.2 million.

B. Original project description

4. The goal of TCEP-II is to increase incomes and improve the livelihoods of poor rural smallholder cocoa farming households in Lofa County. The project's development objective is to improve the incomes and climate resilience of smallholder cocoa producers in Lofa County.

5. TCEP-II aims to address the key bottlenecks to the performance of the cocoa value chain in Lofa County, intervening at its different levels and benefiting both producers and other players such as input suppliers and farm-to-market operators (FMOs). It adopts a cocoa value chain approach with a focus on transaction volume, quality, yields and farm gate prices, while building agribusiness linkages and institutional capacity of key stakeholders, such as cooperatives, germplasm stations, extension services and related public services. To complement this intervention, an important component of the project is related to the investments in roads rehabilitation, to facilitate access to markets and connections among the different actors of the cocoa value chain.

6. The project aims to benefit about 15,000 households (HHs) of which 10,000 will be from cocoa smallholder farmers; the other 5,000 will benefit from roads, input supplies, market linkages and spill over effects along the value chain. Considering an average household size of 4.28, this adds up to 64,200 household members.

II. Rationale for additional financing

A. Rationale

7. This additional financing proposal is aimed at filling the financing gap identified at design in TCEP-II related to the investments in the infrastructure sector, reaching the target of roads rehabilitated foreseen at design (110 km of feeder roads and 270km of farm tracks). The provision of adequate and sustainable roads between farms and markets proved beneficial in previous projects in the country, like the Smallholder Tree Crop Revitalization Support Project (STCRSP), and had been consequently included in the TCEP-II design.

8. In Lofa county, infrastructure, in particular farm-to-market roads, remain inadequate, leaving large gaps for producers to access related markets. This results in underinvestment in agricultural production as well as significant post-harvest losses. It also undermines the ability of poor farmers, in particular those targeted by TCEP-II, to reach their productive potential and to access their effectively participate in

markets. While closing these gaps is often expensive, investing in farm to market roads rehabilitation has enormous potential to boost production, reduce post-harvest losses, reduce transport and transaction costs, and improve the competitiveness of poor cocoa producers while offering them more remunerative, diversified and resilient livelihoods.

9. Concerning the level of implementation of the project component on road rehabilitation, the PIU has awarded five contracts for the rehabilitation of 41.45 km feeder roads; these works should be completed by July 2023. Among the challenges faced in the implementation of these activities, there is the inaccessibility of these roads during the rainy season; the PIU is then committed to speed-up all future procurement processes to make sure that future works can be launched right before the dry season.

10. In implementing these activities, TCEP-II will build on the lessons learned from the previous project, STCRSP, particularly regarding the importance of road maintenance activities and the need to provide trainings to the communities that will be in charge of it following project completion. During the last project supervision, IFAD also requested the PIU to develop a road maintenance strategy. Additionally, through the ongoing experience with TCEP, the PIU is now able to prepare and launch procurement processes more efficiently, and can build on the fruitful partnership already established with the Ministry of Public Works.

11. TCEP-II overall performance has been rated slightly below moderately satisfactory (3.8) at the last supervision mission organised in December 2021. However, to date several progress have been made, particularly through the provision of inputs and services to enhance farm productivity and the finalization of procurement process for road rehabilitation. As of September 2022, the disbursement rate was 24 per cent, slightly low due to the slowdown in project implementation caused by the COVID-19 pandemic. However, the overall project performance remains positive.

12. This proposal therefore meets the requirements for additional financing, particularly the criteria that additional resources should be provided only to existing well-performing projects, whose objectives should be the same as the approved original financing.

13. Additionally, Liberia has not experienced any suspensions in the portfolio since the year 2000 and the current portfolio does not include any problem projects.

Special aspects relating to IFAD's corporate mainstreaming priorities

14. TCEP-II was approved before IFAD11, and so was not screened for IFAD11 mainstreaming criteria. However, the project embeds and effectively address gender, youth, nutrition and climate issues.

15. **Gender.** In Liberia, women play a fundamental role in agriculture as household food producers, providing over 60 per cent of the country´s agricultural labour. Yet, women own less land, and have lower access to agricultural inputs and technical services. TCEP-II is aligned to IFAD's Policy on Gender Equality and Women's Empowerment, and women should represent 25 per cent of total beneficiaries. All project staff and implementing partners have been trained on gender sensitive programming and many activities have been carried out to sensitize communities on women's rights to own land and on gender based violence. Given that the project has not reached its target of women beneficiaries yet, a Gender Action Plan has been developed to better guide the targeting strategy; quotas will be also applied to ensure that women participation to project activities increases.

16. **Youth.** Youth in rural areas experience high levels of unemployment and/or underemployment. While many youth do not find agriculture attractive, those in the sector face difficulties in accessing land, inputs and credit which constitutes an additional barrier. Since the last implementation mission, the project made some

progress in the targeting of youth, even if their participation is still below the target of 50 per cent. For this reason, the PIU has commissioned an assessment on youth inclusion in agricultural activities and the development of a strategy and action plan to help the project to better target youth.

17. **Environment and climate change.** Resilience to climate change has also been mainstreamed throughout the country programme. Latest results on project performance indicate that the project team has partially carried out the key activities related to environment conservation and sustainable natural resource management in alignment with project design and SECAP procedures. More specifically, the PIU has distributed improved seedlings to farmers, having drought and disease resistance ability. Additionally, trainings on the use of climate resilient practices such as adequate shade, crop diversification, pest and disease control, and cocoa germplasm have been carried out. Finally, the project has developed and distributed brochures, flyers and infographics on zero deforestation to farmers.

18. **Nutrition.** TCEP-II also comprises an entire sub-component aimed at improving nutrition among cocoa farmers beneficiaries. In particular, the project encourages crop diversification through intercropping on existing plantations for food and nutrition security; it is also promoting vegetable gardens and horticultural production. The project provided vegetable seeds and equipment to 20 groups of women in 2021, and plans to target a total of 80 groups until the end of the project; this intervention will be coupled with nutrition education. Description of geographical area and target groups

19. TCEP-II targets Lofa County given the importance of cocoa farming in this area. There will be no changes in the targeting strategy. The additional financing will allow reaching all beneficiaries foreseen at design, adding to the 10,000 cocoa smallholder producers, 5,000 other players within the cocoa value chain, such as input suppliers and farm-to-market operators that will benefit from road rehabilitation. Women and youth represent respectively 25 per cent and 50 per cent of all project beneficiaries.

B. Components, outcomes and activities

20. The project's components will remain the same as per original financing:

Component 1: Revitalization of cocoa plantations. The expected outcome of component 1 will be increased quantity and quality of cocoa sold by smallholders. This component comprises five subcomponents: 1.1) Basic rehabilitation and new cocoa plantations; 1.2) Improving post-harvest handling and quality; 1.3) Germplasm garden support; 1.4) Alternative livelihood activities (crop diversification through intercropping on existing plantations for food and nutrition security, shade management and income generation, and on new plantations before newly planted cocoa trees mature); and 1.5) Transformation of cocoa waste as an alternative income source.

Component 2: Rehabilitation and maintenance of roads. The expected outcome of component 2 will be improved and climate-proof access to markets. It contains two subcomponents: 2.1) Road construction, rehabilitation and climate proofing; and 2.2) Maintenance of roads. The additional financing complements the US$2 million already received by TCEP-II in 2020, and represents the major financial contribution to activities under Component 2 consisting of construction, rehabilitation and maintenance works of 110 km of farm to market roads connecting several communities to the markets or to the primary roads, and of the design and construction of up to 270 km of farm tracks. These are the targets set at design.

Component 3: Service provision for value chain development. The outcome of component 3 will be improved value chain organization and performance. This will be achieved through a set of concurrent activities divided into subcomponents: 3.1) Support to farmer organizations (including the establishment of business platforms for value chain players); 3.2) Improved market linkages through the construction of

humidity-controlled warehouses to store cocoa beans during the wet season when roads are not passable; 3.3) Support to extension service development and outreach; 3.4) Dry storage; and 3.5) Implementation support to the Government's strategy on reducing emissions from deforestation and forest degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks.

Component 4: Project coordination, management, monitoring and evaluation (M&E), and policy. Using the country programme approach, TCEP-II adopts a similar strategy to that of TCEP. This will ensure efficient and effective planning, implementation, M&E and knowledge management while considering environmental and climate change resilience. In addition, Component 4 will involve policy engagement activities and will drive gender and social inclusion, along with dialogue for establishing a functional road maintenance fund.

C. Costs, benefits and financing

Project costs

21. **Total cost.** The total cost of the project (including taxes and contingencies) for a period of six years (2019-2025) remains the same that at original design, i.e. US$47.6 million, including a current financing gap of US$14.2 million which will be reduced by US$7.17 million with this additional financing proposal. The US$7.2 million of additional financing will be allocated under Component 2, Rehabilitation and maintenance of roads.

Table 1
Original and additional financing summary
(Thousands of United States dollars)

	*Original financing**	*IFAD Additional financing 1*	*IFAD Additional financing 2*	*Total*
IFAD loan	11 913	1 460	7 170	20 543
IFAD grant	11 913	540	-	12 453
Financing gap	16 167	(2 000)	(7 170)	6 997
Private Sector	3 381			3 381
Beneficiaries	1 783			1 783
Borrower/recipient	2 487			2 487
Total	47 644			47 644

* See tables 2 in document EB 2018/LOT/P.16 for detailed breakdown.

Table 2
Additional financing: project costs by component (and subcomponent) and financier
(Thousands of United States dollars)

Component/ subcomponent	*Additional IFAD loan*		*Remaining Financing Gap*		*Total*
	Amount	*%*	*Amount*	*%*	*Amount*
1. Revitalization of cocoa plantations					
Subtotal A			1 628	100	1 628
2. Rehabilitation and maintenance of roads					
2.1 – Road construction, rehabilitation and climate proofing	4 362	65	2 319	35	6 681
2.2 – Maintenance of roads	2 808	76	906	24	3 714
Subtotal B	7 170	69	3 225	31	10 395
3. Service provision for value chain development					
Subtotal C			2 144	100	2 144
4. Project coordination, management, M&E and policy					
Total	7 170	51	6 997	49	14 167

Note: After the allocation of the US$ 7.17 million, there is still a financing gap of US$7 million that remains.

Table 3
Additional financing: project costs by expenditure category and financier
(Thousands of United States dollars)

	Additional IFAD loan		*Financing Gap*		*Total*
Expenditure category	*Amount*	*%*	*Amount*	*%*	*Amount*
1. Works	7 170	81	1 628	19	8 798
2. Goods, Services and inputs			3 225	100	3 225
3. Consultancies			2 144	100	2 144
4. Salaries and allowances					
5. Operating cost Unallocated					
Total	7 170	51	6 997	49	14 167

Project costs by component and project year (PY)
(Thousands of United States dollars)

	PY1		*PY2*		*PY3*		*PY4*		*PY5*		*PY6*		*Total*
Component/subcomponent	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*
1. Revitalization of cocoa plantations	2 332	4.9	3 396	7.1	3 413	7.2	2 731	5.7	1 787	3.8	737	1.5	14 396
2. Rehabilitation and maintenance of roads	*1 871*	*3.9*	*7 117*	*14.9*	*6 538*	*13.7*	*3 153*	*6.6*	*1 937*	*4.1*	*1 646*	*3.5*	*22 262*
3. Service provision for value chain development	96	0.2	369	0.8	448	0.9	520	1.1	558	1.2	583	1.2	2 574
4. Project coordination, monitoring and evaluation	975	2	789	1.7	1 056	2.2	913	1.9	1 359	2.9	3 318	7.0	8 410
Total	5 274	11	11 672	25	11 456	24	7 317	15	5 641	12	6 284	13	47 644

Financing and cofinancing strategy and plan

22. The remaining financing gap of US$7 million, equivalent to 14.7 per cent of the total cost of the project, was expected to be filled by other financers, such as the Green Climate Fund or the OPEC Fund for International Development. In January 2021, the Adaptation Fund allocated US$8.8 million to Liberia to finance the Building Climate Resilience Project (BCRP) in the cocoa and rice sectors. This project intervenes in three counties, including Lofa, where TCEP-II is also implemented. Despite the complementarities between the two projects, the Adaptation Fund financing has not been used to cover the existing financing gap in TCEP-II, that remains unfilled up to now. Additional sources of cofinancing will be sought in 2022.

Disbursement

23. Disbursement arrangements will remain unchanged as per the original agreement except for the updated paragraphs identified in the updated Letter to the Borrower shared with the Borrower and the project in July 2022. The disbursement of IFAD funds will flow through a designated account in United States dollars for IFAD financing in the central bank of Liberia (IFAD funds will not be mingled with other funds), and it will be processed against duly certified withdrawal applications in accordance with updated IFAD disbursement procedures. The conditions for the first withdrawal have been met, and the first withdrawal application was processed. The thresholds for Statement of Expenditures is US$200,000 equivalent. Consultancies and services provided by a third party based in the country will not be eligible for direct payments.

Summary of benefits and economic analysis

24. The economic and financial analysis remains unchanged as compared with the original project design. Hence, TCEP-II will benefit 10,000 smallholder cocoa farmers and 5,000 other beneficiaries through improved roads and value chain services. Considering the average household size of 4.3 in the project area, this totals 64,200 household members. An additional 5,000 people will benefit from better roads, stronger cooperatives and market linkages, the availability of improved planting material and better input-supply systems.

25. Component 1 is expected to lead to an increase in cocoa production, marketing and exports as a result of: (i) the revitalization of abandoned plantations; (ii) replanting of new trees; (iii) higher yields for smallholder farmers; (iv) higher farm-gate prices; and (e) higher-quality cocoa as a result of improved post-harvest handling and marketing. Benefits from Component 2 (rehabilitation and maintenance of roads) will include greater access to markets, reduced time and cost of reaching local markets, and limited post-harvest losses due to poor transportation conditions. Component 3 (service provision for value chain development) will enhance the delivery of quality services to cocoa farmers and guarantee sustainability through improved extension services and greater access to inputs and markets.

26. The economic results of the project are positive and significant, with an economic internal rate of return of 17 per cent and a net present value of additional benefits totalling US$15.2 million over 20 years against a social discount rate of 10 per cent. The sensitivity analysis indicates that the results are robust to a reduction in the rate of adoption, but sensitive to an overall reduction in benefits, increased costs and delays in implementation.

Exit strategy and sustainability

27. TCEP-II is adopting a multidimensional approach to ensure its sustainability. As already indicated in the design document, the following activities will play an important role in the project exit strategy: i) rehabilitation of abandoned cocoa plantations and replantation of new trees; ii) support to forest conservation, sustainable management of forests, and enhancement of forest carbon stocks; iii) institutional capacity building, particularly with the training of cooperative lead farmers to undertake extension service delivery. The inclusion of and support to the Central Agricultural Research Institute (CARI) as co-implementing partner for activities related to the seed garden are also part of the project exit strategy. Additionally, the project engagement in promoting land security among its beneficiaries represents a positive strategy for project sustainability.

28. Concerning road maintenance, the PIU is currently working alongside with the Ministry of Public Works (MPW) for the establishment and implementation of a sustainable road maintenance plan. Through community engagement and sensitization, Community based organizations (CBOs) are formed and provided with tools, training and subsidies to ensure the road maintenance under the guidance of the MPW.

III. Risk management

A. Risks and mitigation measures

29. The project's highest risks identified at design stage continue to be relevant also for the additional financing, and no additional risks are envisaged. The main risks included weak governance and institutional capacities, vulnerability due to cocoa price variations, and risks for land tenure conflicts.

30. As for the vulnerability due to cocoa price variations, this risk remains high; however, the project is already supporting investments in other food crops for food security, climate resilience and smooth cash flow to reduce vulnerability. Additionally, the

establishment of better and stable partnerships for selling cocoa, should contribute to farmers' resilience.

31. Regarding weak institutional capacities risks, these also have not changed. The mitigation measures that TCEP-II has currently put in place are: a) staff recruited on a competitive basis; and b) organization of trainings to increase staff skills.

32. In order to mitigate the risks related to land tenure, the project constantly consults community leaders and village elders to minimize land tenure related conflicts. It also engages with Government Departments responsible for land tenure policy to promote solutions to securing land access on longer-term basis or ownership transfer to those who want to farm.

B. Environment and social category

33. Given the scale and the scope of the main activities proposed under this project, the project was classified under a SECAP "Category B". This categorization was confirmed throughout the implementation phase of the project.

34. The potential environmental and social risks posed by the TCEP-II are limited and constrained to: (a) the rehabilitation/ revitalization of existing cocoa farms and planting new farms on existing indigenous land; and (b) and the rehabilitation of already established feeder roads and track ways. Therefore, it is not foreseen to have a negative environmental and social impact.

35. The cocoa farm revitalization and rehabilitation component encourages agricultural practices with low impact on the environment (avoiding the use of harmful pesticides or fertilizer on the farms thanks to the development of a Pest Management Plan) and practices that will help the beneficiaries to cope better with the impacts of climate change (selection of seeds and seedlings adapted the county's environment, promotion of optimal tree shade, etc.). Also, only existing farms are targeted to ensure the project does not lead to indirect deforestation. Similarly, only existing feeder roads and track ways are being rehabilitated; the roads rehabilitation component which usually represents the activities with highest environmental risks, have not negatively impacted the environment or lead to displacement of indigenous people. The social risks posed by the project has also been tackled throughout implementation; by targeting 8,000 vulnerable smallholder cocoa farmers and giving the opportunity for more women and young people to start their own farms has minimized significantly the potential conflicts that could arise from beneficiary selections.

C. Climate risk classification

36. In line with the SECAP guidelines on Climate Risk Assessment, the project has been classified as a moderate-risk category. This risk level will be kept stable also through the activities implemented within the Building Climate Resilience in the Cocoa and rice sectors (BCRP) funded by the Adaptation Fund and targeting also TCEP-II beneficiaries. TCEP-II capitalises on lessons learned from STCRSP and integrates climate risk mitigation measures to develop low cost activities in climate change adaptation. These activities entail the adoption of cocoa seeds and seedlings varieties more resilient to higher temperatures, and promoting shading on farms to protect the trees during the dry season temperatures and more sustainable energy in the cocoa drying processes.

37. TCEP-II also tackles the risk of climate change by (i) supporting a germplasm station that could expand to produce enough improved planting and grafting material that can fit with current and future specific hotter conditions of Lofa County beyond its commitment to Nimba; (ii) promoting shading and pruning practices/training to reduce the vulnerability of cocoa trees to the effects of climate change; and (iii) diversifying crops and building capacities for improved disease control.

IV. Implementation

A. Compliance with IFAD policies

38. No adjustments have been made to the original project design during implementation. The project and its additional financing ensure alignment with IFAD12 priorities and policies and adherence to IFAD mainstreaming agenda, embedding the four cross cutting issues related to gender, youth, nutrition and climate change.

B. Organizational framework

Management and coordination

39. The project implementation approach and organizational framework remains the same as outlined in the original project design. The Ministry of Agriculture is the Lead Project Agency of TCEP-II. Under the supervision of the Project Management Unit within the ministry, charged to coordinate donor-funded projects, a Project Implementation Unit (PIU) based in Monrovia was established to manage IFAD-funded projects using a country programme approach.

40. While TCEP-II shares with TCEP the key staff (coordinator, M&E, financial management, procurement), a county-level unit has been created in Voinjama (Lofa County) with adequate human and physical resources to coordinate and follow-up activities on the ground. Memoranda of agreement have been signed with private-sector entities and cooperatives in order to ensure access to markets and services, and the collaboration with the Central Agricultural Research Institute (CARI) continues for increasing the supply of improved planting material. Concerning the implementation of the road component, two qualified civil engineers have been recruited to follow-up on works, and are both based in Lofa County. Additionally, the PIU has signed a MoU with the Ministry of Public Works, that will be in charge of works supervision.

41. A National Steering Committee has been established to drive the project's strategy, oversee planning, measure progress and assess impact. It also facilitates linkages with other projects in the country, government services and value chain stakeholders. The country-level PIU at the Ministry of Agriculture office facilitates local linkages, provide technical and monitoring support, and liaises with TCEP counterparts in Nimba County.

Financial management, procurement and governance

42. The financial management requirements of the original design have not changed. The inherent risk was assessed as high; however, considering that the project follows the same stand-alone financial management arrangements established for ongoing IFAD projects, risk has been reduced to medium. It is worth to mention that project financial management has always been rated as moderately satisfactory at supervision.

43. The financial management arrangements include:

a) the appointment of a qualified financial controller and accountant;
b) the tracking of all programme transactions using customized accounting software in line with the International Public Sector Accounting Standards cash basis of accounting;
c) a designated account in United States dollars for IFAD financing in the central bank of Liberia;
d) the disbursement of IFAD financing against duly certified withdrawal applications in accordance with IFAD disbursement procedures; and
e) periodic financial reports prepared by the PIU in formats agreed upon with IFAD.

44. In addition, consolidated financial statements are audited annually by an independent auditor in accordance with the International Standards on Auditing and

IFAD audit requirements. The audit report, together with a management letter, is normally submitted to IFAD within six months of the end of each fiscal year. Daily financial operations have been detailed in the relevant section of the project implementation manual.

45. At the PIU level, procurement is currently managed by a procurement officer and two assistants, having sufficient knowledge and expertise. They have all been trained on IFAD procurement procedures, guidelines and standard bidding documents, and use IFAD systems in their daily activities.

46. IFAD applies a zero-tolerance policy towards fraudulent, corrupt, collusive or coercive actions in all projects financed through its loans and grants, and these provisions are duly included in all contracts with partners and service providers.

C. Monitoring and evaluation, learning, knowledge management and strategic communication

47. **Monitoring and Evaluation**. TCEP-II has an active Monitoring and Evaluation (M&E) team composed of two M&E field Officers, one based in Nimba for TCEP and the other in Lofa for TCEPII. The head of M&E, who leads the team and coordinates the activities of the field officers on the bases of the project M&E manual and AWPB, is based in Monrovia.

48. The project has an M&E manual with clearly defined objectives. The manual outlines the guidelines for developing AWPBs, updating logframe, preparing outcome surveys, mid-term and end-line evaluations. Based on the AWPB, the project's M&E activities are covered by a workplan with a specific budget and target for each activity foreseen within the calendar year.

49. The preparation of the AWPB is conducted in a participatory and consultative manner, involving the county-level PIU along with colleagues from the central PIU in Monrovia, the decentralized local government, other stakeholders, and implementing partners. The central PIU plays a key role in consolidating the AWPB and ensuring that planned project activities are properly integrated and costed. The project's baseline survey based on IFAD's core outcomes indicators framework was successfully conducted in 2019. Thus, the baseline data of all core indicators is updated in the project logframe, and will represent the benchmark for the mid-term and final evaluation.

50. **Knowledge management and communication.** The PIU has a Knowledge management and communication officer, based in Monrovia and a KM strategy, that is revised every two years. The project KM strategy was drafted through a participatory process, with the PIU, but also with several project stakeholders. The KM Officer is responsible for the implementation of the strategy, working in close collaboration with other PIU staff, particularly the M&E team and tree crops officers, who contribute to identifying best practices, success stories, and documentation of lessons learned.

51. The knowledge management focus of TCEP-II is on documenting lessons and reporting best practices through the collection, sharing and dissemination of information on targeted cocoa value chains, organizational development and cocoa commercialization.

52. TCEP-II Knowledge management activities are clearly included in every AWPB, with a specific budget. These activities are tailored to the needs of different audiences, planning to capture and disseminate knowledge at various levels: (i) managing and sharing information, knowledge and experiences among farmers; (ii) improving the private sector's effectiveness and efficiency in adding value and innovating; (iii) conducting analyses that can provide an evidence base for policy dialogue; and (iv) creating conditions for replication, scaling up and sustainability.

D. Proposed amendments to the financing agreement

53. Subject to the approval of the additional financing by the President delegated by the Executive Board, the TCEP-II financing agreement will be amended to take into account the additional financing in the amount of US$7.2 million and the new financing terms. No new expenditure category will be created. This additional financing fills the gap of the financing plan related to the financing of rural infrastructure as originally approved and will not involve changes to the project, objectives, target area or target group.

V. Legal instruments and authority

54. A financing agreement/letter of amendment between the Republic of Liberia and IFAD constitutes the legal instrument for extending the proposed financing to the borrower/recipient. The signed financing agreement will be amended following approval of the additional financing.

55. The Republic of Liberia is empowered under its laws to receive financing from IFAD.

56. I am satisfied that the proposed additional financing will comply with the Agreement Establishing IFAD and the Policies and Criteria for IFAD Financing.

VI. Recommendation

57. According to the delegation of authority procedure approved by the Executive Board at its 126th session and detailed in document EB 2019/126/R.48/Rev.2, the President is invited to approve the proposed financing in terms of the following resolution:

> RESOLVED: that the Fund shall provide a loan on ordinary terms to the Republic of Liberia in an amount of seven million one hundred seventy thousand United States dollars (US$7 170 000) and upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented herein.

Donal F. Brown

Associate Vice President

Programme Management Department

Appendix I: Original logical framework incorporating the additional financing

Narrative Summary	*Key Performance Indicators*				*Means of Verification*			*Assumptions*
	Name (core indicator [CI])	*Baseline (Y0)*	*Mid-Term (Y3)*	*End Target (Y6)*	*Source*	*Frequency*	*Responsibility*	
Outreach								
	Number of persons receiving services promoted or supported by the project [1][CI 1]	0		15 000	Project MIS/ Monitoring report	Quarterly/ Annually	County-PIU	No major crisis such as Ebola epidemic or external shocks such as hyperinflation, stability within MoA and MF**P**D
	Corresponding number of Households reached [CI 1.a][2]	0		15,000	Project MIS/ Monitoring report	Quarterly/ Annually	County-PIU	
	Estimated corresponding total number of household members [3][CI 1.b]	0		64 200	Project MIS/ Monitoring report	Quarterly/ Annually	County-PIU	
Goal:								
Increase income and improve the livelihoods of poor rural households farming cocoa on a smallholder basis in Lofa country	% of population below the international poverty line in the North Central region[4]	72%	67%	62%	Midterm Review Study or Secondary data (LISGIS)	Mid-term, Completion	IFAD-PIU	• Institutions are strengthened • Government policy supports land acquisition, feeder roads, and private sector inclusion
	Household Food security level [5]	11.3% moderate and severe food insecurity[6]:	TBD	TBD	Baseline/ Completion Survey or secondary data i.e. CFSNS, WFP VAM	Mid-term, Completion	IFAD-PIU	
Project Development Objective:								

[1]Disaggregated by sex
[2]Disaggregated by Lead (head of household, small enterprise or group)
[3]Disaggregated by sex
[4] Household Income and Expenditure Survey, LISGIS 2016
[5]The food insecure people are those that spend more than 60% of their resources on food and have poor or borderline food consumption on combined with those that spend 40-60% of their resources on food and have poor food consumption. The moderately food insecure are the sum of those that have acceptable FCS but spend a very high share (>60%) of their income on food plus those that have borderline consumption and spend 40-60% of their income on food plus those with poor FC but a lower share of expenditure on food (<40%).
[6]World Food Program, VAM Report, 2015

Narrative Summary	*Key Performance Indicators*				*Means of Verification*			*Assumptions*
	Name (core indicator [CI])	*Baseline (Y0)*	*Mid-Term (Y3)*	*End Target (Y6)*	*Source*	*Frequency*	*Responsibility*	
Improve incomes and climate change resilience of smallholder cocoa producers in Lofa County	# of Household reporting an increase in production[CI 1.2.4]	0	5,500	10,000	COI Baseline / Completion survey	Baseline, Mid-term, Completion	IFAD-PIU	Commitment of all stakeholders (government, donors, private sector) to participate in poverty reduction efforts
	# of smallholder farmers who increased their resilience[7] to climate change	0	• 550 • 550	• 4,000***** • 4,000******	Baseline/Completion survey	Baseline, Mid-term, Completion	IFAD-PIU	
	Average gross sales of cocoa per farm	69US$	361 US$	998US$	Baseline/Completion survey, monitoring data	Baseline, Mid-term, Completion	Coop reports, PSP	
	Farm gates prices as % of ICCO reference price for grade 1	56%	76%	86%	Project MIS/Monitoring reports	Quarterly/ Annually	County-PIU	
	% of farmers engaged in alternative livelihood activities (plantain, potatoes, groundnut)		75%	100%	Project MIS/ Monitoring reports	Quarterly/ Annually	County-PIU	
Component 1 – Revitalization of cocoa plantations								
Outcome 1: Increased quantity and quality of cocoa sold by smallholders	# of productive trees per farmer (yielding >25 pods of cocoa per tree)	0	550	1,100	Baseline/Completion survey	Baseline, Mid-term, Completion	IFAD-PIU (LISGIS)	Land tenure system in project counties does not pose any limitations to project activities

[7] A household will be considered as more resilient to climate change if it is at least: a) using climate resilient practices (adequate shade, diversification, pest and disease control) and cocoa germplasm promoted by the TCEP II; and b) is engaged in a zero deforestation agreement which is monitored. It is estimated that at least 50% of the farmers would reach this level in year 6.
*****These farmers will meet all the criteria listed in the above footnote.
******Besides being engaged in a zero-deforestation agreement, these farmers will satisfy at least two of the criteria on the use of climate resilience practices.

Narrative Summary	*Key Performance Indicators*				*Means of Verification*			*Assumptions*
	Name (core indicator [CI])	*Baseline (Y0)*	*Mid-Term (Y3)*	*End Target (Y6)*	*Source*	*Frequency*	*Responsibility*	
	Percentage of grade 1 cocoa sold		47%	90%	Reports of PSP and cooperatives	Annually	CAC, DAO	Targeted communities are involved and responsive to interventions made
Outputs: Plantation revitalized and climate resilient practices and processing introduced	Ha of cocoa rehabilitated or replanted	2,000 ha[8]	4,134	7,500 ha	Reports from DAO, PSP and Cooperatives	Quarterly	CAC, DAO	
	# of groups (FFS) trained in production practices and/or technologies[CI 1.1.4]	0	220 FFS	400 FFS	FFS officer	Quarterly	County-PIU	
Component 2 – Rehabilitation and maintenance of roads								
Outcome 2: Improved and climate proofed access to markets	Km of roads passable all year (*including climate-proofing*) round after three years	133.1 [9]km	413 km	513 km	Reports of CRE	Baseline, Mid-term, Completion	County-PIU, CRE	Targeted communities are involved and responsive to interventions made

[8]Former STCRSP farmers.
[9]STCRSP achievement.

Narrative Summary	*Key Performance Indicators*				*Means of Verification*			*Assumptions*
	Name (core indicator [CI])	*Baseline (Y0)*	*Mid-Term (Y3)*	*End Target (Y6)*	*Source*	*Frequency*	*Responsibility*	
Outputs: Rehabilitation and maintenance of roads	# of kilometres of roads constructed, rehabilitated or upgraded, [CI 2.1.6]	0	280km	380km	Project MIS	Quarterly/ Annually	PIU- IFAD	
	# Number of Road Management Plans (RMP) developed [10]	0	7	7				
	# of Road Management Committees established and functioning[11]	0	1	1	Reports from DAO, PSP and Cooperatives	Quarterly	CAC, DAO	
Component 3 – Service provision for value chain development								
Outcome 3: Improved service provision to cocoa smallholder	Tonnes of cocoa sold by farmers through their cooperatives and/or PSP	1,000	2,775 tonnes	9,800 tonnes	Reports from Coops and PSP	Quarterly	CAC, DAO	Responsive and interested private sector partners in the cocoa sector
	Average increase of business potential (improving service delivery to farmers) for supported cooperatives	2.95 (current average business potential of coops in Lofa)	3.8 for 80% and 4.5 for 20% of selected coops	4.5 for 70% and 5 for 30% of selected coops	Reports of PSP and cooperatives	Annually	CAC, DAO	
Outputs: Sustainable cooperatives for marketing of cocoa and provision of inputs	# of rural producers accessing production inputs and/or technological packages [CI 1.1.3]	0	5,500	10,000	Project MIS/ Reports from Coops and PSP	Quarterly/Annually	CAC, DAO	

[10] Levelling/grading, heaping with maroon and compacting, Opening waterways / construction of culverts, patching potholes, sweeping, slashing, clearing excess vegetation.
[11] Based on an average road extension of 7 km (from STCRSP: 133 km for 19 roads) and given that each road will be provided with a RMC, a total of 56 RMCs will be established.

Appendix II. Original summary of the economic and financial analysis

LIBERIA TREE CROPS EXTENSION PROJECT (TCEP II)

EFA summary tables

Model 1: Gradual plot replanting

Financial IRR	**38%**
Financial NPV(USD)	3,487
PVb	7,019
PVc	3,136
B/C ratio	2.24
Switching values Benefits	-55%
Switching values Costs	124%

Model 3: New Plantation

Financial IRR	**56%**
Financial NPV(USD)	5,581
NPVb	8,433
NPVc	2,852
B/C ratio	2.96
Switching values Benefits	-66%
Switching values Costs	196%

Model 2: Basic Plot Rehabilitation

Financial IRR	**24%**
Financial NPV(USD)	1,873
PVb	5,404
PVc	3,136
B/C ratio	1.72
Switching values Benefits	-42%
Switching values Costs	72%

	Without			With project						
	Y0	Y1/	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Cocoa yields (kg/ha)											
Model 1: Gradual plot replanting	200	201	134	292	333	333	667	667	667	667	667
Model 2: Basic plot rehabilitation	100	101	67	196	267	267	533	533	533	533	533
Model 3: New Plantation	-	-	-	278	278	556	1,111	1,111	1,111	1,111	1,111
% of Famers with acces to each grade by year											
Model 1: Gradual plot replanting											
cocoa - grade 1	50%	50%	50%	60%	60%	70%	90%	90%	90%	90%	90%
cocoa - grade 2	50%	50%	50%	40%	40%	30%	10%	10%	10%	10%	10%
Model 2: Basic plot rehabilitation											
cocoa - grade 1	0%	0%	0%	30%	40%	60%	90%	90%	90%	90%	90%
cocoa - grade 2	100%	100%	100%	70%	60%	40%	10%	10%	10%	10%	10%
Model 3: New Plantation											
cocoa - grade 1	0%	0%	50%	50%	60%	90%	90%	90%	90%	90%	90%
cocoa - grade 2	100%	100%	50%	50%	40%	10%	10%	10%	10%	10%	10%
Cocoa price paid to farmers (US$/kg)											
cocoa - grade 1	1.20	1.20	1.40	1.60	1.80	1.80	1.80	1.80	1.80	1.80	1.80
cocoa - grade 2	1.04	1.04	1.24	1.44	1.64	1.64	1.64	1.64	1.64	1.64	1.64
Cocoa price paid to cooperative (US$/kg)											
cocoa - grade 1	1.40	1.40	1.60	1.80	2.00	2.00	2.00	2.00	2.00	2.00	2.00
cocoa - grade 2	1.24	1.24	1.44	1.64	1.84	1.84	1.84	1.84	1.84	1.84	1.84

Tabel C2: Shadow prices

Shadow prices	Factor
Tradable goods	0.91
Labour- Unskilled	0.70
Pesticides	0.90
Fertilizer	0.9
Output conversion factor	1.07
Social discount rate	10%

	Prices	
	Financial	Economic
Cocoa, grade 1	1.80	1.93
Cocoa, grade 2	1.64	1.75
fertilizer	1	0.91
pesticides	40	36
sprayer	60	55
Rural wage/ a	1.25	0.88

a/ under the kuu system this is estimate for food

Tabel B1: Project economic costs

Component	million USD	Beneficiaries Households	Cost US$/Bene
Revitalisation of cocoa plantations	10.8		
Rehabilitation and maintanance of	22.8		
Service provision for value chain de	2.0		
Project Coordination, M&E	7.7		
Total	43.3	15,000	2,887

Average Household = 4.28 members

Tabel B2: Indicators from the EFA

Outcome	Indicator	Baseline	MTR	FINAL
Improved incomes and climate change resilience of smaalholder cocoa producers	Number of farmers who increased their income from cocoa	0	5,513	10,000
Increased quality and quantity of cocoa sold by smallholders	% of grade 1 (Model 1 50% all others 0%)	17%	47%	90%
	Ha of cocoa rehabilitated	0	4,134	10,000
Improved access to markets	Km of roads rehabilitated	0	12	38
Improved service provision to cocoa smallholder farmers	Number of farmers selling their produce through coops	0	5,513	10,000
	Number of farmers receiving inputs from cooperatives	0	5,513	10,000

Table D: Phasing

		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Model 1: Gradual plot replanting	farmers	438	875	1,638	2,833	3,533	3,533	3,533	3,533	3,533	3,533
Model 2: Basic Plot Rehabilitation	farmers	438	875	1,638	2,833	3,533	3,533	3,533	3,533	3,533	3,533
Model 3: New Plantation	farmers	375	875	1,838	2,333	2,933	2,933	2,933	2,933	2,933	2,933
Total cocoa farmers	farmers	1,250	2,625	5,513	8,000	10,000	10,000	10,000	10,000	10,000	10,000
Total cocoa plantations	ha	938	1,969	4,134	6,000	7,500	7,500	7,500	7,500	7,500	7,500

Table E: Project economic cash flow (million US$)

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Incremental net benefit components 1 and 3	-0.642	-0.437	0.629	-0.782	2.602	4.968	3.727	7.005	6.747	7.873
Incremental impact roads (component 2)	0.000	0.000	0.245	0.573	0.777	0.777	0.777	0.777	0.777	0.777
Total economic benefits	-0.642	-0.437	0.874	-0.209	3.379	5.745	4.504	7.782	7.524	8.650
Economic cost project	-5.455	-11.774	-10.337	-6.117	-4.558	-5.068	-0.300	-0.300	-0.300	-0.300
Less. Costs already included in the models	0.405	0.815	2.261	3.194	6.244	3.638				
Total net economic incremental benefit	-5.693	-11.396	-7.202	-3.132	5.064	4.315	4.204	7.482	7.224	8.350

Graph G: Project economic cash flow

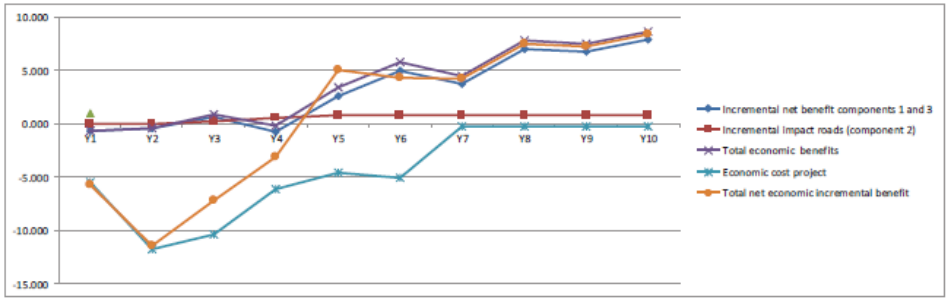

Table F: Sensitivity analysis

		ERR	NPV (mio US$)	Link with risk matrix
Base Scenario		17%	15.1	
Project benefits	-10%	10%	0.5	Combination of risks affecting output prices, yields and adoption rates
Adoption rate	-10%	15%	11.5	Extension sservice outreach is limited, low upteak of good practices,
Adoption rate	-20%	14%	7.8	
Project costs	10%	10%	0.9	Increase of price of service providers, road construction, fertilizer, etc..
Project costs	20%	10%	-0.7	
1 year lag in benefits		10%	-0.3	Low implementation capacity, risks affecting adoption rates

a. Beneficiaries and benefits

1. TCEP II will benefit 10,000 cocoa smallholder farmers and 5,000 other beneficiaries from roads and value chain services. Considering an average household size of 4.289 in the project area, this targeting adds up to 64,200 household members. The additional 5,000 farmers will benefit from better roads, stronger cooperatives, market linkages, availability of improved planting material and better input supply systems.

2. Component A is expected to lead to increase in cocoa production, marketing and exports as a result of: (a) revitalization of abandoned plantations; (b) replanting of new trees; (c) higher yields at smallholder farmers level; (d) higher farm-gate prices; and (e) higher quality of cocoa as a result of improved post-harvest handling and marketing.

3. Benefits from Component B *Rehabilitation of farm to market roads* will procure access to markets, reduce the time and cost to reach the local market and limit the post-harvest losses due to bad transportation conditions. Regarding Component C, the strengthening of cooperatives will contribute to the delivery of quality services to cocoa farmers and guarantee the sustainability of the approach, in particular dissemination of improved planting material, extension services, access to inputs and output markets.

b. Financial analysis

4. The following table summarizes 3 financial models that were developed to estimate the impact of the interventions of the TCEP II. Models 1, 2 and 3 simulate the different scenarios for revitalization and replanting of cocoa plantations (Component A). A secondary model has been prepared to estimate the benefits from intercropping (mixed crops: sweet potato, maize, beans, cassava, plantain). These stream of benefits has been integrated in the three cocoa models, with decreasing benefits as cocoa canopy grows.

Financial models

Comment	Yields	Description of the models	Farmers
Baseline	100-200 kg/ha	Semi-abandoned plantations and yields have been limited to values <100 kg/ha by over shading and lack of weeding and basic management; the principal activity is the harvesting of fruits that grow without any particular management; the trees are from local, unselected germplasm and are 20-40 years old; owing to the mortality of trees the density of productive cocoa trees is often lower than the target of 1000 trees per hectare	
MODEL 1: Gradual plot replanting	From 200 to 667 kg/ha (0.6 kg per stem)	This will include gradual plot replanting, basic revitalization, further improvement of management, using farmers' field schools; gap filling and gradual replacement (5% per annum). Disease control. Fertilizer application (50 kg) on an acre to try out the yield response on a per farm basis, then if positive recommend annually 150 kg/ha (3 bags). Support to beneficiaries will also be on an incremental basis. Intercropping as mentioned above.	Former STCRSP beneficiaries
Model 2: Basic plot rehabilitatio n	–From 100 to 533kg/h a (0.6 kg per stem)	Model 2 is very similar to Model 1 with only the type of beneficiaries differing. Model 2 refers to plantations already existing but not having received support from STCRSP. From a financial perspective, both models require the same inputs and will have the similar yields. Intercropping as mentioned above.	(Non-STCRSP) beneficiaries that have cocoa farms
Model 3: New Plantation	1,111kg/ ha (1 kg per stem)	Beneficiaries to be supported to establish their own plantations on an incremental support basis starting with 0.5ha. Over 1,100 trees will be planted in one hectare. Grafting improved, high-yielding materials on old trees; Planting hybrid or grafted seedlings; regular fertilization. Basic pest and disease control, fertilizer application (150 kg/ha), post-harvest handling. Intercropping as mentioned above.	3,000 youth with plantations

These financial models are based on information collected by the ongoing IFAD project and the TCEP II design team. The financial crop models capture: (i) increases in cocoa yield, (ii) increases in quality; (iii) increases in prices for higher quality, as well as a better bargaining power of farmers. The yield assumptions are based on information from other projects in Liberia and the region. Cocoa price assumptions are based on average ICCO price of US$ 2000/tonne. The ICCO price was US$ 1,892/tonne69 in Dec 17 and US$2242/tonne in Feb 18 and projected to continue to fluctuate over time. Assumptions regarding grades are based on experiences of ongoing projects.

5. The tables below summarize the key financial flows (total revenue, total costs, incremental cash flow) of the 3 models over a period of 10 years, as well as key financial performance indicators (IRR, return to family labour, NPV and B/C ratio).

Model 1: Gradual plot replanting	
Financial IRR	**38%**
Financial NPV(USD)	3,487
PVb	7,019
PVc	3,136
B/C ratio	2.24
Switching values Benefits	-55%
Switching values Costs	124%

Model 2: Basic Plot Rehabilitation	
Financial IRR	**24%**
Financial NPV(USD)	1,873
PVb	5,404
PVc	3,136
B/C ratio	1.72
Switching values Benefits	-42%
Switching values Costs	72%

Model 3: New Plantation	
Financial IRR	**56%**
Financial NPV(USD)	5,581
NPVb	8,433
NPVc	2,852
B/C ratio	2.96
Switching values Benefits	-66%
Switching values Costs	196%

6. The detailed models of revitalization show that the cash flow after financing would be positive from year 1 onwards. In order to achieve this, the project will use the following tools: (a) a subsidy in kind (seedlings, labour for revitalization etc) of US$ 250 per ha and subsidized solar dryers, for which the farmer contributes his labour; (c) a subsidized bag of fertilizer as farm-level demonstration in the enhanced revitalization model. Overall, the approach of the project is financially sound.

[69] ICCO - https://www.icco.org/statistics/cocoa-prices/daily-prices.html December 2017

c. Economic Analysis

Main assumptions and shadow prices

7. An economic analysis has been carried out to assess the economic viability of the project as a whole from the perspective of the country's economy. The analysis was conducted over a 20-year period and in constant 2017 prices. Economic benefits considered in the analysis are: (i) incremental net economic benefits from production and marketing of cocoa and outputs from intercropping;; and (ii) the economic impact of rehabilitation of roads on saving transport costs. The economic cost of the project has been calculated using COSTAB; corrections have been made in order to avoid double counting (cost of revitalization etc.). Financial prices and costs and benefit streams derived from cocoa crop models have been transformed into economic values. Assumptions regarding shadow prices are presented in the table below.

8. Additional non-quantified benefits identified have included benefits from forest conservation and access to more fuel wood on a sustained basis, better yields due to better soil management and correct application of fertilizers and other inputs through FFS learning and sharing.

Main assumptions and shadow prices (US$)

Shadow prices	Factor
Tradable goods	0.91
Labour, skilled US$	0.70
Labour, unskilled	0.70
Pesticides US$	0.91
Fertilizer	0.91
Exchange rate factor	1.07
Social discount rate	10%
Output conversion	1.07

Prices	Financial	Economic
cocoa, grade 1	1.8	1.9
cocoa, grade 2	1.6	1.8
fertilizer	1.0	0.91
pesticides	40.0	36.4
sprayer	60.0	54.5
wages/ a	1.25	0.875

a/ estimate for food under the Kuu system

Economic impact of road rehabilitation and maintenance

9. Road investments (Component B) will provide three sets of benefits to project beneficiaries. First, road rehabilitation/construction will results in quantifiable benefits in the form of (i) access to markets for both inputs and outputs (reflected in the crops models) and (ii) reduced post-harvest losses (reflected in the crop models). Second, a separate model has been prepared to estimate the cost savings for transport, based on the findings of the STCRSP completion report, which highlighted a saving of 1.1 LRD per kg per km of rehabilitated road. This model has assumed road segments of 10 km with a perimeter of impact of 6 km around it and a share of cultivated land in the area of impact of
10% (in line with the national statistics of land use). Thus, the impact area under cultivation goes beyond the 10,000 ha targeted by the project. Given data unavailability, travel time savings and reduction in vehicle operating costs could not be modelled at this stage. A third set of benefits is represented by non-quantifiable broader socio-economic opportunities for the rural population (e.g. increased schools and health centres access).

e. Aggregation of beneficiaries and phasing

10. The following table shows the total number of project beneficiaries, subdivided into activities and phased following the inclusion pattern envisaged by the Project and aligned with the logframe and Costab.

Phasing of revitalization and replanting (ha)

		NUMBER of HOUSEHOLDS									
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Total beneficiaries		1,250	1,250	2,750	2,845	2,000					
Model 1: Gradual plot replanting	propotion	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Model 2: Basic Plot rehabilitation	propotion	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Model 3: New Plantation	propotion	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Model 1: Gradual plot replanting											
year 1	farmers	438	438	438	438	438	438	438	438	438	438
year 2	farmers		438	438	438	438	438	438	438	438	438
year 3	farmers	0	0	963	963	963	963	963	963	963	963
year 4	farmers	0	0	0	996	996	996	996	996	996	996
year 5		0	0	0	0	700	700	700	700	700	700
Cumulative		438	875	1,838	2,833	3,533	3,533	3,533	3,533	3,533	3,533
Model 2: Basic Plot rehabilitation											
year 1	farmers	438	438	438	438	438	438	438	438	438	438
year 2	farmers	0	438	438	438	438	438	438	438	438	438
year 3	farmers	0	0	963	963	963	963	963	963	963	963
year 4	farmers	0	0		996	996	996	996	996	996	996
year 5						700	700	700	700	700	700
Cumulative		438	875	1,838	2,833	3,533	3,533	3,533	3,533	3,533	3,533
Model 3: New Plantation											
year 1	farmers	375	438	438	438	438	438	438	438	438	438
year 2	farmers	0	438	438	438	438	438	438	438	438	438
year 3	farmers	0	0	963	963	963	963	963	963	963	963
year 4		0	0	0	496	496	496	496	496	496	496
year 5						600	600	600	600	600	600
Cumulative		375	875	1,838	2,333	2,933	2,933	2,933	2,933	2,933	2,933
Total cocoa farmers	farmers	1,250	2,625	5,513	8,000	10,000	10,000	10,000	10,000	10,000	10,000

f. Project economic cash flow

11. The Project economic cash flow represents the overall project aggregation (see table below). It includes the net incremental benefits of each financial model in economic terms, converted with shadow prices, and multiplied by the number of direct beneficiaries of each category.

g. ERR, NPV and sensitivity analysis

12. The economic results of the project are positive and significant, with an economic internal rate of return (EIRR) of 17% and a net present value of the additional benefits of USD 15.2 million over 20 years and against a rather social discount rate of 10%. The sensitivity analysis indicates that the results are robust to reductions in adoption rates, but rather sensitive to overall reduction in benefits, increased costs and delays in implementation.

Summary of economic analysis and sensitivity analysis

		ERR	NPV (mio US$)	Link with risk matrix
Base Scenario		**16.8**	**15.**	
Project benefits Project benefits	-15% -10%	9.4% 10.2%	(1.4) 0.5	Combination of risks affecting output prices, yields and adoption rates
Adoption rate Adoption rate	-10% -20%	15.0% 14.0%	11.5 7.8	Extension sservice outreach is limited, low upteak of good practices,
Project costs Project costs	10% 20%	10.3% 9.7%	0.9 (0.7)	Increase of price of service providers, road construction, fertilizer, etc..
1 year lag in benefits		9.9%	(0.3)	Low implementation capacity, risks affecting adoption rates

Graph: Project economic cash flow

13. The graph below depicts and compares over time project's net benefits and incremental costs alongside project cash flow in US$ millions.