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GLOBAL ENVIRONMENT FACILITY

Republic of Sierra Leone

Integrating Adaptation to Climate Change into Agricultural Production and Food Security (IACCAPFS)

GEF/LDCF Terminal Evaluation Report (TER)

Main report and appendices

Mission date: 13-March-2017 to 31-March-2017
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Project Targeted Areas

Map showing targeted districts for the IACCAPFS project in Sierra Leone.

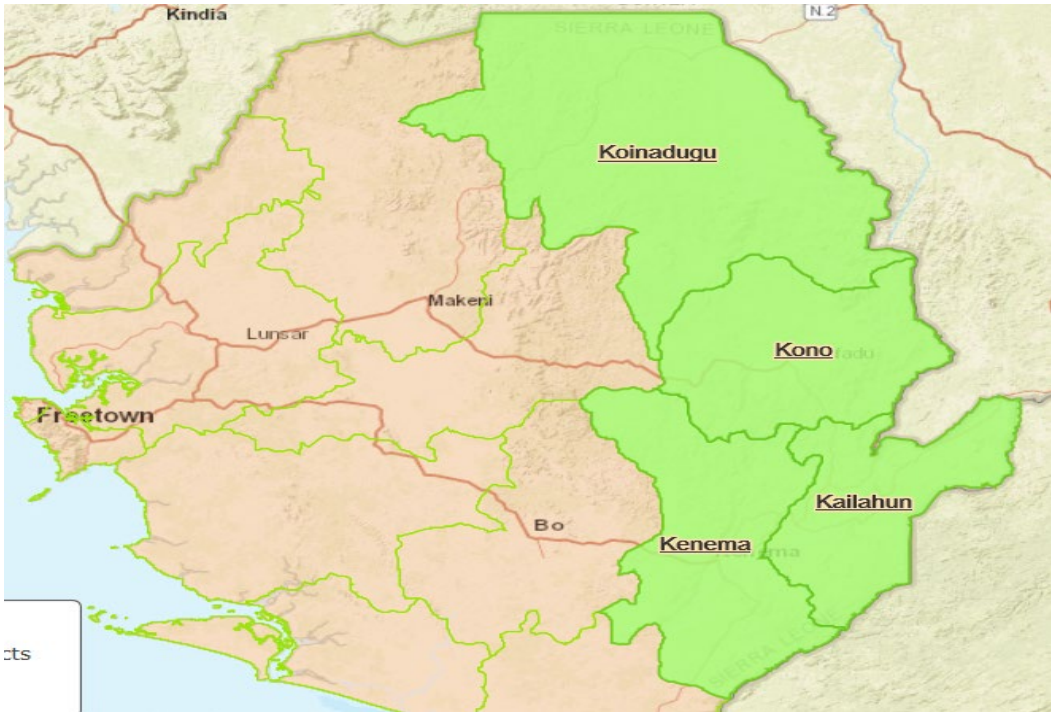


Table showing the RCPRP-RCPRP+/IACCAPFS evolution timeline

Rehabilitation and Community-Based Poverty Reduction Project (RCPRP) Post War Phase 2006-2010	RCPRP Adaptation	Integrating Adaptation to Climate Change into Agricultural Production and Food Security (IACCAPFS & RCPRP+[1]) 2011-2016/7
Component 1 Support to Household Recapitalization and Farming activities development **Component 2** Support to Community based Institutions and Participatory Development **Component 3** Rural Infrastructure Rehabilitation and Development Target Districts: Kono, Kailahun	**Project re-focused on support to target group households through**: - Inland valley swamps /tree crops rehabilitation; - Rural Infrastructure rehabilitation and development; - feeder/trunk roads - Support to community based institutions and participatory development. Target Districts: Kono, Kailahun	**IACCAPFS** **Component 1** Sustainable development of climate resilient inland valley swamp. **Component 2** Integrated water and natural resource management for adaptation. **Component 3** Capacity building and awareness raising on climate change. **Component 4** Project Management & Monitoring and Evaluation **RCPRP+** **Component 1** Support to Smallholder Agriculture Commercialisation **Component 2** Support to community development and decentralisation. Expansion to Kenema and Koinadugu

[1] The '+' indicates a phase II of the RCPRP project.

Exchange rate

US$1 = Leone 7,529

Fiscal Year

1 January - 31 December

Abbreviations and Acronyms

AWPB	Annual Work Plan and Budget
ASSL	Audit Service of Sierra Leone
AWS	Automatic Weather Stations
CARD	Coalition of African Rice Development
COSOP	Country Strategic Opportunity Programme
DCPU	District Project Coordination Units
EVD	Ebola Virus Disease
ENRM	Environment and Natural Resource Management
EPA	Environment Protection Agency
FBO	Farmers Business Organisations
FFS	Farmer Field Schools
FIFO	First In First Out
FAO	Food and Agricultural Organisation
FSS	Food Supply System
GALS	Gender Action Learning System
GAFSP	Global Agricultural Food Security Programme
GEF	Global Environment Facility
GoSL	Government of Sierra Leone
IACCAPFS	Integrating Adaptation to Climate Change into Agricultural Production and Food Security
IFAD	International Fund for Agricultural Development
IVSA	Inland Valley Swamps Associations
IVS	Inland Valley Swamps
LDC	Least Developed Countries
LDCF	Least Developed Countries Fund
LPG	Liquid Petroleum Gas
MTR	Mid-Term Review
MDG	Millennium Development Goal
MAFFS	Ministry of Agriculture Forestry and Food Security
M&E	Monitoring and Evaluation
NAPA	National Adaptation Program of Action
NPCU	National Project Coordination Unit
NRDS	National Rice Development Strategy
NSC	National Steering Committee
NPV	Net Present Value
NERICA	New Rice of Africa
PCR	Project Completion Report
PDR	Project Design Report
PPG	Project Preparation Grant
PRSP II	Poverty Reduction Strategy Paper II
RARC	Rokupr Agricultural Research Centre
RCPRP	Rehabilitation and Community-Based Poverty Reduction Project
RCPRP+	Rehabilitation and Community-Based Poverty Reduction Project - Plus
RB-COSOP	Results Based - Country Strategic Opportunity Programme
RRRI	Rokupr Rice Research Institute
RFCIP	Rural Finance and Community Improvement Programme
SLARI	Sierra Leone Agricultural Research Institute
SMART	Specific, Measurable, Achievable and Attributable, Realistic Time-Bound, Timely and Targeted
SLWM	Sustainable Land and Water Management

SP	Service Providers
TER	Terminal Evaluation Report
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework for Convention on Climate Change
VDC	Village Development Committees
YC	Youth Contractors

IACCAPFS at a glance

Country	Republic of Sierra Leone
Project Name	Integrating Adaptation to Climate Change Into Agricultural Production and Food Security (IACCAPFS)

Key Dates

IFAD Approval	Signing	Effectiveness	Mid-Term Review	Original Completion	Actual Completion	
	21-12-2010	22-3-2012	Feb - 2015	31-3-2016	31-3-2017	
Mid-term Review	**Interim Evaluation**	**Original Grant Closing**	**Actual Grant Closing**			
Feb - 2015	-	31-3-2016	31-9-2017			

GEF/LDCF Financing

Grant	**US$ million**	2.6	**% disbursed**	100%		

Actual Costs and Financing (USD '000)

Component	GEF/LDCF	Co-financing	Beneficiaries	GOVT	Total	Disbursement levels
1	649,000	-	-	-	652,000	65%
2	569,000	-	-	-	575,000	64%
3	598,000	-	-	-	753,000	148%
4	614,000	-	-	-	627,000	279%
Authorised Allocation	214,000	-	-	-	38,000	-

Remarks
The project has consistently been weak in quantifying the in-kind contributions. The in-kind contributions were in the form of tax exemptions for an amount of US$144,996 instead of US$766,000 as per the financing agreement. Although no beneficiary financing was included in the finance agreement, the PDR states that the contribution should have been in the amount of US$ 340,000. No beneficiary contributions were mobilised.

Number of Beneficiaries

Total	Direct	Indirect	Women	Men	Youth	
n/a	9811	10,000+	1180	2070	6042	

Remarks
The numbers of beneficiaries are not accurate, as records have not been consistently processed by M&E. In some instances the beneficiary attendance lists obtained also did not differentiate between gender or age.

Project Objective

To lessen the impact of climate change on vulnerable rural communities, as well as on natural resources critical for sustaining agricultural production and increasing food security

Country Partners

Executing Agency	Ministry of Agriculture, Forestry and Food Security (MAFFS); Meteorological Department, National Project Coordination Unit (NPCU) under a National Steering Committee (NSC)
Government Institutions	District Councils (DC), Ward Development Committees (WDC); Njala University
NGOs/civil society	Community Based Organisations, local NGP, youth and women associations
Other	Private businesses, service providers

Executive summary

i. ***Project overview.*** *The IACCAPFS is a US$3,750,800 project of which GEF/LDCF financing constitutes US$2,644,800, US$766,000 by the Government of Sierra Leone and US$340,000 by the project beneficiaries. The GEF/LDCF project complemented the IFAD Rehabilitation and Community-Based Poverty Reduction Project (RCPRP) and was designed as a catalytic for scaling-up adaptation to climate change using sustainable land and natural resources management approaches including reducing use of bush fallow systems; improved water management in uplands and Inland Valley Swamps (IVS); improving access to weather and climate information through targeted technical and institutional capacity development and on the ground activities.*

ii. ***GEF/LDCF Goal and objectives.***

   i. ***Goal.*** *To reduce the vulnerability of the food supply system to the deleterious impacts of climate change.*

   ii. ***Objective.*** *To lessen the impact of climate change on vulnerable rural communities, as well as on natural resources critical for sustaining agricultural production and increasing food security.*

iii. ***Project relevance.*** *The project was in strong alignment with the agricultural and meteorological objectives* to adapt to the adverse effects of climate change *of the GoSL NAPA 2007. It was also consistent with the overall goal of the GoSL Agenda for Change in the Poverty Reduction Strategy Paper II, IFAD's RB-COSOP 2010-2015 and MDG1. This approach also enabled a wider outreach for the LDCF and placed adaptation on a wider development context in Sierra Leone. While this project was relevant, there was a lack of distinction between activities and indicators in the original logframe. Project relevance was rated as* ***satisfactory (S).***

iv. ***Project effectiveness****. As a measure of success, the project is expected to disburse 100% which is a remarkable achievement considering the poor initial performance. However, the levels of disbursement per component show a mixed picture. The four components disbursed respectively 65%, 64%, 148% and 279%. The latter two overspent but this was, in large part, due to the unexpectedly elevated costs of the Automatic Weather Stations for component three and because of the hiring of a needed assistant and the one-year extension caused by the Ebola Virus Disease (EVD) in component four. Project effectiveness also reviewed the quality of project management, financial management, document keeping and cost-benefit analyses. Project effectiveness is rated as* ***moderately satisfactory (MS).***

v. ***Project impacts.*** *The project completion mission for the RCPRP and IACCAPFS was designed in two phases, part of the first phase was to design and subsequently carry out an impact assessment before collecting the impact data in the second phase. During the mission in March 2017, complete project impact data was not available. Also as a result of the integration of the GEF/LDCF with the RCPRP+, this mission found that disaggregated data through the M&E framework for GEF/LDCF has not been documented consistently across all IACCAPFS activities. This section reviewed food security, income generation and climate change awareness. It was rated as* ***moderately unsatisfactory (MU).***

vi. ***Project efficiency.*** *While the project complied to a large degree with financial management practices, there were considerable improvements to be made in the standard practices of documentation and record keeping. With* the exception of the payment processing cycle, characterised by a strong segregation of duties with a very good filing system, in general *the filing and archiving system was totally absent, files were kept in boxes in different locations and were hard to locate. Procurement files were not kept in chronological order, key documentation was missing such as No Objections, Purchase Orders for Shopping and important email correspondence. Project efficiency was rated as* ***moderately satisfactory (MS).***

vii. ***Sustainability.*** *The main sustainability risks are in relation to the weather stations and the ability of the Meteorological Department to absorb the maintenance costs without further changes to its governance structure or further assistance in the form of support*

from other projects. The greenhouses were deemed not sufficiently profitable without additional fundamental changes, leading to their sustainability in terms of other farmers taking out loans to replicate, as being unlikely.

viii. *Results that are highly likely to be sustainable include the climate resilient rice suited for rain-fed upland ecosystems where farmers were able to double their profit margin over the regular paddy rice. The micro-catchments were highly successful in their objective to pilot water harvesting and soil rehabilitation techniques with a view to promote in situ multiple cropping while improving soil fertility, reducing soil erosion and mitigating against the environmentally degrading practice of slash and burn. The pilot has been rolled out to 22 demonstration sites and the signs are very encouraging that the farmers are happy to continue after the project. The university is also very keen to continue. Sustainability is rated as* ***satisfactory (S).***

ix. ***Innovation.*** *This project has piloted a number of innovative ideas in climate change adaptation. It has partnered with the Njala University to pilot water harvesting and soil rehabilitation techniques and how to make them accessible to rural farmers. The techniques have proven to succeed both at the research stage and in technology transference at the farmer level. Preliminary findings show that this pilot has worked and is being accepted and integrated by farmers. This activity replaced an innovation attempt to use roof rainwater harvesting for crop irrigation, which was not successful for contextual, technical and implementation reasons.*

x. *The greenhouses were also funded from the discontinued roof rainwater harvesting activity and were innovative for the IVSAs involved. They posed technical challenges in pest management and provided lessons in aligning commercial production with market demand. The IVSAs received technical backstopping through an innovative approach of using service providers to work with IVSAs on a systematic contract basis and of IVS youth contractors selected by the IVSAs, but also MAFFS extension workers. Throughout, the innovative service providers worked with IVSAs and youth contractors including in the construction of four earth dams. The dams, which also were an innovative amendment suggested by the project, allowed for perennial use of rain-fed swamps and multi-cropping of rice, although some technical and sustainability concerns still needed to be addressed at completion.* ***Project innovation is rated satisfactory (S).***

xi. ***Partner performance.*** *The partners of the project included, among others, MAFFS, Fresh Salone, Njala University, Sierra Leone Agricultural Research Institute (SLARI) and the Meteorological Department; notably, the degree of performance varied. The greenhouse service provider Fresh Salone had initially failed to provide the agreed technical assistance; however, since the supervision mission of 2016, it was observed that service provision was being carried out.*

xii. *In accordance with the financial agreement, the GoSL should have contributed US$766,000 which has been made in the form of in-kind[2] tax exemptions of US$144,966 (19%). The project however has been consistently weak in quantifying the in-kind contributions and the total figure could be greater. Project beneficiaries were also expected to make a US$340,000 contribution as detailed in the PDR, which has not been made.*

xiii. *Njala University has performed well in a short period of time and managed to produce results in developing water harvesting techniques in dry and infertile soil to enable the cultivation of cassava, sweet potato, okra, plantain, pineapple, banana trees and maize through a variety of water retention techniques and rapid organic composting. It is also showing successful signs that the technology rollout was received well. Due to the lack of financial contributions, partner performance is rated as* ***moderately satisfactory (MS).***

xiv. ***Lessons learned.***

i. *Slow procurement and subsequent disbursal rate leading up to and including most of 2013 highlight the need of early planning and to be proactive.*

[2] The finance agreement refers to the GoSL contribution as being 'in kind'. This refers to cash or other contributions of similar value.

ii. Better monitoring and evaluation would have spotted the underperforming rooftop rain harvesting activities earlier and payment by milestones would have increased accountability and saved more money to be reinvested elsewhere.

iii. With regards to the weather stations, it is important (especially with expensive and sensitive infrastructure), to test-install a small sample to identify and subsequently rectify any expensive technical problems. The contract should also include spare parts for maintenance, a regional technical maintenance support service as well as repair training.

iv. *It would be more helpful if, where possible, and in view of the synergies desired when partnering with IFAD, for the M&E framework to focus more on GEF/LDCF outcome level results in view of the broader goals and objectives instead of a focus on output level achievements*.

Introduction

1. The Global Environment Facility (GEF) endorsed the International Fund for Agricultural Development (IFAD) request for the project on the 21 December 2010 and made available the grant to IFAD as the Executing Agency to assist the Government of Sierra Leone (GoSL) in the implementation of the IACCAPFS project. The project was designed as catalytic for scaling-up adaptation to climate change using sustainable land and natural resources management approaches including reducing use of bush fallow systems; improved water management in uplands and Inland Valley Swamps (IVS); improving access to weather and climate information through targeted technical and institutional capacity development and on the ground activities.
2. The IACCAPFS project complemented the IFAD Rehabilitation and Community-Based Poverty Reduction Project (RCPRP) PLUS that was originally signed with the GoSL on 20 February 2004. IFAD was the first development agency to assist the GoSL in the transition from humanitarian to developmental assistance as it had a strategic niche to assist Governments in the transition from emergency to sustainable development. The focus was on rural poverty reduction with a priority to support the livelihood strategies of households at community level. The project was followed by the RCPRP-PLUS (+) from 2011 and the RCPRP++ in 2016 which is a reference to the one year extension granted to accommodate the impact of the Ebola Virus Disease (EVD). The RCPRP+ and RCPRP++ supported small-scale crop and livestock farmers by providing basic agricultural packages including seeds, tools, livestock and also rehabilitating rural infrastructure.
3. As per the Finance Agreement between IFAD and the Government of Sierra Leone, the total IACCAPFS project was US$3,410,800, of which the GEF/LDCF grant constituted US$2,644,800 and the GoSL was to contribute US$766,000 in in-kind counterpart financing. The Finance Agreement was not inclusive of beneficiary contributions, which as detailed in the Project Design Report, stand at US$340,000 (hereby raising the project total to US$3,750,800), but no beneficiary contributions have been made to the project.
4. The project was declared effective on 22 March 2012 and was due for completion on 31 March 2016 with effective closure on 30 September 2016. The one-year no cost extension was granted in view of the adverse impact of the EVD outbreak from May of 2014 until October 2015. Consequently, project activities ended on 31 March 2017 with project closure forecast for 30 September 2017.

I. Country context

5. Sierra Leone has a total population of 6.4m, a GDP of US$4.215b, an average life expectancy of 51, and a 53% poverty ratio[3]. It has a total landmass of 71,740 km^2 (27,699miles^2) and the country borders the Republic of Guinea to the northeast, in the south and southeast by the Republic of Liberia. The country's agricultural land comprises a total of 60,650 km^2 (upland) and 11,650 km^2 (lowlands). Land suitable for cultivation is estimated at 5.36 million ha or about 74% of the total land area, of which less than 15% is currently under cultivation.
6. It is divided into four provinces: North, East, West and South and the regions are further divided into 13 agricultural districts with 149 chiefdoms. The project-targeted area was in the East (Kenema, Kailahun and Kono) and in the North (Koinadugu). Human impact on the vegetation has been severe largely due to logging and slash-and-burn agricultural practices. Most of the soil types in Sierra Leone are ferralitic in nature and lack important mineral nutrient reserves. The climate of Sierra Leone is described as wet tropical, marked by a distinct wet and dry seasons. Sierra Leone has nine major river systems from north to south including the Great Scarcies, Little Scarcies, Rokel, Jong, Sewa, Moa and Mano Rivers.

[3] World Bank (2016): http://data.worldbank.org/country/sierra-leone

7. **Land Tenure**: The concept of land tenure in Sierra Leone is highly fluid and contested. In essence, the country has three forms and regimes of land tenure: freehold, customary and state tenures. Some of these are based on statutory law (freeholds, leaseholds), while others are provided for under customary laws (family lands, etc).

8. **Slash and Burn**: There is no strictly enforced government policy on slash and burn agriculture, although it is widely recognized across the country and internationally that the highly degraded nature of the forests which cover most of the country is a result of this traditional practice[4]. The Ministry of Agriculture Forestry and Food Security (MAFFS) and others are working to encourage farmers to move their cultivation into the IVS, allowing tree crop growing to resume in the uplands.

9. **Climate Change**: Sierra Leone is ranked as the third Least Developed Country (LDC), least able to adapt to the adverse effects of climate change[5]. At project design stage, farmers were unaware of the meaning of climate change, however were already consciously adapting their farming practices. They reported experiencing changes in rainfall patterns with rain in the dry season and dry periods in the rainy season. These manifested in more intense rainfall patterns with more frequent severe floods and seasonal droughts; late onset of rains; decreasing overall rainfall totals; rising temperatures, particularly in the dry season; stronger winds including reports of local tornadoes; more intense thunderstorms; more frequent landslides.

10. The key problem surrounding climate change in Sierra Leone is the limited adaptive capacity of the vulnerable rural populations, which exacerbates their vulnerability. Influencing factors include their high dependence on rain-fed agriculture and natural resource-based livelihoods. A shortage of livestock, the numbers of which were decimated during the war and contributed to food insecurity, assist in farming activities such as ploughing, transportation and manure fertilisation. Post-war limited institutional and human resource capacity has also led to a massive expert crisis when well-trained and experienced agriculturalists, animal scientists, foresters, fishery experts and others are due for retirement with no qualified experts to replace them.

II. Assessment of project relevance

a) Relevance vis-à-vis the external context

11. The strategic project objectives were designed within the overall framework of the UN Framework Convention on Climate Change (UNFCCC), for which GEF is an operating entity. More specifically, it addresses the objectives outlined in the National Adaptation Programme of Action[6] (NAPA) implementation for Sierra Leone to reduce the vulnerability of the Food Supply System (FSS). IACCAPFS project was formulated under the "*Business as Usual (BAU) scenario*" where the RCPRP+ did not seem to address the expectation that agricultural productivity would be reduced due to increased climate variability[7].

12. The impact of climate change and mitigating the impact of climate change on vulnerable rural communities and natural resources base was an integral part of the project. This is in line with the RCPRP+ to contribute to the overall goal of empowering the rural poor to increase their food security and livelihoods in project districts. This was also consistent with the overall goal of Sierra Leone's national Agenda for Change in the Poverty Reduction Strategy Paper II (PRSP II), IFAD's Strategic Framework's Results Based Country Strategic Opportunity Programme (RB-COSOP) 2010-2015 and Millennium Development Goal 1 (MDG1). This approach also enabled a wider outreach for the LDCF (Least Developed Countries Fund) and placed adaptation on a wider development context in Sierra Leone[8].

[4] International Institute for Sustainable Development (IISD), 2012 Brown and Crawford. http://www.iisd.org/pdf/2012/iisd_conservation_in_Sierra_Leone.pdf
[5] http://reliefweb.int/sites/reliefweb.int/files/resources/Climate_Change_Vulnerability_Index_%202014_Map.pdf
[6] The NAPA provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change
[7] IACCAPFS Project Document para 219.
[8] IACCAPFS Project Design Report para 5

b) Project objectives and outcomes

13. The overall project goal was to reduce the vulnerability of the food supply system to the negative impacts of climate change. The objective was to lessen the impact of climate change on vulnerable rural communities, as well as on natural resources which are critical for sustaining agricultural production in general and also for increasing food security. The project goal was in strong alignment with the objectives set out in the GoSL 2007 NAPA with specific attention to objectives for agriculture and meteorology.

14. The GEF/LDCF project complemented the activities undertaken under phase I of the RCPRP and the RCPRP+ and RCPRP++. The IACCAPFS was designed to complement the RCPRP+(+) in a synergetic manner by assisting RCPRP+ activities address adaptation to climate change. During implementation, the components were also fully embedded in the operational aspects of RCPRP+ implementation with little to no distinction between the two projects. This has ensured that the GEF/LDCF funding also covered additional costs associated with adaptation needs that were identified in the NAPA. These were also discussed at all levels (national, provincial and grass-roots) during the project design (Project Preparation Grant - PPG phase). The GEF/LDCF intervention was articulated around four components:

    i. **Sustainable development of climate resilient inland valley swamp (52 % of total project costs).** This component included the following outcomes: Participatory mapping and monitoring of vulnerability to climate change; Climate-resilient rice production systems; and Training for local rice producers on best adaptation practices.

    ii. **Integrated water and natural resource management for adaptation (28 % of total project costs).** The two outcomes were: Ecosystem-based adaptation in the uplands; and Irrigation efficiency and drainage systems*.*

    iii. **Capacity building and awareness raising on climate change (9.5 % of total project costs).** The comprising outcomes were: Government personnel training; Agriculture climatic data collection and analysis for decision making; and Knowledge and awareness on climate change at community level.

    iv. **Project management and M&E (9 % of total project costs).** This component comprised: Project management and Project M&E.

c) Design changes

15. One of the major external factors that influenced design change of the IACCAPFS was the EVD outbreak in April of 2014. It restricted the ability of staff to move freely around the country to monitor projects. The functional areas that were particularly affected were the inventory control, ability of staff to supervise and carry out project implementation, repair and maintenance of weather stations, complete international training courses in weather station maintenance and deliver routine onsite data collection. As a result a one-year no-cost extension was granted to help the project to implement all of its activities.

16. In addition to the EVD outbreak, other factors were the underperforming and discontinued roof rainfall harvesting activity[9]. This was replaced during the MTR with more promising climate change adaptation agricultural pilot projects. These were the micro-catchment pilots with the University of Njala, the greenhouses and the open field irrigation schemes. Other design changes (2013 supervision mission) that were not in the original Project Design Report (PDR) included the four earth dams in rehabilitated Inland Valley Swamps. These replaced the innovative irrigation systems and the improvement of drainage systems in sites identified as being at high risk of climate vulnerability.

d) Project target area and target group

17. The directly benefitted 9811 beneficiaries of which 6042 were youth, 1180 women and 2070 men. The project targeting approach was in line with IFAD's mandate to target rural people living in poverty and experiencing food insecurity in developing countries. It was based on the knowledge that it is the poorest in societies who are most affected by the impacts of increasing climatic variability, increased frequency of weather extremes and

[9] For a detailed explanation refer paragraph 38.

longer term negative impact on food security. The LDCF project was fully aligned with the RCPRP+(+) in terms of targeting and strictly following said targeting criteria with a focus on small-scale farmers and most vulnerable groups. The target groups for GEF/LDCF project activities were the women headed households, vulnerable heads of households and youth, particularly unemployed youth, people with disabilities and micro/small scale entrepreneurs living in remote areas that are prone to food insecurity due to difficulties in market access.

18. The GEF/LDCF project covered the same districts as the RCPRP+(+). Phase I of the RCPRP (2006-2011) focused activities in two districts of the Eastern Province – Kono and Kailahun. The selection was based on a number of criteria, including vulnerability, accessibility, agricultural potential, geographical spread and the fact that these districts were hardest hit by the war. The geographical target area was subsequently broadened for the RCPRP+ and GEF/LDCF interventions to include the adjacent districts of Koinadugu (to the north) and Kenema (to the west).

e) Implementing arrangements

19. The project worked within existing community structures such as the Farmers Business Organisations (FBOs) and Farmer Field Schools (FFS), which were strengthened by MAFFS, (also RCPRP, the RCPRP+ and RCPRP++) in the GEF/LDCF project areas through the promotion of community-based activities. The project used proven mechanisms for community participation, FFS and other capacity building activities (for farmers, staff of the Meteorology Department and MAFFS extension staff, and also skilling youth), government involvement and technology transfer.

20. **Coordination and execution:** The National Project Coordination Unit (NPCU) was the executive arm of MAFFS responsible for the day-to-day implementation of the project. The District Project Coordination Units (DPCU) were responsible for field implementation and the PCU were fully staffed with management, administration and subject matter specialists. The RCPRP+(+) Project Coordinator reported to MAFFS and to the National Steering Committee (NSC). The NSC with members from all relevant ministries reportedly met twice a year and approved Annual Work Plan and Budgets (AWPBs) and reports presented by the NPCU and issued policy guidance.

21. **PDR Logframe:** The logframe developed as part of the PDR was largely well defined and clearly articulated, but also substantially altered during the MTR. The activities and key indicator columns were combined at design, making it harder than necessary to distinguish between indicators and activities for project staff. The MTR changed the logframe creating a separate indicator column and this is of particular relevance for GEF's SMART (Specific, Measurable, Achievable and Attributable, Realistic Time-Bound, Timely and Targeted) indicator criteria to be unambiguous. During the MTR revision, measurable, targeted time bound aspects of the PDR logframe indicators were moved to the activities column in favour of more general indicators.

22. The main measurement of project implementation was through the separate IACCAPFS result logframe, which was regularly kept up-to-date. The reporting was heavily output centered with no analysis of outcomes. Yield, income and agricultural productivity resulting from GEF/LDCF activities were not included in the indicators which would have helped to determine IACCAPFS impact and the added value of the climate change adaptation measures. In an effort to create better synergies between the two projects, raw data for IACCAPFS IVS farmer yields was available as part of the RCPRP+ but has not been proactively disaggregated for IACCAPFS throughout project implementation. Consequently considerable effort was required at project completion to collect project data that remained incomplete in terms of total number of beneficiaries and overall agricultural and economic productivity.

23. Project relevance was rated as **satisfactory (S)**.

III. Assessment of project effectiveness

24. This LDCF/GEF intervention was articulated around four components: (1) sustainable development of climate resilient inland valley swamp; (2) integrated water and natural

resource management for adaptation; (3) capacity building and awareness raising on climate change and (4) project management and M&E. The overall project goal was to reduce the vulnerability of the food supply system to the deleterious impacts of climate change. The specific objectives were to lessen the impact of climate change on vulnerable rural communities, as well as on natural resources critical for sustaining agricultural production and increasing food security. The nature of the project was to pilot a disparate number of climate change adaptation techniques, which are all linked together with the aim to help find ways for the beneficiaries to better adapt to the negative effects of climate change.

25. As a measure of success, the project is expected to disburse 100%, which is a remarkable achievement considering the poor initial performance. However, the levels of disbursement and the indicator vs. project achievement logframe in annex 1 show that the project has struggled to implement all activities for the first two components. Documentation of project activities has also been a recurring problem so it has also not been possible to determine the full extent of implementation.

26. The four components disbursed respectively 65%, 64%, 148% and 279%. The low disbursement rates reflect the implementation trends. Around half of the activities (10) were implemented 100%, slightly fewer than half (7) reached 50% implementation and remainder activities (3) achieved 33% or less. This picture however does not take into account the achievements in implementing activities that were added during implementation such as the four earth dams and the micro-catchment activities, which were some of the projects most successful activities. The latter two components overspent but this can be explained by, in the case of the former, unexpected elevated costs of the Automatic Weather Stations (AWS) and the latter the hiring of a needed assistant[10] and the one-year extension caused by the EVD. At the same time, some of the pilot activities have also proven to be very promising in adapting to climate change (of particular note are the micro-catchments and the earth dams). The project's effectiveness is rated as **moderately satisfactory (MS).**

Component 1: Sustainable development of climate resilient IVS for rice and other food production.

27. With the impact of climate change already beginning to exacerbate existing food insecurity, the objective of this component was to ensure long term rice productivity in the inland valley swamps despite increasing climate variability. This component aimed to increase production resilience by developing 120 ha of IVS assuring higher and more reliable crop yields to demonstrate that these systems could be climate-proofed, and therefore adapt to changing rainfall patterns. These include flooding and periodic dry spells in the normally wet season and water availability during the dry season. This objective has largely been achieved, and rated as satisfactory.

Outcome 1.1. Participatory mapping and monitoring of vulnerability to climate change vulnerability mapping.

28. This outcome focused on the characterisation and monitoring of the vulnerability of IVS cropping systems (mainly rice) to the impacts of climate change. A vulnerability mapping assessment was undertaken across the project districts in a participatory manner with local communities and fed into the overall project M&E system. The assessment identified 6,413 vulnerable swamps across the four districts totalling 72,649.04 ha[11]. A database was created by the contractor 'INTEGEMS' with coordinates, community name, chiefdom, owner, population, water regime, hectares, biodiversity, agro-climatic zone and soil and vegetative classification. However, due to the recurring documentation and filing problems which affected the project[12], it was not possible for the mission to verify this

[10] The assistant was hired with project and IFAD approval, although no documentation was available with regards to no objections.
[11] Refer to annex 9 for a map of the identified sites.
[12] Refer to section VI) Assessment of project efficiency, paragraph 106.

database as the CD supplied by the contractor had been 'buried' in the unmarked boxes in different locations. The mission safely assumes that this information has not been shared beyond the project activity. Section XI on knowledge sharing also concludes that there is no indication that the project has been sharing information generated as a result of the project activities.

29. Difficulties involved in the data collection process meant that it was not possible for the vulnerability mapping exercise to obtain swamp ownership confirmation for all swamps surveyed. Part of the problem was that land rights and ownership are subject to a complex process of adjudication which is a current national issue and is still under legislative review.

30. The procurement of the GPS equipment and a GIS software licence as per project design, were only half met. The latter was not procured due to budgetary reasons despite recommendations by the vulnerability mapping consulting firm.

31. **Consultation sessions.** A team comprising the communications officer, the project M&E officer and the climate change and environmental officer as well as representatives from the Meteorological Department and MAFFS carried out eight consultation sessions of the 24 that were originally planned. These were held with local communities in all the four districts with the objective to raise awareness about climate change and to start discussions about adaptive measures. The eight consultations were deemed to be sufficient by the project staff to adequately cover the project area.

32. **Study tour.** One of the two planned local study tours has also been undertaken in the four districts to identify IVSs that were rehabilitated under RCPRP, and to evaluate the extent of damage to IVS structures. The same study identified locations for the establishment of the small-scale rooftop rainwater-harvesting network and identified the locations for the automatic weather stations in the four districts.

Outcome 1.2. Climate-resilient rice production systems.

33. Support was given to at least 1,794 men, 1,078 women and 6,021 youth (no disaggregated data available) with climate resilient rice varieties. M&E processing of beneficiary data for the GEF/LDCF project did not take place and beneficiary numbers were not available to the mission. The figures reported in the TER are a result of the mission's efforts to locate and process incomplete and 'filed' attendance sheets[13]. The project procured 3.2 metric tons (mt) of New Africa Rice foundation seeds[14], which are reportedly higher yielding, and boast a 98% germination rate (NERICA L19 & L20[15]) with particular suitability to rain-fed upland ecosystems. Results from the RCPRP+ show that this rice yields 59% more per hectare and farmers are able to double their profit margins over the traditional paddy rice. The purchased rice was initially planted on 80ha of IVS and subsequently multiplied and redistributed to farmers in the four districts. An estimated 72mt was re-distributed to farmers and multiplied on a total of 120 ha of IVS as planned at design.

34. **Dissemination of agro-meteorological data.** This activity was never implemented as it was time bound with output 3.2.1, the establishment of the automatic weather stations, which incurred a number of difficulties. Due to technical and operational challenges the stations are still not entirely operational and require spare parts and repair expertise. The data that is being collected is not being processed into an easily digestible format that would aid rural farmers in planning their crop season. A legitimate argument from the project is that forecasting software and a sufficient amount of historical data are required in order for this information to be useful at the farmer level. The forecasting software was not included in the design of the project and the historical data is not available because of the destruction of infrastructure and loss of human and institutional capacity during the war.

Outcome 1.3. Training for local rice producers on best adaptation practices

[13] Also see section VI) Assessment of project efficiency, paragraph 106.

[14] Foundation seeds are seed stocks multiplied by or under the supervision of a public agency for use in the production of registered and certified seed.

[15] Disaggregated amounts of L19 and L20 NERICA rice purchased could not be determined.

35. Eight of the 16 originally foreseen MAFFS field extension staff were trained (2 in each district) to deal with adaptation to climate change. Eight motorbikes were procured and the project also provided allowances to these MAFFS staff to cover the costs of fuel and maintenance. They provided training through 40 FFS, as demonstration sites were set up to train 1,000 farmers. The training demonstrated the importance of group formation and cohesion in solving climate change related difficulties, devising good adaptive methods and value chains of various food crops.

Component 2. Integrated Water and Natural Resource Management for Adaptation

36. In Sierra Leone, agriculture is mainly rain-fed and is therefore particularly vulnerable to increasingly unpredictable rainfall patterns. The GEF PPG studies undertaken during design, revealed that uplands were not irrigated at the time and farmers cleared and cultivated new plots each year as part of the slash and burn or bush fallow system. The aim of this component was to enable land users to assess the degradation status of their local natural resources (soils, vegetation, water, etc.), to understand the interaction of the natural resource base and climate variability and to prepare their own land-use plans.

Outcome 2.1. Ecosystem-based adaptation in the uplands

37. Only twenty-two out of the forty planned trainings through Village Development Committees (VDC) were carried out as these were deemed sufficient and covered the subjects of: climate change awareness raising, adaptation to changing rainfall patterns, and sensitization against the slash and burn practices.

38. **Rainwater harvesting.** Component 2 also aimed to establish 100 water harvesting sheds, 1,500 roof water collectors and 100 small water storage tanks. This activity was discontinued at the MTR stage because the project concept was deemed flawed in the context of Sierra Leone. The main reason was that buildings with roofs for collecting rainwater in tanks in backyard gardens in rural areas of Sierra Leone was problematic because the amount of storage required to successfully irrigate a vegetable crop in the dry season was not likely to be cost effective in most rural locations. Interviewed farmers rated this initiative as 0 on a scale of 0-10 and advised against further implementation. The constructed facilities also had serious technical design faults; parameters that should have been considered in designing the system were ignored such as crop water requirements, cropping area, catchment area, runoff coefficient and water efficiency. The MTR reported that this was due to rapid water seepage/loss from cracks in both surface and underground tanks and low capacity of tanks to satisfy crop water requirement for cropping areas of not more than $20m^2$.

39. Other contributing factors included failure to seek technical advice from relevant experts from or outside the NPCU, before engaging contractors. The technical evaluation of the facility's ineffectiveness was slow (carried out only after 20 were built) and full payment was made to the contractor ahead of the activity's evaluation, effectively releasing them from contractual obligations to correct eventual design faults. The remaining funds were redirected to finance the micro-catchment, greenhouses and open field irrigation systems.

40. **Micro-catchment.** The project used the remaining US$ 78,000[16] from the discontinued rainwater harvesting activity to partner with Njala University. The university identified and tested: (i) in situ water harvesting techniques to collect, concentrate and store water at the crop root zones (tied ridging[17], moon ridges); and (ii) soil conservation methods that control erosion (mulching, terracing). Although no baseline assessment appears to have been carried out to measure seed, labour or fertiliser use, the research claims to have produced promising results with an average of 4 to 5 tons/ha additional sweet potatoes

[16] Annex 1 of the MTR.

[17] Tied ridges are a slight modification from the traditional type of ridges local farmers in Sierra Leone construct when cultivating sweet potatoes. These have been shown in a demonstration site to be capable of concentrating rainfall and runoff, making crops less susceptible to dry periods within the second cropping period of the rainy season when rainfall amounts are lower and dry spells more frequent. The trapped runoff between the ridge 'ties' can sustain a crop over short dry spells of 1 week duration (and even longer when mulched) with little or no reduction in crop yield on highly permeable 9% sloping IVS catchment.

(+200% to +250%) and an increase of 2.8 to 3.2 additional tons/ha (+350% to +400%) of maize over the control plots.

41. The pilot produced improvements of soil moisture for crops, the water levels went from lows of 38.75 to 70 mm/m to over 200 mm/m of soil depth. The practice of mulching was particularly effective in retaining soil moisture and in enhancing and sustaining crop yields in the experimental plots. Mulching improved soil fertility in organic carbon, nitrogen, phosphorous and potassium and reduced gravel concentrations in the top 10cm of topsoil indicating reductions in soil erosion and leaching. The research also refined techniques in rapid organic composting through the use of steel/metal barrels (these had a 4-day turn around production time[18]). Since the barrels tend to rust within one year of use, alternatives were being sought at the time of the TER.

42. After problems in convincing farmers to join the pilot scheme were overcome through persuasion and education, the research was replicated on 0.5 ha plots in 22 of the 24 planned locations across all project districts, as set out in the MTR, (the full 24 were not carried due to time limitations). During the mission, the first harvest of the site visited had yet to be collected (and the university will continue with the project after completion), however higher crop yields were being reported elsewhere (within the 22 locations) for the water harvesting and terracing plots for maize, sweet potatoes, okra and cassava. Soil erosion is reduced through runoff capture, as well as the use of *Gliricidia sepium* in plot lining, a fast growing, fire and drought resistant, deep-rooted, nitrogen fixing and nutrient rich tree. The gliricidia and rice husk are also used as mulch to reduce soil water evaporation (and improve soil water levels). The university claims that awareness raising against the practices of slash and burn were also carried out, however this awareness was lacking on the site visit conducted by the TER.

43. **Land management and erosion control.** In addition to the micro-catchments activity a total of 102 women, 276 men and 21 youths were also trained through 19 sessions, with the support of trained MAFFS facilitators. The groups developed farm plots, demonstrating that Sustainable Land and Water Management (SLWM) techniques can be used to sustain cropping over successive growing seasons. The aim was to demonstrate that slash and burn is unnecessary while increasing the resilience of production systems and livelihoods to climate variability and generating co-benefits in terms of erosion control. The training included water management techniques (erosion, slope direction, appreciation of a levelled plot), it also taught how to supervise unskilled workers and train others in water management, water control, improved agronomic practices for improved productivity. Due to limited M&E reporting by MAFFS it was not possible to verify the total surface area where these techniques were applied. Information on the number of sites where the training sessions were performed were also missing nor were details on how they were conducted (how frequently, group sizes, plot size, etc.).

44. **Sustainable livelihoods.** Many activities under the sustainable livelihoods output were suggested during the MTR supervision mission on condition of budget availability and were not implemented. These include the establishment of fishponds in earth dams, the planting of economic tree crops (oil palm, moringa, cocoa and coffee plantations) in the fringes of the earth dams as well as food crops (groundnut, maize, banana, ginger, sweet potato, coco yam and vegetables). Many of these food crops have however been introduced separately as part of the water harvesting micro-catchment areas piloted by the University of Njala (also introduced as a result of the MTR). Another suggestion that was not implemented was: further supporting the RCPRP+'s successful honeybee farmers activities with extractors and processing rooms.

45. **Community forestry.** Despite repeated requests, the NPCU was not able to provide written documentation or verbal confirmation on how many of the eight planned community forestry plans were developed. This was an activity implemented by MAFFS where M&E reporting was inconsistent as were IACCPAFS filing practices. Consequently no documentation on the number of community forest plans developed were available. The only documentation from MAFFS shows that 14 community forestry plots were developed by extension workers through a Memorandum of Understanding (MoU) with

[18] The drums generate crushed vegetative from *Gliricidia sepium* fast growing nitrogen fixing trees of 105kg per drum every 4- 7days. A 2 hectare IVS catchment has been adequately supplied with compost to support the production of over nine different crops in a demonstration site.

MAFFS. A total of 200,000 seedlings were raised and the VDC visited by the TER mission demonstrated awareness on slash and burn practices and on the impact of climate change on their livelihoods.

46. **Greenhouses.** Two women groups were supported in the districts of Kenema and Koinadugu with one greenhouse each. A total of two greenhouses out of the originally four envisioned in the MTR (but not included in the revised indicators), were procured and built. One greenhouse reportedly produced cucumbers (easy to produce) while the second focused on learning how to grow tomatoes (more technically challenging, but also more profitable). At the time of project closure, preparations were being made for the greenhouse in Kenema to move from cucumbers to pepper production (more profitable).

47. The main problems with the greenhouse was their elevated unit cost which limited the construction to 2 out of the planned 4 units. The units were also not able to regulate their own temperature, which limited their functionality. The absence of soil sterilisation facilities also meant that greenhouses suffered with pest control problems. This was solved in the case of the Kenema association with the support of the Njala University in the provision of technical knowhow.

48. The greenhouses had to overcome a number of difficulties. The key difference between the two women groups was that the United Farmers Association at Lambayama, Kenema were inexperienced in cultivating commercial crops and connecting with the value chain to sell to the market. Key lessons were learned in timing harvests to higher prices at the market. There were also misunderstandings in as much as that the association members were under the mistaken impression that they would be paid to carry out the activities. Other issues included initial problems with the service provider, which are explained in greater detail under the performance partners section (section K) of this report.

49. **Open field irrigation system.** As with the greenhouses, this intervention was not planned in the project document but was adopted by NPCU (as reported in the MTR) as an alternative to the rainwater harvesting system. Hand dug wells were built at each site, from which water was manually pumped into an overhead tank and distributed to nearby fields using drip irrigation, the manual pumps[19] were deemed too labour intensive for the women and subsequently solar powered pumps were installed. NPCU implemented the construction of four open field systems (one in each target district).

50. The innovative drip-pipe technology met with technical difficulties: in Kenema for example, they suffered from water pressure problems. The TER mission observed that the drip-pipes were abandoned in Kenema and regular water pipes laid, the farmers continued to use regular water taps and buckets to irrigate the open fields. While the open fields were successful in Koinadugu, the Kenema association was not able to make productive use of them. There was a general difference in performance between the two sites, which the mission put down to different levels of experience between the two groups of women. However it was not clear to the mission or reported in the M&E progress reports, why the drip technology worked on one site and not in the other.

51. **Small ruminants.** The purchasing of small ruminants (50 cattle, 100 goats and 100 sheep) to support the former national artificial insemination hub was not possible due to the slow completion of the paddock system. The delays in implementation were picked up at the MTR stage and again in the 2016 supervision, however the paddocks were only completed shortly before project completion and the funds were not available for committal despite the purchase request was submitted.

Outcome 2.2: Irrigation efficiency and drainage systems

52. **Earth dams.** During the 2013 supervision mission, the project team had suggested that the funds for outputs 2.2.1 and 2.2.2 namely innovative irrigation systems and improvement of drainage systems in sites identified as being vulnerable to climate change, were to be used for the construction of four earth dams in Kenema, Kono, Kailahun and Koinadugu. The dams were built with the aim of storing water for use in the dry season to enable double or triple cropping of rice. The MTR reported that farmers, especially those with completed and functioning dams, were already experiencing these results. The interviewed farmers acknowledged an increase in the availability of water in

[19] The M&E system did not record any data on the quantity of material provided.

the swamps, which they attributed to the earth dams. The construction of the dams enabled the double cropping of rice in larger areas of rain fed swamps than was possible before. Local ownership of this intervention was strongly demonstrated by the participation of farmers (as provision of labour) in the construction of the dams.

53. The earth dams, designed to hold around 22,000 m^3 of water, were initially a LDCF/GEF component however while still funded by the IACCAPFS, its implementation was transferred to the IVS component of the RCPRP+. The reasoning, offered by the 2014 supervision mission, was that the various technical and social requirements to be addressed required approximately 10 to 12 months prior to commencement of construction, and this was deemed to be incompatible with the LDCF/GEF planning and project life cycle.

Component 3. Capacity building and awareness raising of climate change at institutional and local level

54. The overall objective of the capacity building effort was to ensure that at the grassroots level, stakeholders would be able to integrate climate change adaptation measures into their daily activities to help secure livelihoods and insure greater food security. The training activities were expected to provide local stakeholders and communities with the required planning, decision-making and monitoring skills to allow them to become more resilient to the impacts of an increasingly unpredictable climate on their production systems and livelihoods.

55. The capacity building also targeted the meteorological services by re-establishing weather stations, and providing climate data to support decision-making processes at all levels. The ability of the Meteorological Department to fulfil its mandate and related weather monitoring tasks, data collection, data analysis, dissemination to end-users and storage was greatly affected by the ten-year war (1992-2002). Some staff members died while others retired from service and others left the country. Of all the 11 synoptic weather stations existing in the country all but 4 were either totally or partially destroyed and were operational during the design stage but below standard in terms of observation instruments, manpower and technical capacity. The effective adoption and design of climate adaptation responses are dependent on coherent national weather data and natural disasters records. The GEF/LDCF activities aimed to address the identified capacity building and weather data collection gaps at national and institutional level by investing in both human resources and equipment.

Output 3.1. Government personnel training

56. The LDCF/GEF project supported capacity building within the Meteorological Department through the training of six technicians on agro-climatology and management of weather stations. It was decided that three instead of six staff members would be sent to study a one-year course at the Nigerian Meteorological Agency. Based on the certificates at least one was certified as a senior and a second as medium level meteorological technician. The activity to train two staff on a post-graduate training course on agro-climatology (one meteorologist in the first year of project implementation and one in the third year of project implementation) was not fulfilled due to an apparent lack of willingness from the staff members. Further, 12 MAFFS staff members received online training in statistics and applied climatology, although relevant certificates were not available for verification at the time of the terminal evaluation mission.

Output 3.2 Agriculture climatic data collection and analysis for decision making

57. **Weather stations.** The PDR had planned for 15 weather stations to be put in place, however the costs involved were significantly underestimated and after attempts to procure stations from the UK, a second attempt was made for cheaper German equipment. Delays were incurred due to FAO[20] procurement procedures, which impacted the project's overall disbursement rates from the early stages of project implementation until late 2013. Four of the final eight stations were eventually procured in 2014. After technical and operational problems identified with the first four stations, the second batch

[20] There are no records explaining why FAO was used for the procurement of the AWS.

of four (received in 2016) included rodent resistant cable protection, reinforced protection against lightning, larger solar panels and larger capacity batteries for night-time readings, as well as evaporation dishes.

58. The stations are referred to as Automatic Weather Stations (AWS) in as much as the data is collected automatically and recorded by an onsite computer for which eight separate adjacent buildings were built and furnished (one at each site). These remote stations have to be manned with Meteorological Department staff for a variety of reasons, which include surveillance of the stations, replenishing the evaporation dishes (birds drink from them at night), carrying out routine maintenance, ensuring onsite computers are working and recording data, cleaning of sensors, clearing the site of weeds, etc. The stations are also fitted with SIM cards which, if charged, are able to transmit the data (stored locally on 128mb memory cards) remotely to the Kenema base station where LDCF/GEF assistant project staff (the staff is expected to start working with the Meteorological Department after the end of the project) is based and is able to collect data. The amount of data the memory cards can store is limited, and they are overwritten when full. It is therefore important to regularly download this data to onsite computers.

59. As part of the handover to the Meteorological Department the preference is to create a base station in the main office in Freetown. The necessity of this base station was not foreseen in the PDR as it was located in Kenema, the project did however supply the Meteorological Department with a vehicle for site visits. There are a number of challenges related to sustainability as the AWSs require spare parts and trained repair technicians. The PDR did not plan for the purchase of spare parts; also, plans to train the GEF/LDCF assistant on AWS repair were dashed because of the EVD. Subsequently there was no budget left to train technicians or purchase spare parts. The table below displays the list and operational status of the eight automatic weather stations. One station is not working, three are in perfect working order, while the remaining four are working to various degrees but require spare parts.

Table 1 Status of automatic weather stations

District	Location - 1st / 2nd Batch	Maintenance Status
Kenema	Kenema town (1st)	Working but spare parts required
	Kpuipabu (2nd)	Perfect working order
Kailahun	Kailahun town (1st)	Working but spare parts required
	Daru (2nd)	Perfect working order
Kono	Koidi (1st)	Not working
	Kayima (2nd)	Working but new cables required
Koinadugu	Kabala (1st)	Antennas need repairing
	Musaya (2nd)	Perfect working order

60. **Rain gauges.** The NAPA meteorological objectives also included the post-war re-establishing of the meteorological network. Twenty rain gauges and Stevenson Screens were hence installed in schools across the four districts. Stevenson Screens are shelters or enclosures made to shield meteorological instruments against precipitation and direct heat radiation from outside sources. During the TER mission on one occasion the equipment had been discovered to be broken due to mishandling; yet, in the majority of cases the pieces of equipment were found to be in perfect working order. Twice-daily readings were confirmed to being systematically collected by schoolteachers. Science curricula were also being adjusted to include lessons on how to scientifically measure and

collect meteorological data. The success of the activity can perhaps be gauged with an example where in one all girl primary school, students were learning about changing rainfall patterns and it was reported that they were raising questions as to why the old text books were not reflecting what they were recording.

Output 3.3. Knowledge and awareness on climate change at community level

61. **Gender Action Learning System (GALS).** The GALS methodology ensured that household beneficiaries from different RCPRP project components were identified though participatory sessions and GALS champions and facilitators were identified for support. This methodology aimed to give women as well as men more empowerment for issues concerning gender justice and community empowerment. Households were encouraged to cluster either as farmer groups or cooperatives that could engage in commercial agricultural activities thereby ensuring ownership. The involvement of beneficiaries in the planning and implementation of project activities ensures community ownership of its interventions. GALS was also integrated into the Climate Change activities and 180 women, youths and heads of vulnerable households have benefitted personally from the awareness raising activities on climate change, hoping that they will share this knowledge with others.

62. **Training of Trainers.** Twelve trainers were trained in participatory community hazard, vulnerability and capacity analysis, community based adaptation to climate change and livelihoods analysis. The aim was for the trainers to conduct community workshops using participatory techniques. The training session was facilitated through the MAFFS, and lasted seven days. The topics included: introduction to climate change, its effects and adaptation; introduction to meteorology; the role of the Meteorological Department; and how and when to use meteorological data. The project design report did not specify how many people the twelve trainers were meant to train.

63. **Climate change awareness.** Increasing public knowledge and awareness about climate change were achieved through a number of activities. These included capacity building activities targeting community radio stations. Twelve radio stations were identified and received training on climate change. The musical and visual tools did not target the 40 planned schools; instead, ‘jingles’ (songs/adverts), and an eight-episode radio theatrical programme, extolling the benefits of IVS cultivation as well as educating about climate change and against the practice of slash and burn, were developed and regularly broadcast in all the districts. The radio stations were each further supported with 20 solar panels and a 12-battery pack as well as 7.4 KW generators, controllers, an inverter and motorbikes to maximise their climate change training with community awareness activities.

IV. Assessment of project efficiency

a) Resources use

64. **Exchange rate.** The exchange rate was stable at USD$1/L.4300 until the economic effects were felt by the EVD outbreak in 2015. The Leone fell dramatically by 72% and was exchanged at USD$1 / L7,529 at the time of the TER.

Table 2 Amounts allocated and disbursed in US$.

I	IFAD / IACCAPFS DISBURSEMENT	
a	Project allocated amount	2,644,800
b	Amount disbursed by IFAD as at 31 Dec. 2016	2,644,800
c	Amount outstanding as at 31 Dec. 2016	-
d	Execution rate	100.00%
e	LDCF/GEF advance to project	214,242.05
f	Amount recovered	122,113.89
g	Outstanding	92,128.16
II	GoSL DISBURSEMENT	
a	Project allocated amount	766,000
b	Amount disbursed by GoSL as at 30 Sept. 2016	-
c	Amount in tax exemptions	144,996
d	Amount outstanding as at 30 Sept. 2016	621,004
e	Execution rate	18.92%

65. **Total project costs.** The overall project budget was US$3,750,800, of which the GEF/LDCF grant constituted US$2,644,800 and the GoSL was to contribute US$766,000 in-kind contributions and beneficiary contributions of US$340,000. The advance received by the project has been in part refunded, the remainder is traceable to bank accounts to be used on activities committed and completed before 31 March 2017.

66. As of 31 December 2016 IFAD was set to disburse 100% of available funds; while this is a major achievement, these figures are inclusive of the additional costs met by the project in the form of the hired assistant and the impact of the EVD outbreak and subsequent one year extension. They are not indicative of overall project success inasmuch as disbursement levels for component one and two stand at 65% and 64% respectively. Of the US$766,000 Government contribution mentioned in the financial agreement, US$144,966 has been provided as in-kind contributions in the form of tax exemptions, which equates to 18.92 percent of the expected amount. It has to be noted however, that the project has consistently been weak in quantifying the in-kind contributions and the total figure could be greater. No funds from the beneficiaries have been received by the project.

#	Category	Loan Allocation	IFAD Disbursement	Disbursement %	Project loan Utilisation	Predicted Available Balance
I	Civil Works	116	134	116%	134	(18)
II	Vehicle & Equipment	578	662	115%	662	(84)
III	Agricultural Inputs	268	272	101%	272	(4)
IV	Studies	765	690	90 %	690	74
V	Technical Assistance	413	390	94%	390	23
VI	Radio Broadcasting	88	83	94%	83	5
VII	Operating Costs	153	199	131%	199	(47)
	Unallocated	264		0%		264
	Total	2,645	2,431	92%	2,431	214
	Authorised allocation		214	-	214	(214)

	Total	2,644,800	2,644,800	100.00%	2,644,800	-

Table 3 Disbursement by category in US$ 000 as at 10 March 2017

67. The total disbursement by category was 92% at the time of the mission, and projected to be 100% (the advance received by the project had yet to be justified). The major areas that contributed to the full disbursement are broken-down into the respective categories as displayed above in table 3:

68. **Category 1, civil works:** The disbursement of US$134,000 which represents 116% of the total allocation includes construction work for rooftop rainwater harvesting (US$48,009.35), greenhouse (US$15,850.79), earth dams (US$17,316.65), basement for weather station (US$9,875.00) and hand dug water wells (US$40,484.62) in Kailahun, Kono, Kenema and Koinadugu Districts.

69. **Category 2, vehicle & equipment:** The disbursed amount of US$662,000 which represents 115% of the total allocation, includes the construction of the Automatic Weather Station (AWS) (US$87,747.17) and procurement of the AWS ($203,495.94); rain gauges (US$39,538.00); Vehicle (US$44,517.00); IT Equipment & Motor bikes (US$97,015.55) and Rice processing equipment ($63,324.35).

70. **Category 3, agricultural inputs:** The disbursement of US$272,000 (101% of the total allocation) contributed to agricultural inputs procured in 2014 & 2015; seeds (US$87,477.92); fertilizer (US$31,616.37); greenhouse (US$44,860.03) and water catchment (US$53,438.86).

71. **Category 4, technical assistance:** The disbursement of US$690,000, representing 90% of the allocation, included sensitization activities ($126,347.20); the baseline study (US$35,372.36); rice yield studies (US$41,698.72) training (US$47,054) and allowances (US$60,387.31).

72. **Category 5, radio broadcasting:** The disbursement of US$390,000 (94% of the total allocation) included the MTR (US$45,000); community sensitisation (US$53,025.12) and allowances to the agronomists and FFS facilitators (US$29,421.29).

73. **Category 6, operational costs:** The disbursement of US$83,000 which is 94% of the allocation, went to radio campaigns on climate change adaptation.

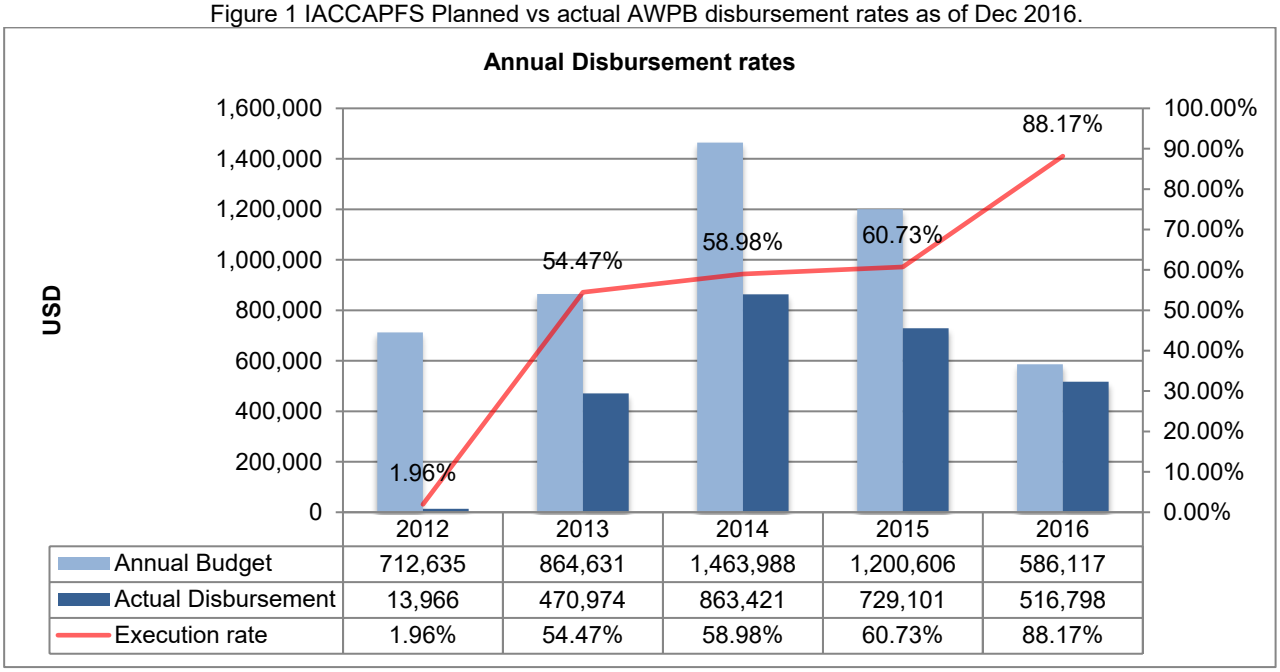
74. **Category 7:** The disbursement of US$199,000 which is 131% of the allocation includes the reallocations due to the salary for the unplanned GEF Assistant since April 2013 to project closure.

Table 4 Disbursement by component in US$ 000 as at 10 March 2017

#	Component	Grant Allocation	IFAD Disbursement	Project loan Utilisation	Disbursement %	Predicted Available Balance
1	Sustainable Development of Resilient IVS	1,009	649	652	65%	357
2	Integrating Water & Natural resource Management for Adaptation	903	569	575	64%	328
3	Capacity Building & Awareness raising of climate change	508	598	753	148%	(245)
4	Project Management & Monitoring and Evaluation	225	614	627	279%	(402)
	Total	2,645	2,431	2607		
	Authorised Allocation		214	38	-	(38)
Total		2,645	2,645	2,645	100%	100%

75. The picture that emerges of the disbursement rates is a mixed one when the numbers are computed by component. While component one and two disbursed 65% and 64% respectively, three and four overspent vis-à-vis the original grant allocation. The main causes for the over expenditure in component 3 were the purchasing of the AWS, the first batch in 2014 for US$116,601.37 and the second one for US$171,213.31 in 2016[21]. With regards to component 4, the over expenditure was attributable to hiring a justified but unplanned assistant for the GEF/LDCF and other unplanned operating costs.

Figure 1 IACCAPFS Planned vs actual AWPB disbursement rates as of Dec 2016.



	2012	2013	2014	2015	2016
Annual Budget	712,635	864,631	1,463,988	1,200,606	586,117
Actual Disbursement	13,966	470,974	863,421	729,101	516,798
Execution rate	1.96%	54.47%	58.98%	60.73%	88.17%

76. The Annual Work Plan and Budgets (AWPBs) disbursement data as per December 2016 (three months before project completion) is an incomplete picture. The average disbursement rate however is 52.8% and may be considered moderately satisfactory. The lowest disbursement rate was observed in 2012 (1.96%), and drags down the overall average. This initial underperforming disbursement was due in large part to the difficulties that the project had in procuring the AWS and the knock-on effect this had from slow Food and Agricultural Organisation (FAO) procurement procedures. However by the end of the 2013 there was a significant improvement in disbursement rates. The disbursement rate was above 50% for the remainder of the project and was boosted as a consequence of the one-year extension due to the EVD.

b) Quality of project management

77. The Project Management and M&E functions were fully co-ordinated and integrated within the management structure of the RCPRP+, with joint planning processes and sequencing. Consequently, the IACCAPFS project was managed as part of the RCPRP+ across all supported activities. The overall quality of project management and M&E during the project lifespan was rated satisfactory, in spite of numerous implementation challenges. The challenges included the consequences of the Ebola Virus Disease which Sierra Leone experienced from May 2014 to October 2015 and which also led to the slowing down of project activities, field monitoring and supervision.

78. **Monitoring and Evaluation.** As has been reported in several supervision mission reports, more effort could have been invested in the IACCAPFS M&E. The project suffered from a deficit in effective results/impacts reporting, analysis and in general documentation and filing practices. During the completion mission it was frequently

[21] The costs relating to the AWS were not discussed in the supervision missions but they are part of the reason of the procurement delay.

explained that synergies had to be found between the two projects in order to avoid burdening the project staff with double reporting efforts; however, it seems that this arrangement has been at the expense of reporting on the results and impacts of the IACCPAPFS. M&E was also carried out by MAFFS on the implementation of its activities such as the training of trainers, FFS, greenhouses and the development of community forest plans; in this case also, M&E reporting was found lacking in results, impact and analyses. The focus on project implementation and lack of data collection and analysis has led to the slow identification of activity performance.

79. A thorough and detailed baseline assessment was carried out through a consulting firm, which applied a documented methodology to identify and record household numbers; sources of livelihoods; changes in crop, tree and land management; household food security; land and water use and availability; climate and weather information; and perceived negative impacts of changes in climate. The same firm however did not carry out the socio economic assessment of project impacts in December of 2016, which was done in-house and fell short of research and reporting standards.

80. It was reported that the RCPRP+ M&E indicators were not entirely SMART[22], equally for the IACCAPFS and, as was explained earlier under project relevance, the activities and key indicator columns of the logframe were combined making it harder than necessary to distinguish between indicators and activities. This was subsequently changed at the MTR stage but, in terms of the indicators being GEF SMART, they were found to be clearly ambiguous and harder than necessary to understand. The indicators tended to focus entirely on project implementation with little to no focus on measuring outcomes, such as numbers of beneficiaries, levels of food security, environmental impact, levels of climate change awareness, number of people trained by trained trainers, and the relative impact of the earth dams on the NERICA climate resilient rice yield levels.

81. During project implementation, the project team held regular review meetings and conducted field supervisions and monitoring. Technical support and field monitoring were carried out ensuring that project activities were implemented in accordance with the demands of the respective AWPBs and in line with the recommendations formulated by IFAD's Supervision Missions.

82. While project management is rated satisfactory, there was a number of recommendations by the supervision missions and MTR that were not implemented. These include the setting up of community dam management committees and maintenance protocols to be put in place. The late implementation of the paddock system in the small ruminant farm as per the recommendation of the 2016 supervision mission has led to a late purchase request for livestock that could not be met. No effort seems to have been made to address the MTR recommendation to explore opportunities with the United Nations Development Programme (UNDP) to upgrade the meteorological infrastructure and support its "African Monitoring of the Environment for sustainable development E-Station" system. This was suggested after it became apparent that the Meteorological Department was not able, for a number of reasons including one of technical capacity, to process the meteorological data and disseminate it to farmers as an early warning system for climate adaptation.

83. Specific issues related to problems in project management as detailed in the MTR include the failure of the roof rainwater harvesting activity. The failure was due to a design flaw, but also to a failure to seek technical advice from relevant experts inside or outside the NPCU, before engaging contractors to construct the water harvesting services. 100% contract payments were also made prior to the evaluation of the product's performance, releasing the vendor/service provider from further obligations and responsibility to correct technical errors. Consequently it wasn't until 20 of the 100 water harvesting sheds were constructed that the project identified they were not performing and were generally unfit. The technical evaluation of the facility could have happened quicker although the financial impact was ultimately limited.

84. Technical problems with the implementation of the weather stations appear not to have been picked up by the supervision missions, or foreseen at the project management level.

[22] SMART: Specific, Measurable, Achievable/Attributable, Relevant/Realistic, and Time-bound, Timely, Trackable and Targeted.

This was the most expensive component of the project and half of the stations (4) have been facing technical problems that could have been identified and corrected sooner had one or two stations been procured and tested first, instead of four stations now requiring upgrades. With hindsight, the supplier should also have been contracted for a regional repair and maintenance training support or service.

85. The implementation of activities during the start of the project was slow; which translated into low disbursement rates. The procurement plan was only approved in March 2013, a substantial portion of which was carried out by FAO for the weather stations, with significant delays due to their procurement processes. This led to an AWPB and implementation rate lagging behind with a mere 5% disbursement rate by June 2013. Notably, by December 2013 the disbursement rate had jumped to 54%, a commendable effort, but highlighting nonetheless the value of early planning and proactivity. At the time of writing it was not possible for the mission to verify the degree to which the implementation timetables were met, to verify the frequency with which the project Steering Committee (SC) gatherings took place or whether the SC generated constructive recommendations during the supervision missions.

86. **Quality of IFAD supervision and implementation support.** Overall, IFAD provided adequate support through project design, supervision missions and implementation with a country presence. Supervision missions occurred regularly and jointly with IFAD and the GoSL on an annual basis. They typically comprised between 5 and 10 experts, with one looking at GEF/LDCF and the remainder covering IFAD thematic areas including institutions and decentralisation, tree crops, M&E, finance, environment and climate change, IVS, roads and gender. A MTR was carried out in 2015 solely for the IACCAPFS project, where significant adjustments were recommended; unfortunately, many of the recommendations were not implemented for reasons which included, among others, technical and budgetary reasons. There were no delays in fund transfers from IFAD and the PCR finance review has determined that the project office largely complied with financial procedures.

87. **Financial management.** The day-to-day financial and administrative procedures were reviewed and the NPCU was found to generally comply with the financial and administrative procedures manual.

88. **Internal controls.** The exception to the general lack of a systematic filing, archiving and documentation system was the payment processing cycle that was characterised by strong segregation of duties with a very good filing system. There has been a strong financial discipline including on-time bank reconciliations detecting recurring bankers' errors in time for follow-up. One of the most outstanding positive elements has been the good filing system with a clear audit trail to the accounting system, making it easy to retrieve the underlying supporting documents during IFAD mission spot checks and statutory audits.

89. **Recurring financial management issues.** The Financial Management issues that have been recurring from year to year were:

    i. Incomplete/ lack of capture of in-kind counterpart contributions (GoSL and beneficiaries). This is in spite of all the implementation support that IFAD provided.
    ii. Special account reconciliations at times had plug-ins of balancing figures, as amounts were withdrawn from bank accounts but not yet replenished.
    iii. Commitment accounting remained a challenge throughout the project, partially because of the failed linkage between Tommarch and Tompro softwares. The commitment figures coming from the accounting software were generally misleading.
    iv. The project was not consistent in the management of the First In First Out (FIFO) exchange rate and lost some funds, in the amount of approximately US$ 50,000. This may affect smooth recovery of initial advances from GEF through IFAD.
    v. Until 2016 it was difficult to directly link significant payments to IVS contractors to physical progress on the ground. In future contracts with such contractors, related payments will need to be based on milestone deliverables.

90. **Fixed assets.** The project has invested in a number of assets across the participating districts. Although a complete assets register is in place, no hand-over plan of these assets to the government, to those being retailed by the NPCU, to the district councils, and/or other actors is yet in place. The plan needs to be devised before actual project closure. Key assets that have to be formally handed over include: (i) weather stations to the meteorological department; and (ii) assets held at the various DPCUs (Kenema, Kailahun, Kono, and Koinadugu).

91. **Statutory audits.** Until 2015, the statutory audits were carried out by private audit firms selected competitively. For the fiscal year 2015, the project was audited by the Audit Service of Sierra Leone (ASSL) in accordance with national law. The 2016 audit, also carried out by ASSL, is still ongoing, in accordance with the new approach IFAD/ GoSL have agreed to as part of the agenda to build national systems. Each year, the project received clean (unqualified) audit opinions and IFAD has been rating the quality of audits as satisfactory, with 2015 being rated as highly satisfactory. ASSL pointed a number of areas for improvement. Even with the Tompro software as discussed above, ASSL brought to light that the financial statements audited were done in Excel and could not be fully reconciled with the Tompro record. The final statutory audit should be proactively planned ahead of the closure date. It has been agreed that the accounts books be closed off around 30 June 2017. This will allow the audit to commence in July 2017 and be completed along with the initial advances recovery process by closure date of 30 September 2017.

92. **Internal audit.** The project was not provided with an internal audit function of its own. Since December 2015 there has been no formal internal audit exercise undertaken, nor related reports have been made available. The use of MAFFS internal audit unit has generally not worked well, and it could take more than a year or two for a formal internal audit report to be generated.

93. **Documentation and record keeping**. During the RCPRP+ completion mission, procurement plans and contract administration registers were found to be properly drafted, maintained and updated as required. The project record-keeping framework and documentation management however were found to require considerable improvement. The general lack of a systematic filing, archiving and documentation system has also meant that the TER mission has had considerable difficulty in locating all the relevant verification documentation and a complete list of beneficiaries.

94. With regards to procurement, most files did not have bidding documents issued to bidders, and were missing certain key documents (such as No objections, Purchase Orders for Shopping and important email correspondence). Above all, none of the procurement records were filed in chronological order consistent with procurement processes. Additionally the use of box files instead of the lever-arch files has contributed to the re-scattering of documents each time the records are accessed.

c) Cost-benefits analysis

95. It has not been possible to estimate the project specific and consolidated internal rate of return. However, a cost-benefit analysis on selected GEF/LDCF funded activities has been carried out for the NERICA rice, the greenhouse innovation and micro-catchment areas.

96. **NERICA rice.** A total of 3.2mt of foundation seeds were procured and multiplied. This drought resistant rice variety reports increased yields of up to 3.22mt/ ha compared to paddy rice of 2.03mt/ ha. With this rice variety, farmers can generate a gross income of L. 5.6 million / ha compared to Paddy rice L. 2.8 million / ha. With a reported average farm size of 4.12 across the project districts, it means that with NERICA rice farmer incomes can increase their total gross margin to L 23.1 million (US$3,070) compared to Paddy Rice at L.11.7 million (US$1,559) as summarized below. See tables 9 and 10 under annex 3 for the detailed gross margin model.

Table 5 Rice profitability

Rice Variety	Yield kg/ha	Price L.	Gross income/ha	Profit margin/ha	Avg farm size	Total gross income L.	Total gross margin L.
NERICA	3,220	2,321	7,473,361	5,610,734	4.12	30,790,248	23,116,222 (US$3,070)
Paddy	2,030	2,321	4,711,467	2,848,886	4.12	19,411,243	11,737,412 (US$1,559)

97. **Greenhouse technology.** Based on the below survey figures (tables 6 and 7), a gross margin computation indicated that the group had the potential to earn L. 575,000 per crop cycle. With a maturing period of two months, and a harvesting period of up to two months for the hybrid cucumber, a cooperative/ group running such an enterprise is theoretically able to have three crop cycles each year, with a possible income of L.1,725,000 (US$420) per year. The investment can generate a Net Present Value (NPV) of L. 4,784,526 (US$1,164). When however the NPV is subdivided by the number of members (9) there is a net of margin of L. 1,725,000 a year, which is not high enough when the operating expenses are factored in. In order for this investment to be profitable, considerations should be made for improved cropping patterns or to propose higher value crops. See table 11, annex 3 for the detailed gross margin model.

Table 6 Parameters used for greenhouse cost-benefit analysis

Parameter	Assumption
Size of greenhouse	80 x 25m
Crop	Cucumber, hybrid
Commencement	22 July 2016
Maturity period	2 months
Harvesting period	2 months
Group size	9 members
Useful life	10 years

Table 7 Budget break-down for Kenema greenhouse

Item	Cost Leone (L.)
High value planting materials	477,000
Agro chemicals	1,998,000
Capacity building trainings	5,570,000
Planting bags	3,000,000
Drip irrigation pipes	5,376,000
Agri-support (3 visits / month for 6 months)	9,680,000
Total	26,101,000

98. **Micro-catchment.** The project districts experience long dry spells during the wet season as a result of climate change. As a result, it is difficult to rely purely on rain-fed agriculture. Through the Njala University, the project identified 22 sites in which micro-catchment areas have been established. A micro catchment treatment brings both quantifiable and unquantifiable benefits by stopping the practice of slash and burn and introducing techniques such as mulching. Based on one sample group cultivating an area of one hectare (half for cropping and half for water reservoir), the following data was collected: the beneficiary group was able to grow maize, okra, sweet potatoes and pepper on half a hectare of land using this technique. The financial analysis indicates that this enterprise is viable with a positive NPV of L. 7.5 million (US$996) and an internal rate of return of 72%. The detailed gross margin model and cash flow projection are included in the attachment table 12, annex 3.

99. From a purely financial perspective the cost-benefit analysis demonstrates that on the whole the LDCF/GEF interventions have proven to be positive with specific reference to the introduction of the NERICA rice and the micro-catchments. With regard to the former, farmers were able to double their net profit, while the latter is a confirmation of its financial viability with the added benefits of providing an economic alternative to the environmentally destructive and widely used practice of slash and burn. This is in contrast to the one of two greenhouses surveyed, the analysis of which is less positive and the

economic model is proven not to be sufficiently sustainable, although it needs to be noted that observations by the TER mission showed that the women group was also considerably less experienced in comparison with the women's association in Koinadugu, where the income levels were reportedly much higher.

V. Project impacts

100. This mission has found that more effort could have been made to systematically collect GEF/LDCF data through the combined IACCAPFS and RCPRP+ M&E. The missing record of IACCAPFS beneficiaries shows the general lack of reporting and documentation which extends to data relevant for the TER project impacts such as agricultural productivity, household assets, access to markets, food security, climate change awareness etc.

101. A socio-economic survey of 60 project-supported farmers and 40 non-project supported farmers has been carried out on reportedly all IACCAPFS activities in December 2016; yet, the exact target group or methodology employed were not clear. Interviews conducted by the mission indicate that M&E was only carried out in areas overlapping with the RCPRP+, namely activities in the IVS. IACCAPFS IVS farmers involved in the micro-catchment pilots were also not counted for concerns of double counting. GEF/LDCF did however have a separate log-frame that was kept up-to-date with implementation targets and achievements at the output level.

102. **Adaptation to climate change.** The main purpose of the project has been to address the apparent lack of a RCPRP(+) recognition that climate change is already impacting on agricultural production and food security in the poorest regions of Sierra Leone. The findings of the TER indicate a generally positive impact in adapting to climate change (within the scope of the pilot projects in terms of food security, awareness, capacity building etc.).

103. **Climate change awareness.** Assessing the level of climate change awareness is a subjective analysis that requires surveys with carefully worded questions and a detailed methodology. Climate awareness impact data was provided by the socio-economic analysis but, as mentioned earlier, it is not possible to verify the methodology used leading to data reliability concerns. These concerns are further underlined by a lack of information on target population disaggregation or ability to review the questionnaires used and a general lack of reporting thoroughness. Nevertheless, the findings claim that communities have a good understanding of climate change, which they associate with rising temperatures, erratic rainy seasons and reduced overall rainfall. The perceived impact of climate shocks were prolonged drought (30%), heavy rains (30%), and flooding (14%), soil erosion (28%), contaminated drinking water (25%), drying up of streams (13%) and air pollution (10%). The report concludes that these results are encouraging although it is not clear which data is being used for the comparative analysis as there was no cross-referencing with other studies such as the comprehensive IACCAPFS baseline assessment.

104. The IACCAPFS impact assessment that was carried out as part of the one fot RCPRP+ didn't revisit the same food security data generated by the baseline study, which makes drawing overall impact conclusions more difficult. Climate impact data was however generated and it shows that over 33.2 % of households in all communities that benefitted from the GEF interventions confirmed having the ability to maintain or increase food production in the event of a flooding. In the control communities, about 15% had such capabilities. The perception on mitigation measures on environmental hazards and its repercussion was also measured and ranked highest with 35.5% respondents followed by training on how to preserve the environment (25.4%), educating on climate change through radio discussion (19.1%), environmental agricultural support (16.2%) and training on climate resistance farming methods (3.8%). Kono district recorded the highest sensitization intervention (95.9%) while Kailahun district recorded the highest intervention with training on how to preserve the environment. Koinadugu recorded 41% environmental agricultural support.

105. **Food security**. The baseline assessment, which used a thoroughly documented methodology, measured food security based on two parameters, namely household's

sources of food and food shortage throughout the year. These included food that originated from farm or elsewhere and which and how many months they struggled to provide enough food to feed their families. As a result, a food security index was generated and it concluded that a mere 3% of interviewees reported to have access to food all year round, 21% reportedly could access food for 10-11 months in the year while the majority faced food shortages for 3-6 months of the year. The regions which suffered the longest period of hunger were identified as Kailahun and Kenema.

106. Currently, the data available to assess project specific impact on food security is presented in the socio-economic assessment, where expenditure on food was examined as an indicator of food security. The report claims that, as a result of low incomes, the share of food expenditure as a proportion of total expenditure was higher for non-project supported households. Project supported households spent 42.8 percent of their total expenditure on food, while non-project supported households spent 57.2 percent on food. The conclusion was drawn from these results that non-project supported farmers are likely to be more vulnerable as a result.

107. It is clear from the TER that the IACCAPFS has had an impact on improving food security as there have been reports indicating that rice production has increased for those farmers using the NERICA rice. The village groups piloting new sustainable agricultural techniques on the 22 0.5 ha micro-catchment plots were also showing initial promising signs. They not only showed promise in improving the quantity and diversity of the crops produced, but also in improving soil quality and moisture through a variety of techniques designed to reduce erosion, nutrient leaching and soil moisture evaporation. Therefore while the project has shown promising indications of a positive impact on food security, this cannot be ascertained as a certainty until the impact assessment is carried out.

108. **Income generation**. Based on available M&E documentation for the IACCAPFS project it is not possible for the mission to conclude comprehensively whether the project activities as a whole have had an impact on the income generation. Some analysis has been carried out as part of the IFAD Project Completion Report (PCR) which indicates that the NERICA rice introduced as part of the climate adaptation strategy has had a positive impact on income generation. Research has shown that farmers have been able to double profit margins, which is very positive for prospects of future sustainability. Reports have also been received of double and triple cropping of rice as a result of the earth dams but it was not possible to quantify this in numerical terms or to what degree they improved the yields of the NERICA rice over the paddy rice varieties.

109. The second most successful income generation activity, that of the micro-catchments, was introduced as a replacement to failed roof rainwater harvesting activity, and has shown positive preliminary results. The cost-benefit analysis of one of the 22 micro-catchment sites has reported an internal rate of return of 72% and an NPV of US$996. Despite the promising early economic and environmental results, more monitoring and analysis should be undertaken as the remaining sites begin to make their first harvests. The greenhouses, on the other hand, have not been as successful and are struggling to make positive economic returns on investment.

110. **Institutions and policies.** The main project objectives were focused around the piloting of climate change adaptation initiatives to complement RCPRP+ activities. Unlike the larger RCPRP(+) where funds were provided to carry out research on key policy issues, the IACCAPFS did not include the objective to directly influence policies. The project did however carry out capacity building exercises directly impacting MAFFS by the training of 12 staff members in statistics and applied climatology. It is also hoped that by supporting the Njala University in developing climate resilient agriculture techniques, that its success will be recognised by MAFFS and be adopted in an organic fashion at grassroots level.

111. The project also directly assisted the Meteorological Department in developing the network of AWS's as well as in developing its technical capacity, both of which are central to a nation's ability to adapt to climate shocks and were seriously impaired as a result of the war. Eight stations were installed throughout the four regions (two per region) Three staff members were trained at the Nigerian Meteorological Agency in a year-long course both as senior and medium level meteorological technicians. The overall objective however to gather and disseminate meteorological data to enable farmers better adapt to climate shocks, has not yet been achieved and a number of technical and financial

sustainability challenges remain with regards to the Meteorological Department's ability to carry on after project closure. The TER has addressed this shortcoming by recommending that other projects further support this activity in view of improving its future sustainability.

112. **Gender equality and women empowerment.** Gender played a substantial role in the IACCAPFS project. It is possible to report that the project positively impacted 1078 women with climate resilient rice varieties, as evidenced through reports on double and triple cropping and doubling of yield and profit margins over the standard paddy rice. 180 women, youth and heads of vulnerable households were trained through the GALS methodology to create awareness on climate change and 102 women were trained in land management and erosion control. It needs to be pointed out though that the numbers stated above are not definitive as the TER was unable to obtain definitive beneficiary numbers. The TER is also not able to determine the impact of the climate change awareness training as surveys have not been carried out and the socio-economic analysis conducted didn't disaggregate between age and gender of the respondents.

VI. Sustainability

113. **Economic and financial sustainability.** The introduction of climate smart agricultural practices, that include improved climate resilient seedlings and different irrigation systems employed especially in the IVS sites, have helped improve food production. The introduction of Nerica L19 and L20 as well as the construction of earth dams and rainwater harvesting techniques have helped in mitigating the effect of climate change in the agricultural sector. The pilot activities in micro-catchment are promising developments that seem to be poised to continue to generate incomes after the end of the project irrespective of whether up-scaling or replication will happen.

114. **Social sustainability.** The use of the NERICA foundation rice is likely to continue as it has been multiplied and planted in 120 ha of land and proven to improve yields. The other activity likely to continue is the micro-catchments, which are being continued by the Njala University. The beneficiaries have also been involved at every stage of the project implementation, hereby ensuring adequate beneficiary participation. A certain degree of social resistance to new technologies was also encountered by the beneficiaries, the project has demonstrated that social acceptance and hence sustainability is possible.

115. **Technical sustainability.** Technical sustainability is ensured through the involvement of MAFFS extension workers who will provide technical backstopping in pest management in the greenhouses in the future. The technical sustainability of at least two of the earth dams however has been questioned by the completion mission. The two dams funded by the IACCAPFS in Kenema and Kono (the latter was visited by the IVS team) have shown some design flaws with regards to the overflow pipes being too narrow and hereby causing lateral overflow and subsequent flood damage in the form of erosion and damage to agricultural land. Supervision mission recommendations that community dam management committees be set up and maintenance protocols be put in place, have not been implemented. This does not bode well for their long-term sustainability.

116. The immediate sustainability of the AWS is not assured because of a number of reasons. The main problems are that the technology is relatively high-tech and spare parts are not available in Sierra Leone or regionally, nor were they included in the contractual agreement with the supplier. The supplier however was contractually bound to include training; yet, this was limited to basic maintenance and installation, rather than repair. Efforts were made to send the IACCAPFS assistant at the NPCU for training in Europe although this was cancelled due to the Ebola outbreak. Subsequent efforts to send him were hampered by budgetary considerations. The assistant was formerly employed by the Meteorological Department and it was originally envisioned that he would subsequent to project completion be in a position to return and give training to other staff.

117. **Institutional sustainability.** The implementation of the GEF project was conducted in close collaboration with MAFFS and also with the Meteorological Department. However considerable gaps remain with regards to the availability of skilled personnel to manage both the AWS and to repair and replace faulty equipment. This is also due to a reduced number of people with the requisite qualifications and experience.

118. The Meteorological Department also suffers from chronic budget shortage and, as a government agency, has no control over its own budget. Consequently, it is unable to prioritise funding for the AWS. For example, the department is not able to meet the Internet costs required to transmit meteorological data from the computers. A temporary solution has been found by supplying them with a vehicle for site visits and physical data collection, although this would not be an ideal long-term solution, given the road conditions, travel distances and vehicle maintenance costs which were covered by a budget line while the internet costs were not. A possible solution is on the horizon as Parliamentary discussions are taking place for the Meteorological Department to become an independent agency with autonomous budgetary control and ability to charge for services rendered. It was not possible though to get an idea of when this is likely to happen.

119. **Seed sustainability.** It was not the stated aim of the IACCAPFS or the RCPRP(+) to support certified seed breeders. Importing climate resilient NERICA rice started with FAO's initial emergency post-conflict support for Sierra Leone, which predates IFAD's original RCPRP intervention. Since the beginning of RCPRP, IFAD has aimed to work closely with FAO and used its innovative FFS approach and community based extension[23]. As part of this, seed multiplication was to be carried out by the farmers, and not certified seed breeders, under the supervision of the Rokupr Rice Research Institute (RRRI)[24] and the respective research stations, a process that evolved over the course of implementation as the RRRI became the Rokupr Agricultural Research Centre (RARC). There is precious little recorded information in the IACCAPFS project documents and supervision mission reports explaining what the IACCAPFS approach was to seed breeding, but in the 2012 RCPRP+ supervision mission it is shown that the RCPRP+ and by extension the IACCAPFS through its co-financing of NERCIA rice, was working with farmers on contract based seed multiplication with interested IVS's.[25]

120. **National Regulation of Import of Rice.** In Sierra Leone there is a clear need to reduce the dependence on imported rice, a fact that is recognised in the National Rice Development Strategy (NRDS). The main concerns in substituting the current system too quickly however include high tariffs encouraging illegal imports through the porous borders and high transportation costs that could lead to higher prices for consumers.[26] With respect to national certified seed import policies, the NRDS does not include an approach to its regulation. The aim of the Sierra Leone Agricultural Development Policy mainly focuses around limiting government intervention in rice and seed supply so as not to overburden national budgets and not to stifle private sector development. It does however recognise the need for research seed multiplication and marketing infrastructure development to ensure a flow of improved seeds of high yielding rice varieties.[27]

121. **Natural resources and the environment.** As per project design and the RCPRP+ environmental and social review note, the environmental sustainability and monitoring of the combined RCPRP+ and IACCAPFS projects was to be ensured by the IACCAPFS through the funding of the baseline survey and impact studies and other activities as detailed in annex four. This mission rates the Environment and Natural Resource Management (ENRM) as satisfactory. This was based on the measures integrated into project design which aimed to mitigate against the environmental impacts of the project. These include carrying out studies on participatory mapping of vulnerability of rice production areas to climate change; a socio-economic analysis on the use of liquid petroleum gas (LPG) vs coal and firewood in GEF areas and a socio-economic analysis. Other adaptation and mitigation measures in reducing the environmental impact, primarily involve soft components in beneficiary training and capacity building in environmental and climate change awareness.

[23] IFAD RCPRP 2003, Appraisal Report, Working Paper 3 paragraph 89.

[24] IFAD RCPRP, 2003, Appraisal Report, Working Paper 3 paragraph 203.

[25] IFAD RCPRP+ 2012, Supervision Mission page 30.

[26] World Bank, May 2014, Rice Prices in Sierra Leone, page 18. https://www.statistics.sl/wp-content/uploads/2017/04/rice_prices_in_sierra_leone.pdf

[27] Coalition of African Rice Development 2009, National Rice Development Strategy (page19) https://www.jica.go.jp/english/our_work/thematic_issues/agricultural/pdf/sierraleone_en.pdf

122. As a result of the IFAD environmental screening and scoping exercise carried out during the design stage, the RCPRP has been classified as Category B[28]. The IACCAPFS, on the other hand, was reported to have a positive impact on the environment. Through the aforementioned soft components such as environmental awareness campaigns, efforts have been made to reduce the harmful slash and burn practices, as well as generating climate change awareness among the general public, which could have had positive environmental impacts.

123. The IACCAPFS also had the objective to carry out the environmental sustainability and monitoring of the combined RCPRP+ and IACCAPFS projects. The indicators used and the relevant achievements are detailed annex 4. There were nine areas covered, namely the studies conducted; support to the community radio stations in spreading raising climate change awareness; the training of extension workers to deal with adaptation to climate change, the number of demonstration sites for SLWM training purposes established at village level; the number of trained farmers; community-based plans for natural resources management produced; local technical assistance provided to farmers and general public climate change awareness raising.

124. **Climate change adaptation** for the combined RCPRP+ and IACCAPFS was ensured through the IACCAPFS as per project design and formed the foundation of the project. The project carried out a number of activities specifically aimed at reducing climate shocks, these include a climate vulnerability mapping exercise and subsequent construction of earth dams to enable a perennial supply of water (despite some technical issues affecting the sustainability of two of the four dams) in climate change vulnerable, non-perennial rain-fed swamps. 3.2 metric tons of NERICA rice suited to rain-fed upland ecosystems were also procured, and multiplied to an estimated 72mt. This was then re-distributed to farmers on a total of 120 ha and is expected to greatly improve food security as beneficiaries are able to double and triple crop rice. The project also piloted innovative sustainable land and water harvesting techniques to collect, concentrate and store water at the crop root zones (tied ridging, moon ridges) as well as soil conservation methods that control erosion (mulching, terracing). This innovative pilot, aimed to demonstrate that in-situ agriculture can be more productive than the destructive practice of slash and burn and has been largely accepted. The project also demonstrated great signs of soil regeneration in soil structure, nutrient and moisture content and the Njala University is set to continue the activities after project completion. 180 women, youth and vulnerable households attended workshops on climate change adaptation; training on how to carry out capacity building workshops on climate change adaptation was also delivered.

125. The results that are highly likely to be sustainable include the climate resilient rice suited for rain-fed upland ecosystems where farmers were able to double their profit margin over the regular paddy rice. The micro-catchments were highly successful in their objective to pilot water harvesting and soil rehabilitation techniques with a view to promote in situ multiple cropping while improving soil fertility, reducing soil erosion and mitigating against the environmentally degrading practice of slash and burn. The pilot has been rolled out to 22 demonstration sites and the signs are very encouraging that the farmers are happy to continue after the project. The university is also very keen to continue.

126. The project's overall sustainability is rated as **satisfactory (S)**.

VII. Targeting and outreach

127. The IACCAPFS targeting approach was in line with IFAD's mandate to target rural people living in poverty and experiencing food insecurity in developing countries. The degree of outreach achieved by the project was difficult to discern due to the lack of project M&E and resulting record of beneficiaries. From the data recovered by the TER it is not possible to get a complete picture of project outreach. As mentioned throughout the report, the project M&E did not systematically record the numbers of beneficiaries. The figures presented in this report are based on the attendance sheets that were signed and which could be located in the non-existing filing system, not on an accurate record of who the beneficiaries actually were. The attendance sheets also did not always disaggregate

[28] The project may have some environmental and social impacts on human populations or environmentally significant areas but which are site-specific and less adverse than Category A".

between gender and age. From this data the TER is able to determine that about 9,811 beneficiaries were directly targeted, although this figure could be more. This total consisted 1,180 women, 2,070 men and 6,042 youth. The indirect beneficiaries targeted by the project activities is estimated at over 10,000.

128. RCPRP and IACCAPFS were designed to reach out to the most vulnerable groups in the project areas, giving priority to poorest and most food insecure chiefdoms/wards. Clear targeting mechanisms were defined at design. The IACCAPFS project was fully aligned in terms of targeting and strictly followed the targeting criteria with a focus on small-scale farmers and most vulnerable groups. The target groups for IACCAPFS project activities were the women headed households, vulnerable heads of households and youth, particularly unemployed youth, people with disabilities and micro/small scale entrepreneurs living in remote areas that are prone to food insecurity due to difficulty of market access.

129. The major target groups reached were:

- **Smallholder farmers.** RCPRP+ & IACCAPFS supported male and female farmers involved in rice/vegetable production, banana, sweet potato, cassava, pineapple, plantain maize, okra and improved pepper seeds.
- **Small-scale entrepreneurs.** The project supported improvement of agro-processing and employment through provision of greenhouses, drip irrigation technology, expertise support through service providers and trained MAFFS extension workers, rice mills, sewing bag machines, standing scales, tarpaulins and 20,000 empty bags for bagging recovered seeds.
- **Gender.** RCPRP+ & IACCAPFS successfully achieved a gender sensitive implementation approach through a systematic representation of women and young women in all economic empowerment activities, groups and organisations formed and strengthened: farmers, chairladies, councillors and service providers.

VIII. Innovation

130. The IACCAPFS has partnered with the Njala University to pilot water harvesting techniques and how to make them accessible to rural farmers, the technology has been tested in 22 locations to help farmers adapt to an increasingly unpredictable climate. The techniques include mulching with *Gliricidia Sepium branches*, to greatly reduce evaporation, and is a fast growing, fire and drought resistant, deep-rooted, nitrogen fixing and nutrient rich tree. The introduction of moon-ridges and mulching at the base of tree crops are used to capture and retain surface water runoff, also tied ridges and the testing of organic compost fertiliser techniques, have proven to succeed both at the research stage and in technology transference at the farmer level. Preliminary findings show that this pilot has worked and is being accepted and integrated by initially reluctant and sceptical farmers. However, it would be interesting to monitor the longer-term impact as this was implemented late in the project's life. Options for up-scaling could include integration with either of the two remaining IFAD programmes, namely the Rural Finance and Community Improvement Programme (RFCIP) projected to close in 2022 or the Global Agricultural Food Security Programme (GAFSP) projected to close in 2018. The TER mission had commenced preliminary discussions on ways of mainstreaming elements of the IACCAPS into these programmes, however this did not proceed far due to time constraints.

131. The greenhouses, which were also funded through the redirection of funds following the discontinued rainfall harvesting component, were also innovative because the greenhouses and the drip-irrigation technology were new to the beneficiaries, as were the techniques in past management. In conjunction with open field irrigation, the two women groups (in Kenema and Koinadugu respectively), were used as technology testing subjects. The women were supported by Fresh Salone, a private sector service provider providing technical support. Challenges in pest management were met in Kenema through partnering with Njala University in soil sterilisation and basic greenhouse contamination prevention strategies. There were differences in economic and agricultural productivity between the two IVSAs. Significant differences were also noted between the

open field irrigation and the greenhouses in favour of the latter, but exact comparative figures were not available.

132. There have also been some unexpected innovations during the implementation process. One such innovation was developed by the RCPRP in the implementation of the earth dam activity, that was funded by IACCAPFS. This involved the creation of capable Service Providers (SPs), working with the IVS Associations (IVSAs) on a systematic contract basis, and IVS Youth Contractors (YCs) selected by the IVS Associations in the four RCPRP districts. The SPs and YCs were contracted for the rehabilitation of the IVS, including construction of earth dams, and provision of other services to the IVSAs such as mechanical cultivation using power tillers. In general the MTR noted that this was a successful innovation, which should be replicated and up-scaled by other organisations. **Innovation in the IACCAPFS is rated as satisfactory (S).**

IX. Knowledge generation and sharing

133. The project has generated a number of useful reports and assessments for which there is no evidence that they were shared widely beyond the project. These include a vulnerability mapping assessment of swamplands that are vulnerable to variable rainfall patterns, a comprehensive baseline assessment, a socio-economic analysis of using LPG vs charcoal and firewood in the IACCAPFS project areas, and an assessment of socio economic indicators in the IACCAPFS project areas. The report quality and reliability of information generated however, has varied significantly. For example while the baseline carried out by an external consulting firm was characterised by a thorough, systematic and well documented approach, the in-house socio-economic analysis (upon which much of the impact analysis relied on), lacked in systematic and methodological reporting. It was specifically missing data on the disaggregation of the target population, questionnaires or information on what questions were asked and a general lack of reporting thoroughness with no referencing to other studies or baselines when making conclusions on project success.

134. The project further carried out awareness raising and capacity building activities through a wide variety of media (billboards, radio programmes, leaflets) that widely disseminated information on climate change awareness and the importance of farming in the IVS as opposed to upland agricultural land. Training occurred at multiple levels, including at the ministerial level in the form of certified training courses, to the beneficiaries level through the training of extension services workers and trainers of trainers, as well as training of radio broadcasters. Ultimately the project has focused a significant portion of its activities on the training of beneficiaries in SLWM techniques, awareness against slash and burn as well as on the impacts of climate change. There has however, been no evidence that the project has been disseminating the information which it has generated as part of the studies and assessments. Knowledge generation and sharing is rated as **moderately satisfactory (MS).**

X. Potential for scaling up and theory of change

135. The IACCAPFS was in large part a testing ground of pilot technologies. Many adaptation techniques were tested and some such as the rainwater harvesting were not successful. Through better monitoring and evaluation, the project could have identified this weakness quicker but it was corrected before it was too late. As a result the project was able to move on to (i) supporting the Njala University with their successful trials in water harvesting and soil rehabilitation; and (ii) introducing new climate adaptation and mitigation (preventing slash and burn) initiatives through the micro-catchment activity. This activity has been one of the most successful of the project and IFAD has been very supportive of the idea to explore new ways to upscale through FFS in other MAFFS programmes.

136. Other activities that require further support in fulfilling their original objectives through upscaling and integration into other projects are the AWS and specifically in providing repair training, spare parts and forecasting software, and in ensuring that the data is being correctly processed and transmitted to the rural farmers in a format that they can understand. The earth dams also require further support for two reasons. Primarily

because of their relevance: they have been very successful in enabling farmers in rain-fed swamps to double or triple crop. Secondly, there were a number of design sustainability issues relating to sufficient water retention capacity leading to overflow, lateral erosion and flood damage being caused to downstream agricultural land and local infrastructure like bridges that will require addressing.

Theory of change. The diagram in annex 5 depicts the causal pathways from project outputs through intermediate states to outcomes and impact. It shows the interactions of the all the stakeholders, their interrelationships throughout the project implementation process and the feedback loops leading to a virtuous circle that strengthens the ability of the stakeholders to meet the project objectives. For example, when beneficiaries learn and accept climate change as a reality (intermediate state) as a result of training (output) and facilitation by MAFFS (engagement and interaction), they are more likely to support the activities related to outputs such as the land management and erosion control, alternative livelihoods, or climate resilient rice. Ultimately these will self-reinforce to produce (outcomes and impacts) increased perennial rice yields, improved adaptive capacity of the food supply system to the impact of climate change.

XI. Performance of implementation partners

137. The partners to the project included, among others, MAFFS, Meteorological Department, Njala University, Sierra Leone Agricultural Research Institute (SLARI) and Fresh Salone and the degree of performance varied. The greenhouse service provider Fresh Salone initially failed to respond to the NPCU attempts to fulfil its obligation to provide technical assistance; however, after the supervision mission of 2016 Fresh Salone satisfactorily supported the pilot greenhouses established at two sites in Kabala (Koinadugu) and Kenema. The overall assessment has been complicated due to the cooperative in Kenema being affected by problems of miscommunication with the beneficiaries. There were expectations by the women group in Kenema of being paid by the project to work in the greenhouse, as well as technical problems which led to the brief dissolution and subsequent reformation of said woman group.

138. MAFFS facilitated tax exemptions, and in-kind contributions of land for the establishment of the automatic weather stations in the four districts of Kailahun, Kono, Kenema and Koinadugu. The District Agriculture Offices, in collaboration with the local councils, supported project implementation at district level through technical backstopping in the area of extension services and regular monitoring and supervision of project activities such as the earth dams in terms of carrying out site visits, progress monitoring and reporting.

139. The counterpart did not meet its financial obligations as stipulated under section B-5 of the Financial Agreement between Republic of Sierra Leone and IFAD. The Republic of Sierra Leone was supposed to contribute in kind counterpart financing in the amount of seven hundred and sixty-six thousand United States dollars (US$ 766 000). At present there has been no contribution other than US$144,966 in the form of tax exemptions, which constitutes 19% of the expected amount. It needs to be mentioned that the project has been consistently weak in quantifying the in-kind contributions, therefore, the total figure could be greater.

140. Njala University has in a short period of time managed to make progress both in developing water harvesting techniques in dry and infertile soil to enable the cultivation of cassava, plantain, pineapple, banana trees and maize through a variety of water retention techniques and rapid organic composting. The university has also managed to pilot 22 out of the 24 micro catchment sites with rural farmers. The first crop is still to be harvested but this mission has observed that the crops are growing successfully and the farmers appear to be really committed to adopting these techniques in in-situ multi-cropping and high yielding multiple crop varieties. The one drawback was that awareness raising about slash and burn didn’t seem to have been conducted in the visited site. Due to the lack of financial contributions, partner performance is rated as **moderately satisfactory (MS).**

XII. Lessons learned

141. The review of IACCAPFS project implementation and the supervision reports has raised a number of issues that can be learned from to improve future project management. These include:

i. The slow procurement and subsequent disbursal rate up to and including most of 2013, highlight the need of early planning and proactivity.

ii. Better monitoring and evaluation would have spotted the underperforming rooftop rain harvesting activities earlier and had the contractor been paid on a milestone basis there would have been more accountability on his part, as well as greater savings to be redirected to other activities.

iii. The primary partner agency of the IACCAPFS and the RCPRP+ has been MAFFS with the exception of the Meteorological Department with respect to the AWS. The aim was also to partner with the Environment Protection Agency (EPA) and this was also where the GEF focal point was located, but this aim was not achieved. Due to a lack of EPA participation, in 2013 EPA agreed to meet quarterly to receive progress updates, however subsequent supervision missions of 2014 and 2015 showed no progress had been made despite repeated efforts by the IACCAPFS. The reasons why this was the case were not clear, although after a meeting with the EPA during the TER mission, tensions were observed between the IACCAPFS climate change team and the EPA but it was not possible to get an impartial explanation as to why. In future, supervision missions could perhaps place greater emphasis on detailing inter-agency tensions and provide possible solutions.

iv. With regards to the weather stations, it is important especially with expensive and sensitive infrastructure, to test-install a small sample to identify and subsequently rectify any expensive technical problems. It would be an idea to include procuring spares in the project design. It is also worth including spare parts into the contract with the supplier.

v. Sustainability was integrated into the design of the project, but an exit strategy was not included. The exit strategies involved radio and TV broadcasts informing people that the project was coming to an end. Despite this, the mission has still encountered aid dependency among beneficiaries at community level. It was therefore suggested by the GEF team to combine the exit strategy[29] with a more community based approach in future. The GEF TER mission believes that the project could have benefitted from having community-based activities where beneficiaries were engaged in discussing what they had learned and gained from the project and what plans, if any, they had for after the project. These activities would best be integrated at the indicator level to ensure monitoring and evaluation and should also not last longer than six months. This would change the focus from depending on aid to focusing on what the communities can do themselves.

vi. While the IACCAPFS and RCPRP projects are merged and synergies were identified to maximise effectiveness, it would have been important to ensure that these synergies were not at the expense of robust monitoring indicators that cover outcomes as well as outputs. For example at the M&E level, the IACCAPFS project focused entirely on meeting physical implementation targets (outputs) of the roof top water harvesting infrastructure. No technical information was being gathered and analysed before twenty had been built to understand the effectiveness and technical efficiency of the product. While this is the example which performed the worst, the trend is applicable to the project as a whole.

vii. The M&E plan should be developed in accordance with the GEF M&E Guidelines[30], and should be designed to meet the SMART[31] criteria. The indicators should focus more on tracking results as opposed to only implementation progress.

[29] The exit strategy was deemed to be insufficient also for the RCPRP+.
[30] New guidelines have been published in 2017.
[31] SMART: Specific, Measurable, Achievable/Attributable, Relevant/Realistic, and Time-bound, Timely, Trackable and Targeted.

XIII. Conclusions and recommendations

142. From the impact assessment that has been conducted it is not possible to draw conclusions in terms of improvements made in year round food security because the same parameters as the baseline have not been measured.

143. The conclusions that can be drawn from the data generated by the project are that the climate resilient rice has had a positive impact on the ability of farmers to double and triple crop, although it is still not clear to what extent the earth dams have helped in this regard. The micro-catchment activities have shown to drastically improve soil quality in terms of moisture retention, and in improving soil structure and nutrient content by reducing topsoil erosion and evaporation. The pilots plots are showing that farmers are potentially able to greatly diversify their crops and it is hoped this will lead to a reduced need to slash and burn vegetation to clear new plots every year. From the preliminary data, the greenhouses do not seem to have been sufficiently profitable for the beneficiaries after the input and running costs are factored in.

144. In terms of project management, improvements need to be made in the reporting, analysing of basic project data such as who and how many beneficiaries the project is targeting and including this information in the M&E framework. The inexistent filing mechanism and lax collecting and reporting of results data has made it very hard to understand the extent of success of IACCAPFS activities to meet the project outcomes.

145. Scaling up of the micro-catchment activities should be considered within current or future MAFFS programmes. This is a successful activity with multiple benefits in economic generation, soil rehabilitation and an alternative to the environmentally destructive slash and burn practices. The earth dams should also be considered for up scaling (after the technical issues are addressed) to help further identify and subsequently address the technical problems of flood damage and erosion related to reservoir capacity and size of overflow piping. The AWS need to be considered for additional support to ensure that the Meteorological Department is able to download, process and make the data accessible to the rural farmers as an early warning system against an increasingly unpredictable climate.

146. The final disbursement data is incomplete at this stage because the remainder of the advance payment (US$38,000) remains unallocated. It was also not possible to get final figures of the IACCAPFS AWPB distribution per year, the ones reported in the TER are as of 31 December 2016. It is therefore recommended that the most up-to-date financial figures are reflected in the TER during the second phase of project closure.

Annex 1 Indicator and achievement logframe

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
GEF/LDCF Goal Reduce the vulnerability of the food supply system to the deleterious impacts of climate change.	**Contributions to the NAPA objectives (NAPA - GoSL 2007):**				
	Develop irrigation and land drainage system for agriculture.	Irrigation - 27% Dams / ponds - 22% Boreholes - 26% Inlet water gate - 28% Water storage tank - 2% Other - 37%	30 solar powered irrigation schemes provided (15 by PY 2 and 15 by PY 3). 100 Rainwater harvesting sheds in uplands installed. 1500 roof water collected installed. 100 small water storage tanks established 4 earth dams constructed.	20 water-harvesting sheds. 40 roof water collection points. 40 tanks. 4 earth dams in rain-fed swamps.	• MTR • Physical implementation logframe • 2015 progress report
	Cultivation of drought resistant crops.	n/a	Develop 120 ha of climate proofed IVS.	120ha of IVS was cultivated with 3.2 metric tons of drought resistant upland NERICA rice.	• Physical implementation logframe • 2015 progress report
	Develop and implement agricultural land-use and land cover management plans.	n/a	8 community forestry plans (4 in PY1 and 4 in PY 2).	14 forestry community plantations were developed by MAFFS.	MAFFS M&E progress report.
	Train/educate professional and technical staff including agricultural extension workers on climate change and agriculture.	n/a	16 field extension workers (4 x 4 years).	8 extension workers trained in climate change adaptation.	Physical implementation logframe
			10 Trainers trained to carry out capacity building workshops on adaptation (6 in PY 1 and 4 in PY2).	12 trainers of trainers were trained to carry out capacity building workshops on adaptation.	Physical implementation logframe
	Promote swampland farming.	n/a	n/a	1078 women, 1794 men, and 6021 youth have been supported with climate resilient rice varieties.	IVS beneficiary attendance sheets.

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
			36 community leaflet and posters campaigns annually.	36 Billboards and leaflets campaigns were carried out nationwide to sensitize on climate change and against slash and burn practices.	Physical implementation logframe
			4 community radios able to provide agricultural and weather/cc information.	12 radio producers/managers were trained in climate change awareness.	Physical implementation logframe
			Radio campaigns on CC and adaptation are designed.	Climate change / swampland cultivation radio based awareness adverts and an 8 episode soap-opera were developed and aired.	Physical implementation logframe
	Resilience of key agricultural production systems to climate change impacts in Sierra Leone.	n/a	120 training sessions to farmers (through the FFS).	40 Farmer Field Schools (FFS)/ demonstration sites developed to train on best farming practices including adaptation practices.	• Physical implementation logframe • Progress reports
			24 demonstration sites exhibiting structural approach.	339 women, men and youth have been educated on best agricultural practices to reduce soil erosion and improve agricultural productivity in view of increasing climatic variability.	Beneficiary lists
			No. of appropriate water harvesting technologies identified	Technologies in water harvesting, combating soil erosion and increasing soil fertility and have been developed and tested in 22 locations.	• 2015 progress report • Design plans / concept notes • Njala University report
	Meteorology				
	Establishment on National Early Warning Systems.	Forecast of extreme weather received: Extreme events - 25% Pest / disease - 9% Start of rains - 12% Weather forecasts - 6%	Information dissemination tools produced.	n/a	

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
		No information - 68%			
	Rehabilitate and upgrade meteorological and climatic stations.	n/a	Construction of 15 Automatic Weather Stations.	• Construction of 8 Automatic Weather stations, 2 per district. • 8 buildings were built to house offices. • A vehicle was procured for the Meteorological Department for post-project weather station operation.	• Physical implementation logframe • Partial direct observation
		n/a	20 rain gauges are set up and operational in selected sites.	20 secondary schools in the project operational areas received rain gauges	• Physical implementation logframe • Partial direct observation
	Educate meteorological department personnel to forecast and inform about particular dangerous or extreme events.	n/a	6 Metrological Department technicians trained on agro-climatology management of weather stations.	3 Meteorological Department technicians were trained and certified on agro-climatology by the Nigerian Meteorological Agency.	• Physical implementation logframe • Educational certificates
		n/a	24 Meteorological Department and MAFFS staff completed the training.	12 MAFFS staff received online training on statistics and applied climatology.	Physical implementation logframe
	Raise public awareness and mainstream gender perspectives into climate change issues.	n/a	No targets available.	180 women youth and heads of vulnerable households were trained through the GALS methodology to create awareness on climate change.	Physical implementation logframe

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
GEF/LCDF Objective To lessen the impact of climate change on vulnerable rural communities, as well as on natural resources critical for sustaining agricultural production and increasing food security.	Household food security maintained/ improved above baseline level indicated for districts where project is implemented.	All year round food security was reported by only 3 % of households. 21% of households reported access to food for 10 – 11 months in the year while the majority faced food insecurity for 3 – 6 months of the year.	n/a	• The socio-economic analysis of 2016 quotes the Food Security Early Warning System (2016 EWS) that 53.03% of people surveyed in the IACCAPFS project districts reported to have acceptable food consumption levels.	Socio-economic analysis
	Climate resilient income sources for vulnerable households promoted in 8 communities.	n/a	Support to 120 farms in 4 project districts.	120ha of IVS was cultivated with 3.2 metric tons of drought resistant upland NERICA rice.	• IVS beneficiary lists • 2015 progress report
	Number of supported beneficiaries report ability to maintain or increase food production in the event of harsh climatic conditions.	n/a	At least 70 % of supported beneficiaries report ability to maintain or increase food production in the event of harsh climatic conditions.	• The project assisted 1180 women, 2070 men and 6042 youth.	Beneficiary lists
Component 1: Sustainable development of inland valley swamps for rice / other food crop production					
Outcome 1.1: Participatory* mapping *and monitoring of vulnerability to climate change					
Output 1.1.1 Participatory mapping and vulnerability of rice production areas and Integration of the GIS/MIS system in the RCPRP-PLUS	No. of consultation sessions held in project districts.	n/a	24 consultation sessions (8 in PY1, 8 in PY2and 8 in PY3).	The project carried out only 8 consultation sessions in project districts.	• Back to office report. • Attendance lists.
	No. of local study tours held in project district.	n/a	2 Local study tours (1 in PY2and 1 in PY3).	1 local study tour was held to identify vulnerable areas of RCPRP interventions especially on IVS.	Study Tour Back to Office Report (BTOR).
	No. of GPS equipment and GIS software procured.	n/a	1 GPS and 1 GIS equipment procured.	One GPS handset was procured to map project interventions. GIS software was not procured.	Procurement plan (2013).
	Vulnerable human and natural resources to climate change identified and mapped in project operational areas.	n/a	Vulnerable human and natural resources to climate change identified and mapped	Vulnerability mapping of rice production systems was completed in project operational districts.	Vulnerability mapping report.

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
			in project operational areas.		
Outcome 1.2: Climate-resilient rice production systems					
Output 1.2.1 Climate resilient cropping models promoted in IVS	No. of farms supported in the four project districts.	n/a	Support to 120 farms in 4 project districts (30 in PY1; 30 in PY2; 30 in PY3 and 30 in PY4).	• Number of farms not available. • 1794 men, 1078 women and 6021 youth have been supported with climate resilient rice varieties.	IVS beneficiary attendance lists.
	No. and type of agricultural equipment provided.	n/a	Small farming tools and kits.	The equipment provided includes 4 rice mills, 4 bag sewing machines, standing scales, tarpaulin and 20,000 empty bags for bagging recovered seeds.	2015 Progress report.
Output 1.2.2 Dissemination of Agricultural Met Data (time bound with Outcome 3.2.1 below)	No. of tools developed for dissemination of agro met data.	n/a	Tools produced.	No tools developed.	n/a
	No. of training sessions held on dissemination and the use of tools.	n/a	No. of training sessions held on dissemination and the use of tools.	No trainings were held.	n/a
Outcome 1.3: Training for local rice producers on best adaptation practices					
Output 1.3.1 Training to farmers on resilient crop varieties	No. of field extension workers trained.	n/a	16 persons trained (4 per year for 4 years).	8 field extension staff were trained (2 in each district). 4 motorbikes were procured. The project also provided allowances to these staff to take care of fuel and maintenance of the motorbikes.	Attendance lists.
	No. of demonstration sites established.	n/a	No targets set.	40 Farmer Field Schools (FFS), demonstration sites established.	Progress report.
	No. of farmers training sessions held.	n/a	120 training sessions to farmers– 60 in PY1 and 60 in PY3.	40 FFS demonstration sites established. 1000 farmers on best farming practices including adaptation practices. (No. of training sessions not available.)	MAFFS M&E reports.
Component 2: Integrated Water and Natural Resource Management for Adaptation					
Outcome 2.1: Ecosystem-based adaptation in the uplands					
Output 2.1.1 Pilot community-based plans for NRM (integrating adaptation	No. of training sessions conducted on NRM	n/a	40 training sessions through Village Development Committees (VDC)	22 trainings through VDCs were carried out.	• M&E Logframe • Training report

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
measures)	No. of NRM plans produced	n/a	40 NRM plans integrating adaptation measures produced by PY3 (20 in PY 1 and 20 by PY3)	No NRM plans were produced.	n/a
Output 2.1.2 Rainwater harvesting in the uplands	No. of appropriate water harvesting technologies identified. Activity discontinued.	n/a	100 water harvesting sheds installed (20 in PY1; 30 in PY2; 20 in PY 3 and 30 in PY4)	20 water-harvesting sheds.	MTR
			1500 roof water collected installed (200 in PY1; 500 in PY2; 500 in PY2 and 300 in PY4)	40 roof water collection points.	MTR
			100 small water storage tanks established (25 each year).	40 tanks.	MTR
	No. of micro-catchment structures constructed per hectare	n/a	% decrease in water vulnerability during the dry season (average of 70 % by PY4).	• 22 0.5ha micro-catchments identified and set-up. • In situ water harvesting techniques identified, that collect, concentrate and store water at the crop root zones (tied ridging, moon ridges). Soil conservation methods that control erosion (mulching, terracing).	• Survey / questionnaires • Njala University report
Output 2.1.3 Land management and erosion control	No. of demonstration sites exhibiting structural approach.	n/a	24 demonstration sites exhibiting structural approach.	• A total of 339 women, men and youth trained in 19 training sessions. • Training included water management (erosion, slope direction, appreciation of a levelled plot). • Teach to supervise unskilled workers in water management, water control, improved agronomic practices. • Teach to train others in water management and improved agronomic practices for improved productivity.	Beneficiary lists.
Output 2.1.4	No. of community forest plans developed.	n/a	8 community forest plans developed.	It was not possible to verify the number of plans designed, but 14 forestry community plantations	MAFFS report.

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
Promotion of alternative Livelihood schemes				were developed by MAFFS. To date, 200,000 foresting seedlings were raised by the forestry division and planted in various communities in the four districts.	
	Number of greenhouses and open field irrigation established.	n/a	4 greenhouses and 4 open field irrigation established.	2 greenhouses and 4 open field irrigation systems with hand dug wells were established in project operational areas. In each greenhouse and open field, there is a tower, borehole, water tanks and drip lines for irrigation.	Partial direct observation
	No. of small ruminants and chicken restocked.	n/a	50 cattle, 100 goats and 100 sheep.	No small ruminants were stocked due to late completion of paddocks and request for purchase.	Direct observation.
Outcome 2.2: Irrigation efficiency and drainage systems					
Output 2.2.1 Innovative irrigation systems	• 30 solar powered irrigation schemes provided (15 by PY 2 and 15 by PY 3). • Local technical assistance provided to farmers. • 20 % increase in access to irrigation water. • % decrease in crop failures and food shortage in the targeted sites by PY 4 (60 % by PY4).	n/a	Discontinued.	Discontinued.	MTR
Output 2.2.2 Improvement of drainage systems in climate risky sites	• Drainage works and maintenance conducted in 6 climate risky sites (3 sites in year 2 and 3 sites in year 3). • Resilient investment measures to prevent economic losses introduced in the six sites. • 40 % decrease in crop failure and food shortage in the 6 managed sites by PY 2 and PY3).	n/a	Discontinued	Discontinued.	MTR
Output 2.2.3 Establishment of pilot earth dams in the IVS	No. of earth dams constructed.	n/a	6 Dams	4 earth dams constructed	• MTR • Physical implementation

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
					logframe
	No. of Dam village development committees.	n/a	No. of Dam village development committees (VDC).	No VDCs were set up.	• MTR • 2016 supervision mission.
Component 3: Capacity building and awareness raising of climate change at institutional and local level					
Outcome 3.1: Government personnel training					
Output 3.1.1 Training to staff of the Meteorological Department	No. of meteorologist trained at post graduate level.	n/a	Advanced training achieved by two meteorologists (at post graduate level) by PY 3.	No meteorologists were trained to post-graduate level.	• 2015 progress report • NPCU staff interviews
	No. of technicians trained on agro-climatology.	n/a	6 Technicians trained on agro-climatology and management of weather stations.	3 Met. Dept. Staff were trained on agro-climatology at the Nigerian Meteorological Agency. They completed an intensive one year Medium Level Meteorological Technicians' Course.	Educational Certificates
Output 3.1.2 On-line training of government staff	No. of Met and MAFFS staff trained on-line.	n/a	24 Meteorological Department and MAFFS staff completed the training (12 by PY 1 and 12 by PY3).	12 MAFFS staff received online training.	• Attendance list. • MAFFS M&E report.
Outcome 3.2: Agriculture climatic data collection and analysis for decision making					
Output 3.2.1 Establishment of automatic weather stations	No. of automatic weather stations established and operational.	n/a	15 automatic weather stations established and operational (4 in PY1 and 11 in PY 2) All rainfall stations instruments are provided by PY2.	• 8 weather stations were constructed. • 8 buildings were also constructed to house the offices, including furniture and equipment, security wire fencing. • One vehicle was procured for the Meteorological Department to visit the sites.	• Partial direct observation • 2015 progress report
Output 3.2.2 Network of rain gauges re-established	No. of rain gauges established in selected sites.	n/a	20 rain gauges are set up and operational in selected sites (10 by PY2 and 10 by PY4)	20 secondary schools in the project operational areas were selected for the installation of the rain gauges.	• Partial direct observation
Outcome 3.3: Knowledge and awareness on climate change at community level					

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
Output 3.3.1 Capacity building activities on Climate change adaptation for local communities and radio stations	No. of Trainers of Trainers (ToT) trained.	n/a	10 trainers trained to carry out capacity building workshops on adaptation (6 in PY 1 and 4 in PY2).	12 ToT were trained.	Attendance lists.
	No. of capacity building workshops conducted.	n/a	36 Community capacity building workshops (9 per year) undertaken to benefit 360 women, youth and heads of vulnerable households.	180 women youth and heads of vulnerable households were trained through the GALS methodology to create awareness on climate change. Each individual trained represented an IVS association.	• Attendance lists. • Training report
	No. of radio station staff trained.	n/a	4 training sessions for radio stations on capacity building for adaptation by PY1	4 community radio stations were supported. 12 radio producers/managers were trained in climate change awareness.	• Attendance lists. • Training report.
Output 3.3.2 Awareness raising campaigns on climate change and adaptation at the local level	No. of musical-based tools developed.	n/a	Musical-based tools in 18 communities and 40 schools (song to be produced in PY1 and tours in PY2 and PY3)	'Several' radio jingles (adverts) have been developed and aired on climate adaptation (no exact number available).	Partial direct observation
	No. of community leaflet and posters produced.	n/a	36 community leaflet and posters campaigns annually	Billboards were installed nationwide including all project operational areas with climate change messages. Calendars and leaflets were distributed at community level.	Partial direct observation
	No. of radio campaign messages designed.	n/a	No specific targets were set.	An 8 episode radio soap opera developed and aired to sensitize on climate change and the benefits of cultivating the IVS.	Partial direct observation
	No. and type of equipment provided.	n/a	No specific targets were set.	Radio stations were supported in terms of computers, generators, solar panels, battery backups and a motorbike each also with additional funds from RCPRP.	Partial direct observation
	No. Community radio stations supported.	n/a	4 community radios are equipped to function and provide agricultural and weather information.	Four community radio stations were supported.	Partial direct observation

RESULTS HIERARCHY	INDICATORS APPRAISAL, MTR, Completion	Baseline	Target	ACHIEVEMENTS	DATA SOURCE
Component 4: Project Management and M&E					
Output 4.1 Project management	No. and category of LDFC personnel recruited.	n/a	One climate change expert and one driver	3 climate change staff were recruited. One team leader, one assistant and one driver.	MTR
	No. of project vehicle procured.	n/a	One Project vehicle is purchased in PY 1	2 vehicles were procured. 1 for the project and the other for Meteorological Department for their oversight responsibilities on the Automatic Weather Stations.	MTR
Output 4.2 Project M&E	No. of timely M&E reports.	n/a	No target available.	Annual M&E reports were regularly produced. As well as activity implementation reports by project and partners.	M&E reports
	No. of studies conducted.	n/a	No target available.	3 thematic studies and baseline have been conducted. Rice yield, socio economic study and the use charcoal versus LPG.	Thematic studies
	No. of audit reports.	n/a	No target available.	3 audits have successfully been carried and the another should be completed by with Audit Service Sierra Leone, before project closure.	Audit reports

Annex 2 Record of supervision and follow-up missions

Year	Type of mission	Period
2012	Supervision mission	04 to 19 Oct 2012
2013	Supervision mission	2-June-2013 to 18-June-2013
	Implementation support mission	05 to 26 October 2013
2014	Supervision mission	3 – 18 February 2014
2015	Midterm review	February 2015
2016	Supervision mission	10 – 21 October 2016
2017	Project completion mission	13 to 31 March 2017

Annex 3 Cost-benefit gross margin models

Table 8 Detailed NERICA rice model

Improved Model: Nerica rice					
Unit: One hectare	1.00 USD= 7,529.0 SSL				
	Unit	No of Units	SSL/ Unit	SSL	USD
Income					
Sale of rice-Main season - nov	kg	3,220	2,321	7,473,234	993
Maize (short season, Feb-March)	kg	313	6,000	1,875,000	249
Gross income				**9,348,234**	**1,242**
Operation costs					
Seeds	kg	125	3,200	400,000	53
Fertilizer acquisition	kg	250	3,600	900,000	120
Brushing	man days	20	15,000	300,00	40
Nursery	man days	5	15,000	75,000	10
Cleaning	man days	20	15,000	300,000	40
Tilling	man days	20	15,000	300,000	40
Podding	man days	20	15,000	300,000	40
Basal Fertilizer application	man days	3	15,000	37,500	5
Transplanting	man days	5	15,000	75,000	10
Weeding 1	man days	20	15,000	300,000	40
Weeding 2	man days	10	15,000	150,000	20
Fertilizer application 2	man days	3	15,000	37,500	5
Bird scaring	man days	3	15,000	37,500	5
Harvesting	man days	20	15,000	300,000	40
Transportation	man days	10	15,000	150,000	20
Marketing	man days	5	15,000	75,000	10
Total operating costs				**3,737,500**	**496**
Financial Gross Margin per/ha				**5,610,734**	**745**

Table 9 Detailed paddy rice model

Improved Model: Paddy rice					
Unit: One hectare	1.00 USD=		7,529.0 SSL		
	Unit	No of Units	SSL/ Unit	SSL	USD
Income					
Sale of rice- Main season-Nov	kg	2,030	2,321	4,711,386	626
Maize (short season, FEB-March)	kg	313	6,000	1,875,000	249
Gross Income				**6,586,386**	**875**
Operation and maintainance costs					
Seeds	kg	125	3,200	400,000	53
Fertilizer aquisation	kg	250	3,600	900,000	120
Brushing	man days	20	15,000	300,000	40
Nursery	man days	5	15,000	75,000	10
Clearing	man days	20	15,000	300,000	40
Tilling	man days	20	15,000	300,000	40
Poddling	man days	20	15,000	300,000	40
Basal Fertilizer application	man days	3	15,000	37,500	5
Transplanting	man days	5	15,000	75,000	10
Weeding 1	man days	20	15,000	300,000	40
Weeding 2	man days	10	15,000	150,000	20
Fertilizer application 2	man days	3	15,000	37,500	5
Bird Scaring	man days	3	15,000	37,500	5
Harvesting	man days	20	15,000	300,000	40
Transportation	man days	10	15,000	150,000	20
Marketing	man days	5	15,000	75,000	10
Sub-total				**3,737,500**	**496**
Financial Gross Margin per Hectare				**2,848,886**	**378**

Table 10 Greenhouse model using hybrid cucumber

Improved Model: Green house							
Unit: 80Mx25M area	1.00 USD=		7,529.0 SSL				
	Unit	Kg/crop cycle	Price-Le/kg	sales/crop cycle-Le	No of crop cylces/pa	Annual income	USD
Harvest/sale of cucumber							
1st round	Kg	10	5,000	50,000	3	150,000	20
2nd round	Kg	22	5,000	110,000	3	330,000	44
3rd round	Kg	50	5,000	250,000	3	750,000	100
4th round	Kg	40	5,000	200,000	3	600,000	80
5th round	Kg	8	5,000	40,000	3	120,000	16
6th round	Kg	40	5,000	200,000	3	600,000	80
7th round	Kg	50	5,000	250,000	3	750,000	100
8th round	Kg	10	5,000	50,000	3	150,000	20
9th round	Kg	20	5,000	100,000	3	300,000	40
10th round	Kg	9	5,000	45,000	3	135,000	18
		259		**1,295,000**		**3,885,000**	**516**
Capex							
Construction costs	Ls	1.0	5,376,000	-			-
Operation and maintainance costs							
Organic manure	trip	1	300,000	300,000	3	900,000	40
Cucumber Seed	pkt	1	15,000	15,000	3	45,000	2
Fertilizer	kg	100	2,400	240,000	3	720,000	32
Poly bags	carton	1	45,000	45,000	3	135,000	6
Chemical (Assorted)	g	1,660	72	120,000	3	360,000	16
Total Cash Costs				**720,000**		**2,160,000**	**96**
				575,000		**1,725,000**	**420**

Cash flow projection							
	Y0	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6-Y10**
Initial outlay	- 5,376,000						
Annual income	-	1,725,000	1,725,000	1,725,000	1,725,000	1,725,000	1,725,000
Net cashflow	**- 5,376,000**	**1,725,000**	**1,725,000**	**1,725,000**	**1,725,000**	**1,725,000**	**1,725,000**

Appraisal

NPV	4,748,526
IRR	30%

Table 11 Micro-catchment model

Small catchment area Model					
Unit: One ha but 0.5 specifically catchment area	1.00 USD=		7,529.0 SSL		
	Unit	No of Units	SSL/ Unit	SSL	USD
Production					
Maize cob	kg	200	2,500	500,000	66
Maize seed	Bc	70	6,000	420,000	56
Okra fruit	kg	125	1,700	212,500	28
Okra Seed	Bc	20	5,000	100,000	13
Pepper fruit	kg	50	2,700	135,000	18
Pepper seed	Bc	10	7,000	70,000	9
Sweet Potato	kg	1,750	800	1,400,000	186
Gross Income				**2,837,500**	**377**
Expenses					
Inputs used					
Banana	Sucker	11	1,818	20,000	3
Cassava cuttings	Bundle	2	50,000	100,000	13
Maize	Bc	12	3,000	36,000	5
Okra seed	Bc	6	5,000	30,000	4
Pepper seed(improved)	Bc	8	7,000	56,000	7
Sweet potato vine	50kg bag	2	25,000	50,000	7
Labour	man days	40	20,500	820,000	109
				1,112,000	**148**
Operating profit				**1,725,500**	**229**
Capital expenditure					
Crusher with motorized engine	machine	1	1,200,000	1,200,000	159
Smasher with motorized engine	machine	1	1,300,000	1,300,000	173
Bio-char cleaner	Klin	1	600,000	600,000	80
Compost drums	drum	2	500,000	1,000,000	133
Tarpaulins				-	-
Total Initial outlay				**4,100,000**	**545**

Cash flow projection

Cash flow projection					
	Y0	**Y1**	**Y2**	**Y3**	**Y4-Y10**
Initial outlay	- 4,100,000				
Annual income	1,725,500	1,725,500	1,725,500	1,725,500	1,725,500
Net cashflow	**- 2,374,500**	**1,725,500**	**1,725,500**	**1,725,500**	**1,725,500**

Appraisal

NPV-Le	7,479,955
IRR	72%

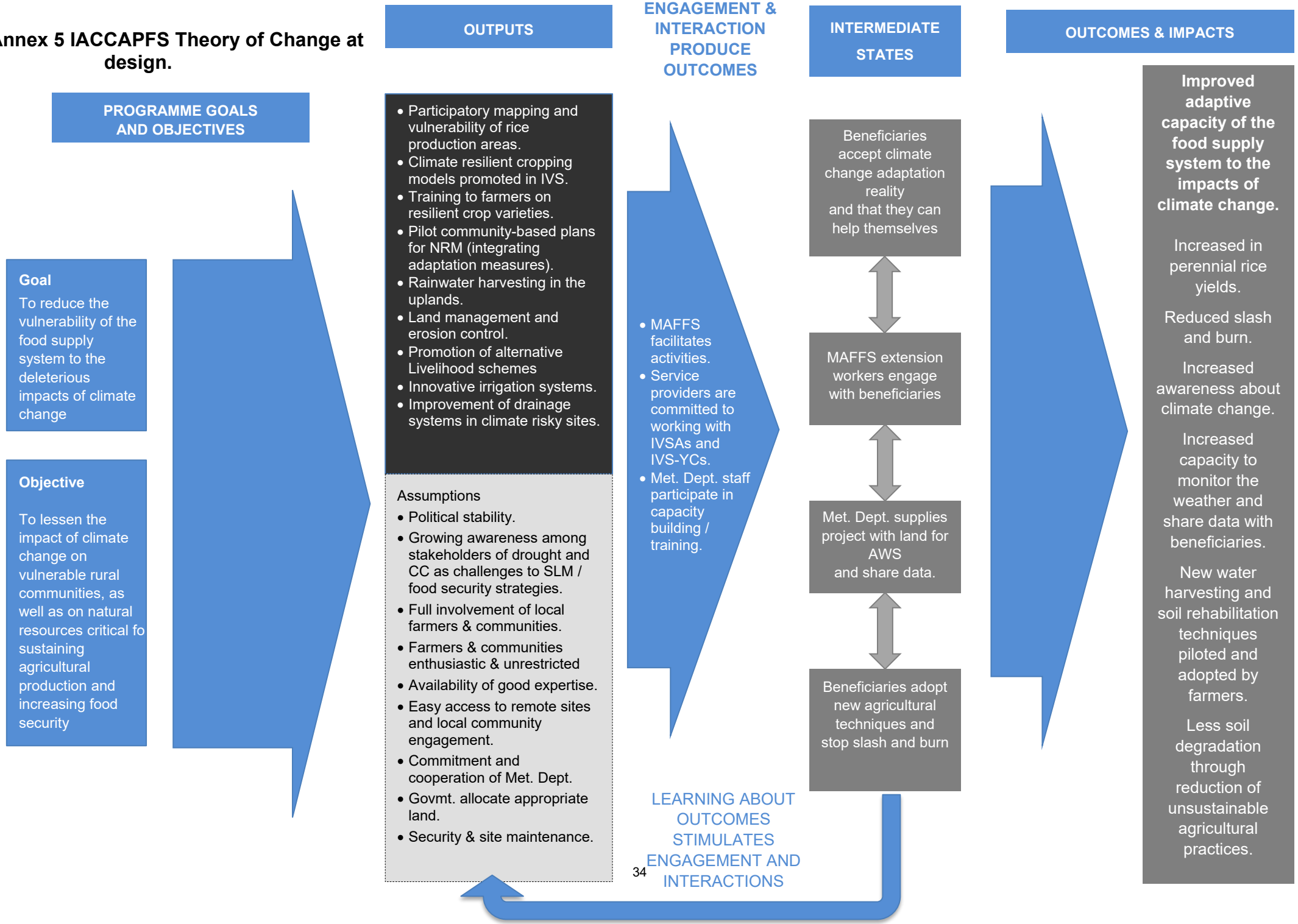
Annex 4. RCPRP+ / IACCAPFS Environmental Indicators & achievements

Table showing environmental indicators and achievements from the RCPRP+ Environmental and Social Review Note (ESRN).

Environmental Indicators	Achievements
No. of field extension workers trained to deal with adaptation to climate change.	• 8 field extension staff were trained (2 in each district).
No. of demonstration sites for SLWM training purposes established at village level	• 20 out of 100 rainwater harvesting systems were installed. This activity was discontinued and resources redirected towards other activities. These include: ○ Collaboration with the University of Njala to install 22 pilot micro-catchment demonstration sites on the fringes of IVS sites were developed. ○ 2 greenhouses and 4 hand-dug wells installed to test water irrigation technology and open field irrigation.
No. of trained farmers (disaggregated by gender and age)	• 40 Farmer Field Schools were established. • 14 trainers of trainers trained in capacity building on climate change adaptation. • 138 ward committee and landowners trained in capacity building on climate change adaptation. • 102 women, 276 men and 21 youth trained in 19 training sessions on land management and erosion control.
No. of community-based plans for natural resources management produced	• 14 community-based forests were implemented in collaboration with MAFFS: 4 in Kenema district; 4 in Kono; 3 in Kailahun and 3 in Koinadugu districts.
Local technical assistance provided to farmers	• Technical assistance to farmers has been provided throughout the project. • The greenhouses were supported by the Fresh Salone technical service provider and MAFFS extension workers as well as Njala University. • The micro-catchment demonstration plots were supported by Njala University.
No of community leaflet and poster campaigns on climate change and environment produced every year	• Billboards were installed nationwide including all project operational areas with climate change and slash & burn messages. Calendars and leaflets were distributed at community level, in total 36 campaigns were achieved.
Radio campaigns on climate change adaptation	• 4 community radio stations were supported in terms of computers, solar panels, batteries, generators with additional funds from

are designed	RCPRP as well to regularly broadcast climate change information and agricultural information. • An 8 episode radio soap opera and adverts raising awareness on climate change, the benefits of cultivating the Inland Valley Swamps, and the negative effects of slash and burn were introduced and aired weekly.
Community radios are able to provide agricultural and weather/climate information	• This activity was not successfully implemented. The collected agro-meteorological data was not successfully synthesised and translated into digestible information for farmers.
Completion of baseline assessment and impact studies.	• A baseline assessment was carried out. • A study on participatory mapping of vulnerability of rice production areas to climate change. • A socio-economic analysis into using liquid petroleum gas (LPG) vs charcoal and firewood in GEF operational districts. • An assessment of specific socio-economic indicators in the IACCAPFS project areas was also carried out.

Annex 5 IACCAPFS Theory of Change at design.



Annex 6 IACCAPFS Evaluation ratings[32]

Aspect	Rating and justification
Relevance	**Satisfactory** The project was highly relevant in terms of meeting the Government's needs in adapting to climate change as expressed in the National Adaptation Programme of Action (NAPA). It was consistent with the Agenda for Change, and the MDG1. Partnership with IFAD has also enabled a wider outreach for the LDCF in Sierra Leone. A number of relevant project design changes were undertaken to ensure the continued relevance of the project to the overall goals and objectives. These have in large led to tangible results, which already have the potential to improve food security in the context of an increasingly variable climate. The project worked successfully within the existing community structures which were strengthened with MAFFS through proven community participatory mechanism. The rating was brought down because of the minor shortcomings with the PDR logframe which could have avoided confusion by separating the activities and indicators columns. This was corrected at the MTR stage and could not be rated as unambiguous in line with the GEF SMART criteria. The indicators also had to be strengthened during the MTR review. There were also a number of design flaws that could not be corrected during implementation or took a lot time to correct. These include the roof water harvesting activities, the challenges in the implementation of the AWS, the necessity of an assistant and an insufficient exit strategy.
Effectiveness	**Moderately Satisfactory** The extent to which the project objectives were achieved is mixed. The low disbursement rates for component 1 and 2 reflect the implementation trends. Around half of the activities (10) were implemented 100%, slightly fewer than half (7) reached 50% implementation and remainder activities (3) achieved 33% or less. This picture does not however take into account the achievements in implementing activities that were added during implementation such as the earth dams and the micro-catchment activities, which were some of the projects most successful activities

[32] It is recommended that these ratings be subject to review after the second phase is completed and ratings are provided for all IFAD / IACCAPFS activities

Efficiency	**Moderately Satisfactory** The project remarkably achieved full project disbursement. At component level however there was a mixed picture. Components one and two achieved above average disbursement levels (65% & 64%) while three and four over spent (148% & 279%). Due to project design underestimating the costs of the weather stations, only 8 of the original 15 planned could have been procured. The 8 that were purchased were still too expensive and caused large overspend affecting other components.
Monitoring and Evaluation system	**Moderately unsatisfactory** The rating was brought down in part because of the shortcomings in the M&E framework with respect to the absence of comprehensive M&E reporting of IACCAPFS activities despite the close integration with RCPRP+. The indicators were not adequately set up in the PDR logframe to capture this data, and the subsequent MTR recommendations were not followed by the project. Other elements include the absence of an archiving and filing system, with reports buried in unidentified boxes in a container and old building.

Annex 7 Assessment of risks to sustainability of project outcomes

Sustainability dimension	Likelihood for this dimension to be achieved and description of the existing threat
Financial sustainability	**Automatic Weather Stations.** The structural organisation of the Meteorological Department is such that this budget deficient department is not able to manage its own budget and pay for basic services such as internet connections for the onsite computers to transmit data, or purchase spare parts or repair the AWS. There is the possibility of making the Meteorological Department an independent agency such as the EPA and manage its own revenue streams independently from central government, but it is not clear when this will likely happen. **Greenhouses.** The cost-benefit analysis has shown that without further changes in value of crops being produced, the greenhouses will not produce sufficient income for this agricultural activity to become an attractive option for others to emulate through taking out loans. **NERICA rice.** The introduction of the rain-fed rice suitable for upland ecosystems has had a beneficial impact on the community. Farmers are able to double their profit margin making its sustainability highly probable. This is likely to be financially sustainable post project closure. **Micro-catchments.** The micro-catchments are only in the early stages of development however the techniques piloted by the Njala University have proven to be a financially viable alternative to slash and burn agriculture. This in-situ agricultural model is able to produce higher value crops while also improving soil fertility and reducing erosion. The University is actively engaged to continue with the propagation of these activities beyond the project life. Although proven to be financially viable, further support in the form of upscaling would be very welcome. Financial Sustainability is rated as Moderately Likely (ML)
Socio-political sustainability	**Social sustainability**. The main aim of this project was to raise awareness, develop capacity and pilot new climate resilient adaptation technologies and one of the main obstacles that the project has had to overcome is that of social acceptance of new agricultural practices. The resistance the local farmers has been true particularly with respect to the micro-catchments and in reducing the widely adopted destructive practice of slash and burn. The project has shown that with patience, determination and demonstration, social acceptance is possible. The

	micro-catchment farmers the TER mission has visited appeared to be impressed and motivated to continue although they were not aware of the negative impacts of slash and burn. As is also true with the NERICA rice initiative, activities that are economically beneficial are likely to enjoy high levels of socio sustainability. Socio-political sustainability is rated as Likely (L)
Institutional and governance sustainability	The project has been developed with the interests of the GoSL at its centre. It is in line with the GoSL Agenda for change, Sierra Leone's Second Poverty Reduction Strategy Paper (GoSL 2009a). The project has also been designed to address climate change priorities outlined in the NAPA. Due to the degree of relevance of the IACCAPFS to the GoSL priorities, the institutional and governance sustainability is rated as L.
Environmental sustainability	The main environmental risks are climate change related. The project is designed to help adapt to climate change and generally improve the environment in terms of reducing the environmentally destructive slash and burn practice, therefore there are very few environmental risks. The main environmental concern is related to the sustainability of the earth dams. The limited capacity of the reservoir to capture heavy rainfall and the relatively narrow drainage pipes mean that the dams tend to overflow laterally causing erosion and flooding damage. This has been raised with a view to address this issue through other projects and programmes. Environmental sustainability is rated as L.

Annex 8. TER Rating Matrix[33]

Criterion	Rating
Project performance	
– Relevance	4
– Effectiveness	4
– Efficiency	4
– Sustainability	5
Rural poverty impact	
– Households 'incomes and assets	4
– Human and social capital and empowerment	N/A
– Food security	4
– Agricultural productivity	4
– Institutions and policies	4
– **Overall rural poverty impact**	**4**
Additional evaluation criteria	
– Gender equality and women' s empowerment	4
– Access to markets	N/A
– Innovation	4
– Potential for scaling-up	4
– Environment and natural resources management	4
– Adaptation to climate change	4
– Targeting and outreach	5
Partners performance	
– IFAD' s performance	4
– Government performance	4
Overall project achievement	4

[33] It is recommended that these ratings be completed after the second completion phase when the impact assessment will have been completed.

Annex 9. Swamp vulnerability map

Map of Sierra Leone showing locations of Inland Valley Swamps in the districts of Kailahun, Kenema, Kono and Koinadugu.