



**THE ENHANCING COMMUNITY
RESILIENCE PROGRAMME 2011-2017**

FINAL EVALUATION SUMMARY

Photo credit: ECRP/Nicky Milne



Photo credit: ECRP/Matt Gonzalez-Noda

About ECRP

The Enhancing Community Resilience Programme (ECRP) was designed to address the chronic climate vulnerability faced by rural people in Malawi. It started in 2011 and is closing in 2017. The purpose of the ECRP is to increase the resilience of vulnerable communities to climate variability and change. DFID, Irish Aid and the Royal Norwegian Embassy fund the ECRP. Its total budget is £30.6m, of which £27m is provided by DFID.

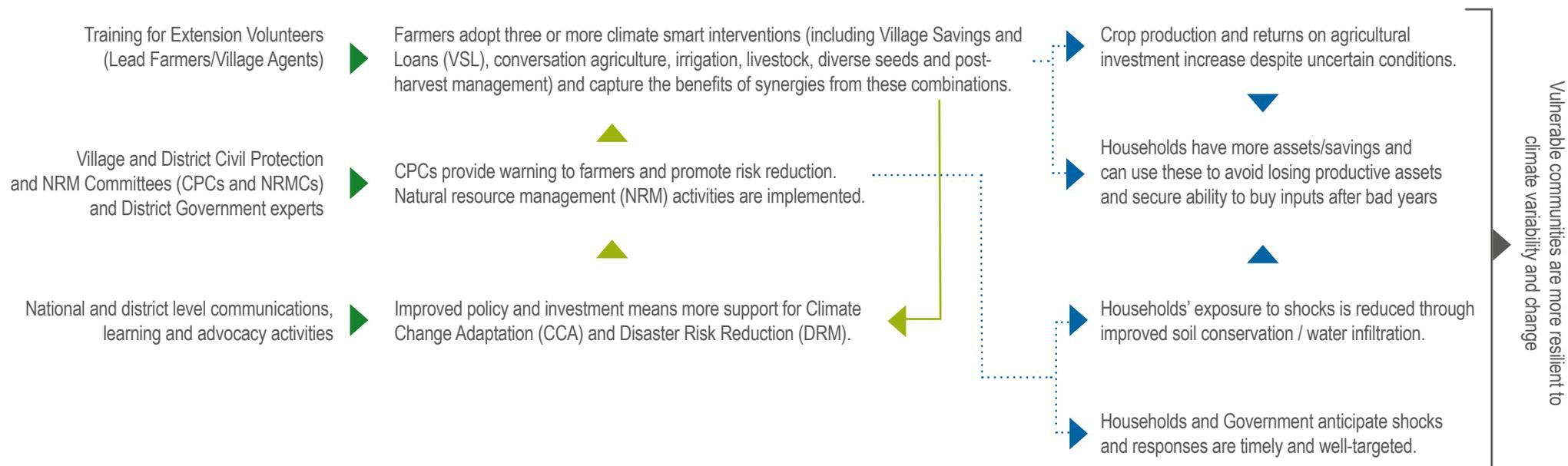
ECRP had five major components that aim to build resilience to climate change. They are 1) improved capacity of local authorities (especially village, area and district civil protection committees); 2) improved and resilient livelihoods for vulnerable households in target areas; 3) enhanced early warning for District Governments and vulnerable households; 4) informed policy in areas relevant to climate and disaster resilience;

and 5) strengthened humanitarian response and recovery. Component 4 is managed by CEPA which aims to distil lessons learnt from the programme to advocate for improved policies and programmes at district and national level. Component five was added in 2015-16, following large scale floods that affected the country in January 2015, with the recovery component supporting households affected both by floods and the subsequent drought.

The ECRP theory of change relies upon households adopting multiple (ideally three or more) disaster risk reduction or climate change adaptation strategies and benefitting from the synergies between these activities. Work at household level is reinforced by capacity building at village and district level and by policy advocacy at national level, as outlined in the figure on the right.



Figure 1. Simplified Theory of Change





About this evaluation

This evaluation covers programme progress up to the end of June 2017. It covers all 11 districts targeted by the programme and has a dual accountability and learning purpose. It provides supplementary analysis on evaluation questions prioritised by DFID and implementing partners to support the final report of progress against logframe indicators which is available within the separate Programme Completion Review (PCR). The evaluation sought to respond to four main evaluation questions:

1. What impacts can be attributed to ECRP at household level and what contribution has the programme made to change at community, district and national levels?
2. Was the programme theory of change relevant given ECRP's objectives and target groups?
3. Was the programme efficient and effective in the way it delivered its results?
4. To what extent are programme impacts likely to be sustained without further intervention?



Photo credit: ECRP/Matt Gonzalez-Noda

Methods

The evaluation followed a theory-based approach and divided its work into four workstreams. It included a statistical impact assessment under the household-level workstream and contribution analysis conducted for the community and national level workstreams. Finally, a value for money assessment and effectiveness workstream looked at costs and benefits of different ECRP interventions and combinations. The table to the right provides an overview of the evaluation workstreams and approaches used for each.

Data collection was conducted in all 11 districts covered by ECRP, and included a survey of 2,236 beneficiary and non-beneficiary households, a survey of Village Civil Protection Committees involving over 100 committee members in 22 beneficiary and 11 non-beneficiary CPCs, and focus groups involving 206 beneficiaries and 151 non-beneficiaries. Individual interviews were also carried

out to investigate intra-household dynamics amongst 36 beneficiary households and 11 non-beneficiary households. 92 key informants at village, district and national level were also consulted about a range of evaluation questions, with 47 people responding to the ECRP online survey.



Table 1.

Evaluation work streams and overview of methods

Workstream	Evaluation Questions	Overview of methods
Household Level Impacts	Qs 1, 2 and 4.	Statistical impact assessment; mixed methods analysis of factors contributing to sustainability and scale.
Community Level Impacts	Qs 1, 2 and 4.	Qualitative assessment using areas of change and contribution analysis. Some limited quantitative analysis of a survey of Civil Protection Committees (CPCs).
National Level Policy Impacts	Qs 1, 2 and 4.	Qualitative assessment of one policy process using contribution tracing and light touch assessment of other policy work via stakeholder interviews.
Value for Money and Effectiveness	Qs 3 and 4.	Assessment of the costs associated with reaching beneficiaries with each intervention; cost benefit analysis to assess cost-effectiveness of different ECRP interventions and their combinations.

Key Findings



ECRP has been a successful programme which has reached over 177,000 households



ECRP has been a successful programme which has reached over 177,000 vulnerable households and exceeded many of the logframe targets which were within its direct control. Work to strengthen village-level warning systems has indirectly benefitted over 1.5 million people. ECRP implementers spent around £134 per direct beneficiary household and approximately £2 per indirect individual beneficiary. The graph to the right summarises the numbers reached with each intervention, an estimate of the cost per beneficiary for each intervention and a summary of the findings in relation to their respective impacts.

The interventions promoted by ECRP were relevant to the needs of beneficiaries and to the policy context in Malawi. The programme was also found to be unique due to its longevity, its focus on combination of interventions and work at multiple levels (household, community, district and national).

ECRP created an impact at household level and improved the resilience of its participants. This has occurred despite the fact that rural Malawians have been hit with severe shocks during the programme's lifetime and in general food security and poverty levels have worsened. For its direct beneficiaries, the programme was responsible for statistically significant increases in the adoption of resilience building practices such as conservation agriculture, the use of drought tolerant seeds, participating in village savings and loan groups

(VSL), irrigation farming, and the use of early warnings and weather forecasts. Statistically significant increases in the adoption of low carbon technologies such as solar lights and fuel efficient stoves were also identified. The evaluation also attributed statistically significant differences in the value of household assets of ECRP beneficiaries and non-beneficiaries to the adoption of combinations of ECRP interventions. These differences ranged between £68 and £136 depending on the package adopted.³

Assets are an important characteristic of household resilience because they include farm tools that are essential for farming and livestock or household items which can be sold during hungry periods. Whilst ambitious targets for overall increases in asset and income levels for beneficiaries were not met, ECRP has helped its beneficiaries to maintain more of their assets than the non-beneficiaries we compared them with⁴ despite the repeated and severe climate shocks which occurred during the programme lifetime.

¹ Refers to costs of DRR activities not total programme costs.

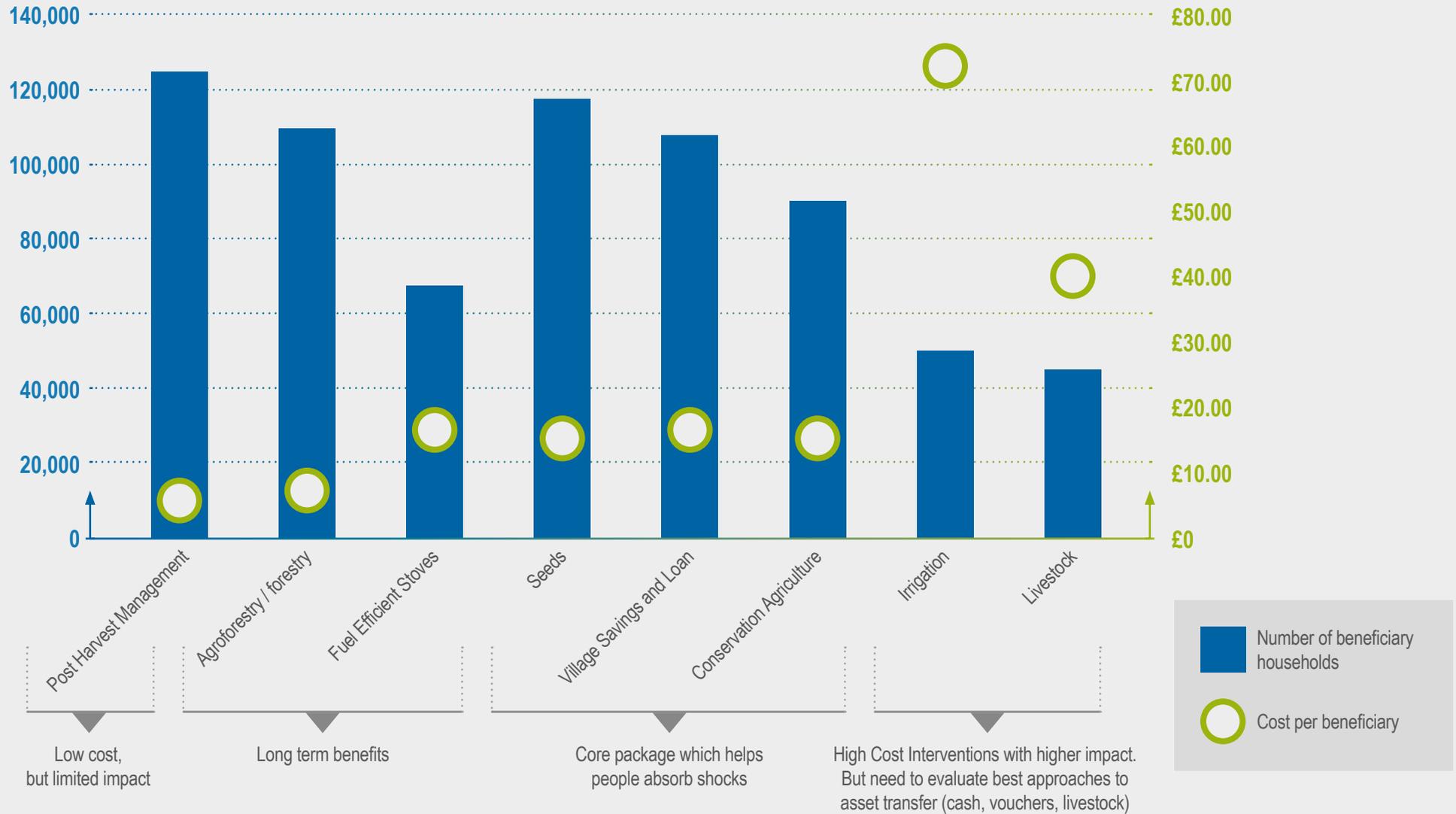
² In DISCOVER, there was also an explicit objective that VSL was an entry point to starting small enterprises and ultimately to accessing larger loans via microfinance.

³ Whilst on first glance this might appear lower than expenditure per household, it does not capture the additional income or food consumption which has also occurred as a result of ECRP. It was not within the scope of the impact assessment to statistically attribute increases in income but quantitative data was used to assess likely impacts on income and food security via the cost benefit analysis described later. Therefore the total value created by ECRP exceeds the increase in asset values alone.

⁴ Using statistical matching to ensure they were sufficiently similar to make a meaningful comparison.

Graph 1.

Number of beneficiary households and cost per household for ECRP interventions



Key Findings continued

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ECRP has spent £134 per direct beneficiary household and delivered at least £2 of benefits for every £1 spent

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ECRP's impact has been achieved in a cost-effective way. A cost benefit analysis of the programme's impact on crop production and income flows show that over a 10-year period it generated between £2 and £3 of benefits for each £1 invested. Income flows are important for resilience because households use income to purchase food and household essentials and to invest in assets and new and less weather dependent businesses. The programme did not reach its targets related to food security and we could not attribute statistically significant increases in food security to the programme. However, there were limitations in the methodology used to assess this and during focus group discussions, beneficiaries repeatedly explained that many ECRP interventions have helped them produce or purchase food, with interventions such as irrigation being particularly important due to them providing a source of food and income outside of the main rain-fed harvest.

ECRP has also played a critical role in strengthening capacity for disaster risk reduction at community level in 272 Group Village Headman Areas (GVHs).

It has also initiated natural resource management activities which, if sustained, reduce household exposure to floods and dry spells. Around 70% of the 24 beneficiary CPCs sampled in our evaluation met the programme's definition of being fully functional and all were partially functional, whereas none of 11 non-beneficiary CPCs were fully functional.⁵

Capacity which the programme created at village level has delivered life-saving early warning messages, tackled crop pest outbreaks, encouraged farmers to use seasonal and short-term weather forecasts and implemented NRM activities include tree planting, river bank management and the enforcement of by-laws protecting existing forest areas, but these were mostly at an early stage and could not be assessed in detail by this evaluation. Feedback from stakeholders about the value of the programme at community and district level has been overwhelmingly positive.

Advocacy directed at District Councils has also supported disaster risk reduction (DRR).

For example, evidence was found that it had increased the speed and level of District response to crop pests and diseases (especially army worm and banana bunchy top disease) and had increased District Council action on the enforcement of forest conservation plans. Efforts to advocate for the increased allocation of resources to DRR – especially early warning and disaster preparedness – were not always successful but had achieved results in some cases. Whilst Government acted in line with programme advocacy messages, the allocation of its budget to DRR is still limited by overall funding constraints. Whilst it was outside of the scope of our evaluation to make a detailed assessment of the role of ECRP in influencing these district level advocacy outcomes, District stakeholders frequently commented positively in relation to ECRP's role.



Photo credit: ECRP/Matt Gonzalez-Noda



At the national level, the programme has influenced the development of new resilience programmes by other NGOs and donors and influenced policy development processes. At least one major donor-funded programme was modelled on the ECRP approach and a case study of ECRP's inputs into the National Climate Change Management Policy found it had played an important role. ECRP also developed strong relationships through advocacy with the Environmental Affairs Department in the Ministry of Natural Resources, Energy and Mining (MoNREM), the Department of Disaster Management Affairs (DODMA) and the Department of Climate Change and Meteorological Services (DCCMS) but it has not actively engaged with the national Social Support programmes with which it shares a target group.

The use of low-cost interventions and focus on building the capacity of village-level volunteers and District Government has enhanced the sustainability of ECRP's results, however a lack of ongoing resources, combined with multiple shocks may limit the ability of beneficiaries to sustain their livelihood gains. Due to the severe shocks and weak economic growth, food security and poverty indicators have worsened, suggesting that greater investment of funds per households might help beneficiaries to make larger and more sustainable livelihood gains.

This could include greater volumes of funds spent on asset transfer, value chain development to create processing and marketing jobs that are less weather-dependent.

A number of district Government respondents also reported that a lack of funds at local level may limit the availability of ongoing support to beneficiaries. Government could invest more at local level but could also use its existing resources in a more joined up way. Future programmes could provide enhanced technical support to improve the functionality of District Council systems and make more effective use of existing cash transfers and donor investments to create incentives for natural resource management and household resilience building

⁵ Due to resource constraints we were only able to sample 7% of all the 272 Civil Protection Committees. Full functionality of the VCPC is defined as: 1) Has workplan 2) Meets at least 4 times per year 3) Has carried out risk assessment 4) Has raised awareness of disaster risk in the community 5) Has implemented long-term risk reduction activities Full functionality of the Early Warning System at GVH level is described as: 1) Has mechanisms and equipment to detect disasters (to include: phone; river/rain gauge); AND 2) Has provided early warning messages for flood/storm in the last year AND/OR has disseminated weather forecasts AND 3) Has engaged in facilitating/delivering humanitarian response.

Conclusions and recommendations

Q1: Was the programme theory of change relevant given its objectives and target groups?

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Resilience funders must commit to supporting projects which are at least five years long

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Conclusion 1

ECRP's interventions were relevant to the target group and the objective of the programme. In line with programme documents, ECRP's household-level interventions required moderate amounts of land and labour capacity to be successfully adopted. When combined with interest-based targeting, this resulted in a target group which before the programme had started was slightly better-off, on average, than farmers randomly selected from comparison areas. More clarity on target groups could enable greater tailoring of specific interventions.

Recommendation 1

For future programmes, DFID and resilience programme developers could be more specific about target groups and only offer interventions that are appropriate to the level of land, labour and market access of that group. For example, activities for very poor households could include cash and asset transfers, poultry or dove rearing, low-value VSL or small-scale irrigation on borrowed land. Off-farm employment or natural resource based businesses with low running costs may also be viable. These households can also be involved in NRM activities under public works and can benefit from free seeds. Activities for better off households should focus on marketing of agricultural products and engagement in NRM via payment-by-results schemes. They may also be involved in seed production for market or purchasing seed produced by others.

Conclusion 2

Different targeting approaches have different costs and benefits. However, the inclusions/exclusion errors resulting from the ECRP interest-based targeting approach are not substantial. Spending money on targeting may not necessarily deliver value given poverty rates in Malawi are high with households moving above and below poverty thresholds annually.

Recommendation 2

Resilience programme funders must decide whether they feel targeting offers value for money. This will depend on whether they wish to maximise the efficiency of programmes which they directly support in the short-term or if they want to engage more effectively in strengthening Government systems for targeting, which could have more wide-reaching impacts or greater value in the long-term.

Conclusion 3

ECRP's longevity was extremely important in its success, but greater predictability about the programme's end date, rather than a series of extensions, would have facilitated adaptation of the programme's approach. Output costs declined after three years of operations as programme delivery systems became more efficient.

Recommendation 3

Resilience programme funders should ensure funding is committed for programmes lasting at least five years. This will allow time to establish systems and maximise efficiency in delivery.



Conclusions and recommendations continued

Q2: What impacts can be attributed to ECRP at household level and what contribution has the programme made to change at community, district and national levels?

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Resilience funders should make moderate increases to the level of investment per household to protect livelihood improvements from shocks

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Conclusion 4

At household level, ECRP reached over 177,000 households, exceeded 11 out of 15 of its implementation targets and met its outcome level targets for asset increases amongst female-headed households. Statistically significant improvements in asset values of £68 - £136 (2017 values) were attributed to participation in the programme. However, these gains were insufficient for the programme to reach its ambitious targets for income, asset or food security and households' food security and incomes have worsened with the severe shocks experienced. Whilst ECRP households were better off than those not in the programme, ECRP did not deliver sufficient resilience gains to protect household livelihoods. This was a result of ECRP's relatively modest spend per beneficiary, the repeated climate shocks affecting its beneficiaries and weak economic growth limiting job creation or improvements in Government services.

Recommendation 4

Resilience programme funders and implementers should make moderate increases to the level of investment per household in future resilience programmes. Using asset transfer as an incentive for natural resource management is a potentially cost-effective option. Piloting and research will help to identify the optimal level of investment which does not create conflict between households and generates sustainable results – it is suggested that investments of between £50-£100 per beneficiary per year, of which at least 50% is direct asset transfer, could be a starting point for research.

Conclusion 5

At community level, the evaluation found that ECRP had played a critical role in facilitating positive changes in the performance of Village Civil Protection Committees (VCPC) in its operational areas. These changes encouraged the adoption of household-level interventions, improved the coverage of life-saving flood early warnings including to very poor and female headed households, and led to more effective humanitarian targeting and response. When combined with the ECRP core package⁶, receiving early warnings was shown to lead to increased household assets averaging £57 compared to those that only adopted the core package. There are however opportunities to reduce the costs associated with delivering improvements in the performance of the VCPCs as there was a wide variation between the expenditure of different ECRP implementing partners on this activity.

Recommendation 5

Future resilience programmes should sustain investments in village and district level DRR systems but identify approaches to streamline the method and reduce costs. Costs could be reduced through the development of national manuals, better tailoring of training packages to the hazard context of each district, less repetitive training and placing less emphasis on early warning in areas which are not prone to flooding.

Conclusion 6

Improved VCPC capacity created some increased motivation for natural resource management activities, but more incentives and improved monitoring could result in stronger performance in future programmes.

Recommendation 6

Future programmes must place a greater emphasis on the design and implementation of natural resource management activities from the programme design phase. This should include identifying an appropriate range of incentives for sustainable management of these activities, ensuring coordination with public works supported under national social protection programmes and improving M&E systems to track progress and generate lessons learned.

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Future programmes must place a greater emphasis on natural resource management

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⁶ The "core package" was defined for this evaluation as those low-cost interventions which were extremely widely adopted. For a household to have adopted the core package, it would have to a) be using at least 2 conservation agriculture practices in the last planting season, b) have any member of the household join a VSL AND have made any number of contributions. And c) Have dried and tested the moisture content of their maize or other grains before storing it AND have applied chemicals to store any maize or grain harvested in the previous season.

Conclusions and recommendations continued

Q2: What impacts can be attributed to ECRP at household level and what contribution has the programme made to change at community, district and national levels?
continued

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ECRP successfully involved both female headed households and wives in male-headed households with a positive effect on household decision-making

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Conclusion 7

Analysis of results for different packages does not lead to a firm conclusion about an “optimal” ECRP combination which would be most financially efficient in improving household resilience. However a programme combining direct asset transfer, VSL, Conservation Agriculture, systems to improve access to improved seeds, irrigation and DRR is likely to have the most meaningful results for beneficiaries. This also offers strong value for money especially if costs can be reduced for irrigation and DRR.

Recommendation 7

Future programmes should incorporate combinations of direct asset transfer, VSL, Conservation Agriculture, seed systems, irrigation and DRR. Further research is needed to identify the best approaches to supporting livestock production which could include livestock pass-on programmes, livestock extension services and animal health support, cash or voucher programmes or identification of business opportunities within livestock value chains such as fodder production, or marketing of livestock products.

Conclusion 8

Despite a lack of formal gender analysis during the design of the programme, the programme has successfully involved both female headed households and wives in male-headed households and has had a positive effect on intra-household decision-making.

Recommendation 8

Sustain commitments to gender mainstreaming and the ‘leave no one behind’ approach⁷, ensuring strategies are documented in programme design. Gender approaches should include approaches which enhance women’s economic empowerment and promote equality in intra-household decision-making. Approaches to ‘leave no one behind’ should set realistic targets and allocate resources for linking with specialist organisations that can support disabled and chronically ill people to be included.

Conclusion 9

ECRP has been actively engaged in advocacy at national level with positive feedback on the programme's influence from targeted stakeholders. At least one other donor-funded programme was reportedly modelled on the ECRP approach, and it is clear that ECRP has contributed to improvements in the accessibility of weather forecast information, communication of the DRM policy, the formulation of the national Climate Change Management Policy, dialogue around national resilience planning and policy related to energy from fuel-wood. The flexible approach enabled the programme to take advantage of opportunities but more resources dedicated to advocacy and a narrower focus would have enabled deeper understanding of Government's needs in relation to policy development and implementation and a more targeted response. In addition, support from donors which have different types of leverage and influence on Government was lacking in ECRP's advocacy efforts but more resources and a narrower focus would have enabled deeper understanding of Government's needs in relation to policy development and implementation and a more targeted response. However, support from donors which have different types of leverage and influence on Government was lacking in ECRP's advocacy efforts.

Recommendation 9

In future programmes, it would be useful to identify a more focused set of policy or implementation capacity gaps at national level and then resource joint work with Government to meet these appropriately. A flexible process is essential to take advantage of political opportunities and to ensure value is added to existing support from other development partners. Allocation of time by donors to support programme advocacy efforts through high-level policy engagement with Government would enhance effectiveness.

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Learning from ECRP was used to design new resilience programmes

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⁷“Leave No One Behind” refers to approaches which can be inclusive of all vulnerable groups. This includes children, youth, persons with disabilities, people living with HIV, and older people.

Conclusions and recommendations continued

Q3 Was the programme delivery efficient and effective?

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ECRP approaches were cost efficient and effective. Benchmarking costs per output helps improve value for money

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Conclusion 10

ECRP approaches were mostly cost-efficient and effective. However, there is scope to reduce costs through learning from the most efficient members of each consortium, especially in relation to DRR and irrigation. The programme's core post-harvest management activities do not appear effective as many non-beneficiaries use the same approach and there are no detectable improvements in avoided losses. However more recent innovations may generate different results.

Recommendation 10

Implementers of resilience programmes should continue to monitor and benchmark costs per output to ensure cost-efficiency. This should form part of a process to reduce unit costs for DRR and irrigation and to identify more innovative and cost-effective approaches to post-harvest management, if required.

Conclusion 11

Levels of supervision were higher in ECRP than in other similar programmes in Malawi, which was associated with the programme's success. ECRP used local Government experts to support technical delivery and village-based volunteers to provide ongoing support; the employed programme staff organised activities, managed resources and consolidated monitoring records. This was efficient and effective. However, the numbers of staff employed varied substantially across consortium members.

Recommendation 11

Resilience programmes should continue to work through village-based extension volunteers and district Government. The median ratio of 1 field staff: 18 villages may be a useful benchmark for future programmes using similar approaches but staffing arrangements will vary based on context and programme objectives.

Conclusion 12

ECRP's partnership with Local Government was considered unusually strong for an NGO implemented programme by both District and National level Government stakeholders. However, programme planning and reporting was not aligned with Government systems and the transfer of knowledge and skills was mostly at the individual level.

Recommendation 12

Future programmes could consider more formal joint-management option where implementation is coordinated by District Councils and programme budgeting and planning years are aligned to those used by District Councils.

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Future programmes could strengthen coordination by aligning to District Government planning cycles

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Conclusions and recommendations continued

Q4: To what extent are the programme impacts likely to be sustained without further intervention?

Conclusion 13

Limited use of free inputs and extensive work through local Government and Community Volunteers has made programme interventions sustainable. A lack of capacity for investment in the ongoing maintenance of irrigation schemes and staff turnover at District level are the biggest threats to sustainability.

Recommendation 13

Continue to involve District Officials and local volunteers in the implementation of activities and work to ensure technical manuals and political incentives are in place to ensure sustainability.

Conclusion 14

Asset transfers can be provided in-cash or in-kind, through direct procurement or through market-based approaches using vouchers. ECRP's in-kind transfers of seed and livestock enabled beneficiaries to access productive assets they may not have found in the market. However, there may be limitations to the sustainability of these approaches. For example, in some cases seed pass-on programmes were only effective for a few years where improved seeds are only viable for 2-3 seasons. Livestock pass-on programmes were also at risk of failure without substantial oversight from programme staff and cooperation from community leaders. ECRP's seed and livestock interventions have focused on direct asset transfer, with assets procured by the programme. Whilst transferring livestock increases household assets, the supervision costs can be high and the benefits of pass-on can be reduced if not all households cooperate or if deaths prevent pass-on from happening. That does not detract from the fact that livestock production is a profitable business for ECRP's target group and there are multiple resilience and social benefits that come from livestock ownership. However, ruminants also place demands on limited biomass and there may be other off-farm business options which could be explored.

Recommendation 14

Future resilience programmes should build on ECRP's lessons and identify opportunities to reduce costs in asset transfer programmes. Alternative approaches to direct transfer and pass-on could be considered, with a greater role for the private sector if possible. More research is needed in relation to the cost-effectiveness of local models of seed supply which might include the promotion of open pollination varieties, voucher programmes and work with private sector input suppliers, community seed banks and establishment of outgrower schemes for seed companies.

Future programmes could also explore different delivery options in future asset transfer programmes. This could include: 1) Identifying whether market-based approaches to enabling transfer of specific assets (e.g. cash or voucher programmes) would reduce costs compared to direct procurement; 2) Identifying if lower cost ways of improving livestock production without making direct transfers (e.g. sole focus on animal health interventions and training) are relevant to the target group; or, 3) Exploring if the transfer of alternative productive assets for off-farm enterprises could create stronger incentives for natural resource management (e.g. bee-keeping, bamboo production, sale of forest products).

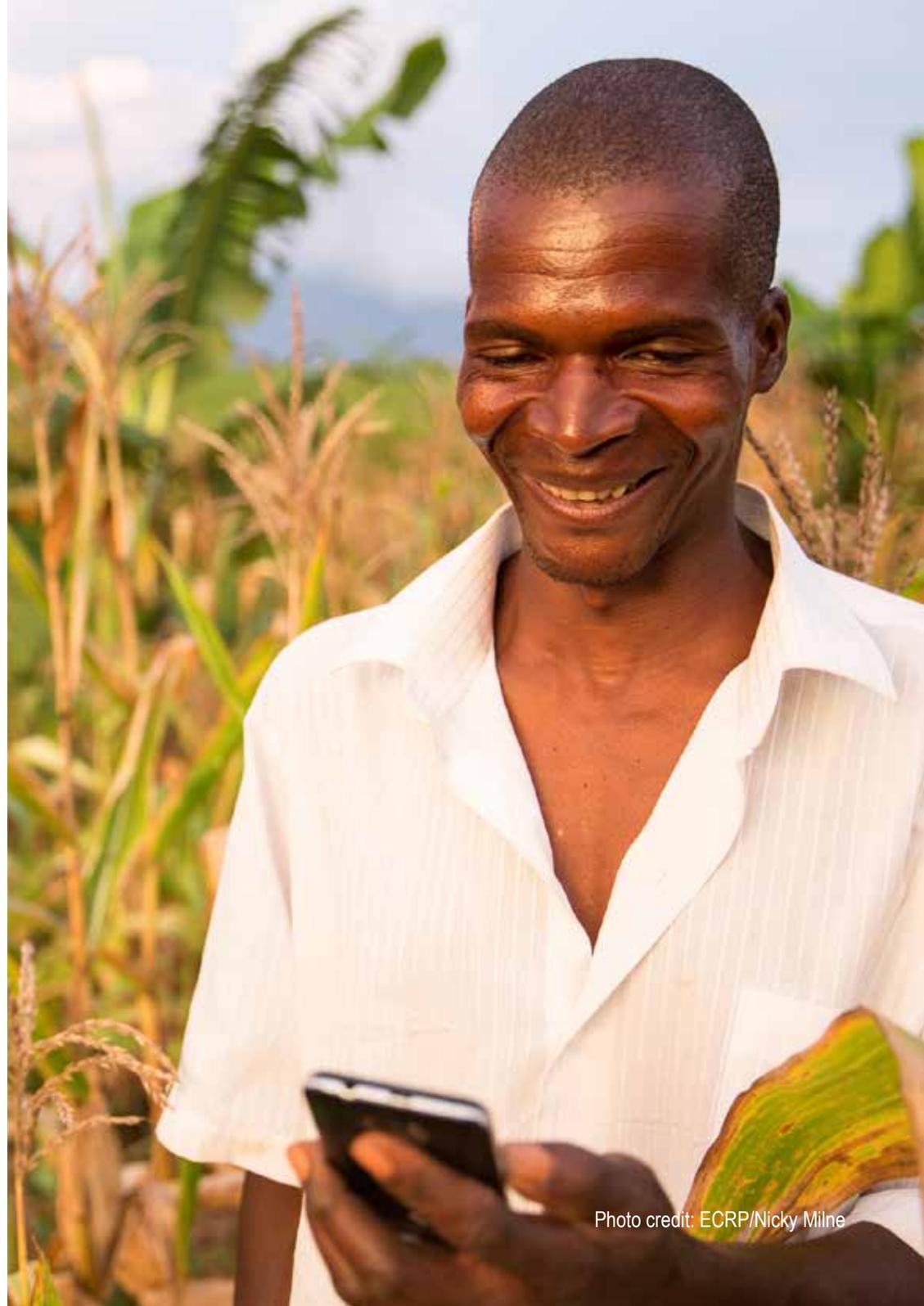


Photo credit: ECRP/Nicky Milne



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RESILIENCE PROGRAMME 2011-2017**

FINAL EVALUATION SUMMARY



Norwegian Embassy



Final Evaluation

The Enhancing Community Resilience Programme 2011-2017

Submitted to DFID by LTS International and the Centre for Development Management

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Acronyms

ACPC	Area Civil Protection Committee
ADDRMO	Assistant District Disaster Risk Management Officer
CA	Conservation agriculture
CBA	Cost Benefit Analysis
CCA	Climate Change Adaptation
CDM	Centre for Development Management
CEPA	Centre for Environmental Policy and Advocacy
CISONECC	Civil Society Network on Climate Change
CPC	Civil Protection Committee
CUMO	Concern Universal Microfinance Operations Ltd
DISCOVER	Developing Innovative Solutions with Communities to Overcome Vulnerability Through Enhanced Resilience
DFID	Department For International Development
DoDMA	Department of Disaster Management Affairs of Malawi
DPD	Director of Planning and Development
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EA	Enumeration Area
ECRP	Enhancing Community Resilience Program
EDO	Environmental District Officer
EWS	Early Warning System
FGD	Focus Group Discussion
FISP	Farm Input Subsidy Programme
FHH	Female Headed Households
GVH	Group Village Headman Area (lowest level administrative area)
Ha	Hectare
HH	Household
IDDRR	International Day for Disaster Risk Reduction
IP	Implementing Partner
KII	Key Informant Interview
LF	Lead Farmer
M&E	Monitoring and Evaluation
MIS	Management Information System
MK	Malawi Kwacha
MMS	Malawi Meteorological Services
MVAC	Malawi Vulnerability Assessment Committee
NGO	Non-governmental organisation
NRM	Natural Resource Management
NRP	National Resilience Plan
PCR	Programme Completion Review

PMU	Programme Management Unit
PPI	Progress out of Poverty
PSP	Participatory Scenario Planning
TA	Traditional Authority
TBIE	Theory based impact evaluation
ToC	Theory of Change
VCPC	Village Civil Protection Committee
VDC	Village Development Committee
VEM	Village Extension Multiplier
VNRMC	Village Natural Resource Management Committee
VFM	Value for Money
VSL	Village Savings and Loans

The evaluation was conducted by LTS International and the Centre for Development Management (CDM) who together act as the Enhancing Community Resilience Programme Monitoring and Evaluation Agency (ECRP M&E Agency). The primary author of the main report is Kirsty Wilson. Tillem Burlace led the production of the value for money annex, Matthew McConnachie, the impact assessment annex and Barbara Befani, the advocacy contribution analysis annex. The evaluation would not have been possible without the contribution of the Deputy Team Leader, Bright Sibale who led the team of data collectors and analysts at CDM, who delivered a complex set of quantitative and qualitative data to a tight deadline. Special thanks to Assa Maganga and Peter Jere who led the quantitative and qualitative teams respectively. Quality assurance was provided by Dr Paddy Abbot, Dr Merlin Hanauer, Jenny Chapman and Courtenay Cabot Venton.

The team would like to thank the implementing agencies of ECRP and all the community members, Government officials and other stakeholders who have taken time to participate in evaluation exercises since ECRP began in 2011.

Executive Summary

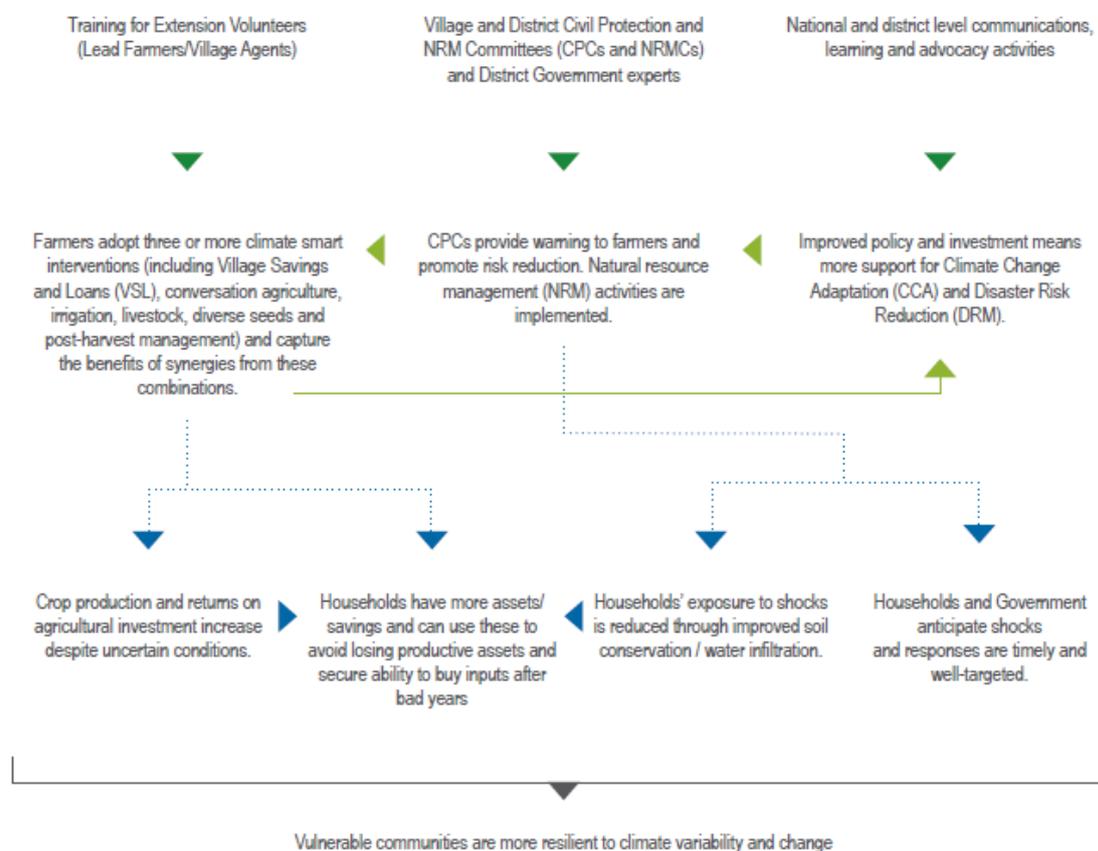
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Figure 1: Simplified Theory of Change



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Value for Money and Effectiveness	Qs 3 and 4.	Assessment of the costs associated with reaching beneficiaries with each intervention; cost benefit analysis to assess cost-effectiveness of different ECRP interventions and their combinations.

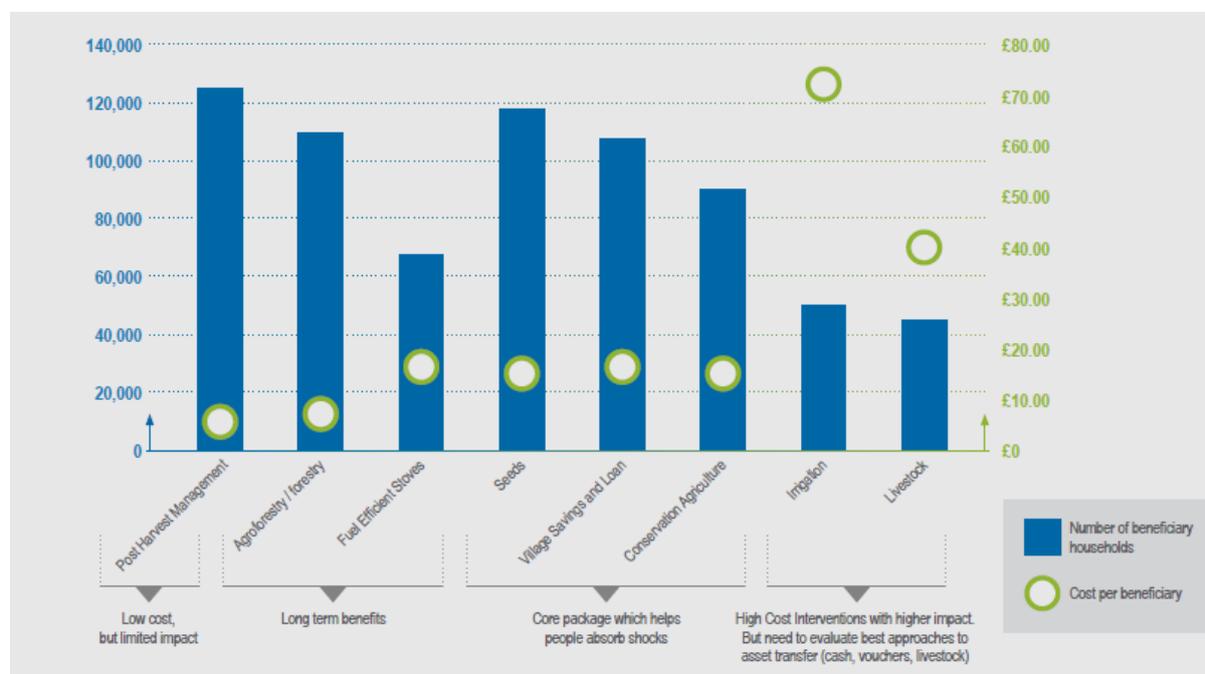
Data collection was conducted in all 11 districts covered by ECRP, and included a survey of 2,236 beneficiary and non-beneficiary households, a survey of Village Civil Protection Committees involving over 100 committee members in 22 beneficiary and 11 non-beneficiary CPCs, and focus groups involving 206 beneficiaries and 151 non-beneficiaries. Individual interviews were also carried out to investigate intra-household dynamics amongst 36 beneficiary households and 11 non-beneficiary households. 92 key informants at village, district and national level were also consulted about a range of evaluation questions, with 47 people responding to the ECRP online survey.

Key Findings

ECRP has been a successful programme which has reached over 177,000 vulnerable households and exceeded many of the logframe targets which were within its direct control. Work to strengthen village-level warning systems has indirectly benefitted over 1.5 million people. ECRP implementers spent around £134 per direct beneficiary household and

approximately £2 per indirect individual beneficiary.¹ The graph below summarises the numbers reached with each intervention, an estimate of the cost per beneficiary for each intervention and a summary of the findings in relation to their respective impacts.

Figure 2 Summary of numbers of beneficiaries and costs for interventions under ECRP



The interventions promoted by ECRP were relevant to the needs of beneficiaries and to the policy context in Malawi. The programme was also found to be unique due to its longevity, its focus on combination of interventions and work at multiple levels (household, community, district and national).

ECRP created an impact at household level and improved the resilience of its participants. This has occurred despite the fact that rural Malawians have been hit with severe shocks during the programme’s lifetime and in general food security and poverty levels have worsened. For its direct beneficiaries, the programme was responsible for statistically significant increases in the adoption of resilience building practices such as conservation agriculture, the use of drought tolerant seeds, participating in village savings and loan groups (VSL)², irrigation farming, and the use of early warnings and weather forecasts. Statistically significant increases in the adoption of low carbon technologies such as solar lights and fuel efficient stoves were also identified. The evaluation also attributed statistically significant differences in the value of household assets of ECRP beneficiaries and

¹ Refers to costs of DRR activities not total programme costs.

² In DISCOVER, there was also an explicit objective that VSL was an entry point to starting small enterprises and ultimately to accessing larger loans via microfinance.

non-beneficiaries to the adoption of combinations of ECRP interventions. These differences ranged between £68 and £136 depending on the package adopted.³

Assets are an important characteristic of household resilience because they include farm tools that are essential for farming and livestock or household items which can be sold during hungry periods. Whilst ambitious targets for overall increases in asset and income levels for beneficiaries were not met, ECRP has helped its beneficiaries to maintain more of their assets than the non-beneficiaries we compared them with⁴ despite the repeated and severe climate shocks which occurred during the programme lifetime.

ECRP's impact has been achieved in a cost-effective way. A cost benefit analysis of the programme's impact on crop production and income flows show that over a 10-year period it generated between £2 and £3 of benefits for each £1 invested. Income flows are important for resilience because households use income to purchase food and household essentials and to invest in assets and new and less weather dependent businesses. The programme did not reach its targets related to food security and we could not attribute statistically significant increases in food security to the programme. However, there were limitations in the methodology used to assess this and during focus group discussions, beneficiaries repeatedly explained that many ECRP interventions have helped them produce or purchase food, with interventions such as irrigation being particularly important due to them providing a source of food and income outside of the main rain-fed harvest.

ECRP has also played a critical role in strengthening capacity for disaster risk reduction at community level in 272 Group Village Headman Areas (GVHs). It has also initiated natural resource management activities which, if sustained, reduce household exposure to floods and dry spells. Around 70% of the 24 beneficiary CPCs sampled in our evaluation met the programme's definition of being fully functional and all were partially functional, whereas none of 11 non-beneficiary CPCs were fully functional.⁵ Capacity which the programme created at village level has delivered life-saving early warning messages, tackled crop pest outbreaks, encouraged farmers to use seasonal and short-term weather forecasts and implemented NRM activities include tree planting, river bank management and the enforcement of by-laws protecting existing forest areas, but these were mostly at an early stage and could not be assessed in detail by this evaluation. Feedback from stakeholders

³ Whilst on first glance this might appear lower than expenditure per household, it does not capture the additional income or food consumption which has also occurred as a result of ECRP. It was not within the scope of the impact assessment to statistically attribute increases in income but quantitative data was used to assess likely impacts on income and food security via the cost benefit analysis described later. Therefore the total value created by ECRP exceeds the increase in asset values alone.

⁴ Using statistical matching to ensure they were sufficiently similar to make a meaningful comparison.

⁵ Due to resource constraints we were only able to sample 7% of all the 272 Civil Protection Committees. Full functionality of the VCPC is defined as: 1) Has workplan 2) Meets at least 4 times per year 3) Has carried out risk assessment 4) Has raised awareness of disaster risk in the community 5) Has implemented long-term risk reduction activities. Full functionality of the Early Warning System at GVH level is described as: 1) Has mechanisms and equipment to detect disasters (to include: phone; river/rain gauge); AND 2) Has provided early warning messages for flood/storm in the last year AND/OR has disseminated weather forecasts AND 3) Has engaged in facilitating/delivering humanitarian response.

about the value of the programme at community and district level has been overwhelmingly positive.

Advocacy directed at District Councils has also supported disaster risk reduction (DRR).

For example, evidence was found that it had increased the speed and level of District response to crop pests and diseases (especially army worm and banana bunchy top disease) and had increased District Council action on the enforcement of forest conservation plans. Efforts to advocate for the increased allocation of resources to DRR – especially early warning and disaster preparedness – were not always successful but had achieved results in some cases. Whilst Government acted in line with programme advocacy messages, the allocation of its budget to DRR is still limited by overall funding constraints. Whilst it was outside of the scope of our evaluation to make a detailed assessment of the role of ECRP in influencing these district level advocacy outcomes, District stakeholders frequently commented positively in relation to ECRP's role.

At the national level, the programme has influenced the development of new resilience programmes by other NGOs and donors and influenced policy development processes.

At least one major donor-funded programme was modelled on the ECRP approach and a case study of ECRP's inputs into the National Climate Change Management Policy found it had played an important role. ECRP also developed strong relationships through advocacy with the Environmental Affairs Department in the Ministry of Natural Resources, Energy and Mining (MoNREM), the Department of Disaster Management Affairs (DODMA) and the Department of Climate Change and Meteorological Services (DCCMS) but it has not actively engaged with the national Social Support programmes with which it shares a target group.

The use of low-cost interventions and focus on building the capacity of village-level volunteers and District Government has enhanced the sustainability of ECRP's results, however a lack of ongoing resources, combined with multiple shocks may limit the ability of beneficiaries to sustain their livelihood gains. Due to the severe shocks and weak economic growth, food security and poverty indicators have worsened, suggesting that greater investment of funds per households might help beneficiaries to make larger and more sustainable livelihood gains. This could include greater volumes of funds spent on asset transfer, value chain development to create processing and marketing jobs that are less weather-dependent.

A number of district Government respondents also reported that a lack of funds at local level may limit the availability of ongoing support to beneficiaries. Government could invest more at local level but could also use its existing resources in a more joined up way. Future programmes could provide enhanced technical support to improve the functionality of District Council systems and make more effective use of existing cash transfers and donor investments to create incentives for natural resource management and household resilience building.

Conclusions and recommendations

Conclusions and recommendations in relation to the four evaluation questions are presented below. More detail on the evidence supporting these conclusions is available in the report.

Q1: Was the programme theory of change relevant given its objectives and target groups?

Conclusion 1 ECRP's interventions were relevant to the target group and the objective of the programme. In line with programme documents, ECRP's household-level interventions required moderate amounts of land and labour capacity to be successfully adopted. When combined with interest-based targeting, this resulted in a target group which before the programme had started was slightly better-off, on average, than farmers randomly selected from comparison areas. More clarity on target groups could enable greater tailoring of specific interventions.

Recommendation 1: For future programmes, DFID and resilience programme developers could be more specific about target groups and only offer interventions that are appropriate to the level of land, labour and market access of that group. For example, activities for very poor households could include cash and asset transfers, poultry or dove rearing, low-value VSL or small-scale irrigation on borrowed land. Off-farm employment or natural resource based businesses with low running costs may also be viable. These households can also be involved in NRM activities under public works and can benefit from free seeds. Activities for better off households should focus on marketing of agricultural products and engagement in NRM via payment-by-results schemes. They may also be involved in seed production for market or purchasing seed produced by others.

Conclusion 2 Different targeting approaches have different costs and benefits. However, the inclusions/exclusion errors resulting from the ECRP interest-based targeting approach are not substantial. Spending money on targeting may not necessarily deliver value given poverty rates in Malawi are high with households moving above and below poverty thresholds annually.

Recommendation 2: Resilience programme funders must decide whether they feel targeting offers value for money. This will depend on whether they wish to maximise the efficiency of programmes which they directly support in the short-term or if they want to engage more effectively in strengthening Government systems for targeting, which could have more wide-reaching impacts or greater value in the long-term.

Conclusion 3 ECRP's longevity was extremely important in its success, but greater predictability about the programme's end date, rather than a series of extensions, would have facilitated adaptation of the programme's approach. Output costs declined after three years of operations as programme delivery systems became more efficient.

Recommendation 3: Resilience programme funders should ensure funding is committed for programmes lasting at least five years. This will allow time to establish systems and maximise efficiency in delivery.

Q2: What impacts can be attributed to ECRP at household level and what contribution has the programme made to change at community, district and national levels?

Conclusion 4 At household level, ECRP reached over 177,000 households, exceeded 11 out of 15 of its implementation targets and met its outcome level targets for asset increases amongst female-headed households. Statistically significant improvements in asset values of £68 - £136 (2017 values) were attributed to participation in the programme. However, these gains were insufficient for the programme to reach its ambitious targets for income, asset or food security and households' food security and incomes have worsened with the severe shocks experienced. Whilst ECRP households were better off than those not in the programme, ECRP did not deliver sufficient resilience gains to protect household livelihoods. This was a result of ECRP's relatively modest spend per beneficiary, the repeated climate shocks affecting its beneficiaries and weak economic growth limiting job creation or improvements in Government services.

Recommendation 4: Resilience programme funders and implementers should make moderate increases to the level of investment per household in future resilience programmes. Using asset transfer as an incentive for natural resource management is a potentially cost-effective option. Piloting and research will help to identify the optimal level of investment which does not create conflict between households and generates sustainable results – it is suggested that investments of between £50-£100 per beneficiary per year, of which at least 50% is direct asset transfer, could be a starting point for research.

Conclusion 5 At community level, the evaluation found that ECRP had played a critical role in facilitating positive changes in the performance of Village Civil Protection Committees (VCPC) in its operational areas. These changes encouraged the adoption of household-level interventions, improved the coverage of life-saving flood early warnings including to very poor and female headed households, and led to more effective humanitarian targeting and response. When combined with the ECRP core package⁶, receiving early warnings was shown to lead to increased household assets averaging £57 compared to those that only adopted the core package. There are however opportunities to reduce the costs associated with delivering improvements in the performance of the VCPCs as there was a wide variation between the expenditure of different ECRP implementing partners on this activity.

⁶ The "core package" was defined for this evaluation as those low-cost interventions which were extremely widely adopted. For a household to have adopted the core package, it would have to a) be using at least 2 conservation agriculture practices in the last planting season, b) have any member of the household join a VSL AND have made any number of contributions. And c) Have dried and tested the moisture content of their maize or other grains before storing it AND applied chemicals to store any maize or grain harvested in the previous season.

Recommendation 5: Future resilience programmes should sustain investments in village and district level DRR systems but identify approaches to streamline the method and reduce costs. Costs could be reduced through the development of national manuals, better tailoring of training packages to the hazard context of each district, less repetitive training and placing less emphasis on early warning in areas which are not prone to flooding.

Conclusion 6 Improved VCPC capacity created some increased motivation for natural resource management activities, but more incentives and improved monitoring could result in stronger performance in future programmes.

Recommendation 6 Future programmes must place a greater emphasis on the design and implementation of natural resource management activities from the programme design phase. This should include identifying an appropriate range of incentives for sustainable management of these activities, ensuring coordination with public works supported under national social protection programmes and improving M&E systems to track progress and generate lessons learned.

Conclusion 7 Analysis of results for different packages does not lead to a firm conclusion about an “optimal” ECRP combination which would be most financially efficient in improving household resilience. However a programme combining direct asset transfer, VSL, Conservation Agriculture, systems to improve access to improved seeds, irrigation and DRR is likely to have the most meaningful results for beneficiaries. This also offers strong value for money especially if costs can be reduced for irrigation and DRR.

Recommendation 7 Future programmes should incorporate combinations of direct asset transfer, VSL, Conservation Agriculture, seed systems, irrigation and DRR. Further research is needed to identify the best approaches to supporting livestock production which could include livestock pass-on programmes, livestock extension services and animal health support, cash or voucher programmes or identification of business opportunities within livestock value chains such as fodder production, or marketing of livestock products.

Conclusion 8 Despite a lack of formal gender analysis during the design of the programme, the programme has successfully involved both female headed households and wives in male-headed households and has had a positive effect on intra-household decision-making.

Recommendation 8 Sustain commitments to gender mainstreaming and the ‘leave no one behind’ approach⁷, ensuring strategies are documented in programme design. Gender approaches should include approaches which enhance women’s economic empowerment and promote equality in intra-household decision-making. Approaches to ‘leave no one behind’ should set realistic targets and allocate resources for linking with specialist organisations that can support disabled and chronically ill people to be included.

⁷ “Leave No One Behind” refers to approaches which can be inclusive of all vulnerable groups. This includes children, youth, persons with disabilities, people living with HIV, and older people.

Conclusion 9 ECRP has been actively engaged in advocacy at national level with positive feedback on the programme's influence from targeted stakeholders. At least one other donor-funded programme was reportedly modelled on the ECRP approach, and it is clear that ECRP has contributed to improvements in the accessibility of weather forecast information, communication of the DRM policy, the formulation of the national Climate Change Management Policy, dialogue around national resilience planning and policy related to energy from fuel-wood. The flexible approach enabled the programme to take advantage of opportunities but more resources dedicated to advocacy and a narrower focus would have enabled deeper understanding of Government's needs in relation to policy development and implementation and a more targeted response. In addition, support from donors which have different types of leverage and influence on Government was lacking in ECRP's advocacy efforts.

Recommendation 9: In future programmes, it would be useful to identify a more focused set of policy or implementation capacity gaps at national level and then resource joint work with Government to meet these appropriately. A flexible process is essential to take advantage of political opportunities and to ensure value is added to existing support from other development partners. Allocation of time by donors to support programme advocacy efforts through high-level policy engagement with Government would enhance effectiveness.

Q4 Was the programme delivery efficient and effective?

Conclusion 10 ECRP approaches were mostly cost-efficient and effective. However, there is scope to reduce costs through learning from the most efficient members of each consortium, especially in relation to DRR and irrigation. The programme's core post-harvest management activities do not appear effective as many non-beneficiaries use the same approach and there are no detectable improvements in avoided losses. However more recent innovations may generate different results.

Recommendation 10 Implementers of resilience programmes should continue to monitor and benchmark costs per output to ensure cost-efficiency. This should form part of a process to reduce unit costs for DRR and irrigation and to identify more innovative and cost-effective approaches to post-harvest management, if required.

Conclusion 11 Levels of supervision were higher in ECRP than in other similar programmes in Malawi, which was associated with the programme's success. ECRP used local Government experts to support technical delivery and village-based volunteers to provide ongoing support; the employed programme staff organised activities, managed resources and consolidated monitoring records. This was efficient and effective. However, the numbers of staff employed varied substantially across consortium members.

Recommendation 11: Resilience programmes should continue to work through village-based extension volunteers and district Government. The median ratio of 1 field staff: 18 villages may be a useful benchmark for future programmes using similar approaches but staffing arrangements will vary based on context and programme objectives.

Conclusion 12 ECRP's partnership with Local Government was considered unusually strong for an NGO implemented programme by both District and National level Government stakeholders. However, programme planning and reporting was not aligned with Government systems and the transfer of knowledge and skills was mostly at the individual level.

Recommendation 12: Future programmes could consider a more formal joint-management option where implementation is coordinated by District Councils and programme budgeting and planning years are aligned to those used by District Councils.

Q4: To what extent are the programme impacts likely to be sustained without further intervention?

Conclusion 13 Limited use of free inputs and extensive work through local Government and Community Volunteers has made programme interventions sustainable. A lack of capacity for investment in the ongoing maintenance of irrigation schemes and staff turnover at District level are the biggest threats to sustainability.

Recommendation 13: Continue to involve District Officials and local volunteers in the implementation of activities and work to ensure technical manuals and political incentives are in place to ensure sustainability.

Conclusion 14 **Asset transfers can be provided in-cash or in-kind, through direct procurement or through market-based approaches using vouchers. ECRP's in-kind transfers of seed and livestock enabled beneficiaries to access productive assets they may not have found in the market. However, there may be limitations to the sustainability of these approaches.** For example, in some cases seed pass-on programmes were only effective for a few years where improved seeds are only viable for 2-3 seasons. Livestock pass-on programmes were also at risk of failure without substantial oversight from programme staff and cooperation from community leaders. ECRP's seed and livestock interventions have focused on direct asset transfer, with assets procured by the programme. Whilst transferring livestock increases household assets, the supervision costs can be high and the benefits of pass-on can be reduced if not all households cooperate or if deaths prevent pass-on from happening. That does not detract from the fact that livestock production is a profitable business for ECRP's target group and there are multiple resilience and social benefits that come from livestock ownership. However, ruminants also place demands on limited biomass and there may be other off-farm business options which could be explored.

Recommendation 13: Future resilience programmes should build on ECRP's lessons and identify opportunities to reduce costs in asset transfer programmes. Alternative approaches to direct transfer and pass-on could be considered, with a greater role for the private sector if possible. More research is needed in relation to the cost-effectiveness of local models of seed supply which might include the promotion of open pollination varieties, voucher programmes and work with private sector input suppliers, community seed banks and establishment of outgrower schemes for seed companies.

Future programmes could also explore different delivery options in future asset transfer programmes. This could include: 1) Identifying whether market-based approaches to enabling transfer of specific assets (e.g. cash or voucher programmes) would reduce costs compared to direct procurement; 2) Identifying if lower cost ways of improving livestock production without making direct transfers (e.g. sole focus on animal health interventions and training) are relevant to the target group; or, 3) Exploring if the transfer of alternative productive assets for off-farm enterprises could create stronger incentives for natural resource management (e.g. bee-keeping, bamboo production, sale of forest products).

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1. Introduction

1.1. Introduction to ECRP

The Enhancing Community Resilience Programme (ECRP) was designed to address the chronic climate vulnerability faced by rural people in Malawi. It started in 2011 and is closing in 2017. The purpose of the ECRP is to increase the resilience of vulnerable communities to climate variability and change. DFID, Irish Aid and the Royal Norwegian Embassy fund the ECRP. Its total budget is £30.6m, of which £27m is provided by DFID.

The programme has the following elements:

- NGO work with communities in 11 target districts. Five districts are covered by the DISCOVER consortium led by United Purpose (formerly Concern Universal), seven districts are covered by the CA-ECRP consortium led by Christian Aid (with one district covered by both)⁸;
- Both consortia work with the Malawi-based Centre for Environmental Policy and Advocacy (CEPA) to deliver advocacy and policy influence.

In the original programme design, ECRP was intended to support the Malawi Vulnerability Analysis Committee (MVAC) to enhance the timeliness, comprehensiveness and accuracy of early warning information. However, ultimately no finance was provided as the UK stopped direct support to the Government of Malawi in 2011. Whilst the absence of these funds changed the programme's theory of change, the MVAC has continued to function, supported by other partners.

By the end of the programme, ECRP's theory of change included five major components that aim to build resilience to climate change at the household, community and district levels. They are 1) improved capacity of local authorities (especially village, area and district civil protection committees); 2) improved and resilient livelihoods; 3) enhanced early warning response; 4) informed policy; and 5) humanitarian response and recovery. Component 4 is managed by CEPA which aims to distil lessons learnt by the consortia to advocate for improved policies and programmes at district and national level.

A key part of the ECRP model is that households are encouraged to adopt multiple disaster risk reduction or climate change adaptation strategies. The programme also aims to ensure

⁸ For the DISCOVER consortium, the programme districts were Karonga (Northern Region), Salima and Dedza in Central Region and Balaka and Nsanje in the Southern Region. For ECRP consortium, the programme districts were Kasungu in Central Region, Machinga, Mwanza, Thyolo, Mulanje, Chikwawa and Nsanje in Southern Region of the country.

that local institutions have increased knowledge of local risks, vulnerabilities and capacities. This encourages adoption of the programme's resilience strategies at the household level but also improves ECRP, government and other development partners' investment and targeting in order to increase resilience to climate shocks and changes at household and community levels. In 2015-16, following large scale floods that affected the country in January 2015 and the drought that followed that same farming season, the programme recognised the importance of humanitarian response and recovery activities to protect beneficiaries from large-scale drought and flood shocks. The humanitarian and response component was therefore only added at this point in the programme's lifetime. There has also been a growing recognition that those households receiving humanitarian response were not always being targeted for resilience support, to tackle this issue, the World Food Programme (WFP) provided funds to CA-ECRP to integrate humanitarian beneficiaries into ECRP in Machinga, Mulanje and Thyolo.

The ECRP logframe (Annex B) provides more information on programme's expected impact, outcomes, and outputs as well as the indicators selected for routine monitoring up to September 2016.

1.2. Introduction to the M&E Agency

The UK-based LTS International (LTS) and the Malawi-based Centre for Development Management (CDM) have been working together as the M&E Agency of ECRP since 2011 – this group will be subsequently referred to as 'the M&E Agency'. The M&E Agency has supported the creation of an online management information system and trained implementing partners in its use, conducted routine monitoring reviews, produced evaluative studies and facilitated a range of learning exercises with programme and external stakeholders.

1.3. Evaluation Scope

This evaluation covers programme progress up to end June 2017. It is the final evaluation of the ECRP given active implementation work concluded in March 2017. This evaluation covers all 11 districts of programme operations. Data collection took place in a sample of Traditional Authorities (TAs) and Group Village Head Areas (GVHs) as described in Section 2. The evaluation focused on the programme's core activities as defined in the theory of change and did not cover supplementary projects such as the co-financing of forestry activities with the World Agroforestry Centre (ICRAF) or the post-harvest and recovery activities financed in summer 2017.

1.4. Objectives of this Evaluation

The evaluation had a dual learning and accountability purpose. It generated evidence of the programme's achievements in increasing resilience at household, community and national level and documented lessons learned for future resilience programming in Malawi. The primary audiences for the evaluation include DFID, the Norwegian Embassy, Irish Aid and the Implementing Agencies for ECRP. A summarised version of the report will also be shared with Government and Development Partners who are members of the National Steering Committee on Climate Change and with district Government officials involved with ECRP. The Terms of Reference for the evaluation is available in Annex A. The evaluation aimed to provide supplementary analysis to support the final report of progress against logframe indicators. This is prepared in a separate DFID Programme Completion Review (PCR) which will be available as a draft in Annex M to this report.

1.5. Evaluation context

Malawi is one of the poorest countries in the world, ranking 173 out of 188 countries in the Human Development Index 2015. Per capita incomes are very low, at US\$255, and 70.9 per cent of the population lives on less than U.S \$1.90 per day. Natural resource degradation is already affecting livelihoods and with most Malawians are reliant on rain-fed agriculture for their livelihood (83.9 per cent in 2014) this creates a cycle of vulnerability. Widespread conversion of woodland to agricultural land has increased soil erosion and resulted in lower yields, increased flood risk and more precarious livelihoods.

Malawi experiences high levels of climate variability and suffers major floods and droughts every few years. These events also have large impacts on the overall economy and will be exacerbated by climate change. During the period from 1970 to 2008, Malawi experienced more than 40 weather-related disasters, with ten major flood or drought events, affecting an average of 2.3 million people each and causing annual crop losses of US\$149 million on average. Estimates of the future impacts of climate change in Malawi are potentially large, with additional costs equivalent to an additional 2% of GDP per annum by 2030-2050, and rising thereafter.⁹

There are many different actors working on resilience in Malawi, but they haven been poorly coordinated. Between 2011 and 2014 there were 38 development agencies implementing or supporting the implementation of resilience programmes. Political economy challenges limit the efficacy of the national Government. Furthermore, climate and disaster risk is not

⁹ LTS (2015) Economics of Climate Change. Options and Analysis. Report submitted to DFID.

adequately incorporated into national development planning¹⁰. While there is discussion of climate change in the Malawi Growth and Development Strategy II (2011-2016), there are no clear outcome targets, and no analysis to show how targets could be reached, but intervention areas overlap with those proposed by ECRP. A National Disaster Risk Management Policy was developed prior to ECRP's inception and during the lifetime of ECRP, new policies have also been written for Agriculture, Climate Change Management, Energy, and Gender. A new National Resilience Strategy has been under development as well as a new iteration of the National Social Support Programme.

¹⁰ Climate Compatible development planning: priorities and entry points in Malawi. Submitted to DIFD by LTS International Limited and the Centre for Development Management. November 2015.

2. Approach and methods

2.1 Evaluation Questions, Matrix and Workstreams

The evaluation was guided by OECD-DAC criteria¹¹ and responded to four questions, as follows:

1. What impacts can be attributed to ECRP at household level and what contribution has the programme made to change at community, district and national levels?
2. Was the programme theory of change relevant given ECRP's objectives and target groups?
3. Was the programme efficient and effective in the way it delivered its results?
4. To what extent are programme impacts likely to be sustained without further intervention?

The evaluation also responds to sub-questions which are detailed in the evaluation matrix which is available in Annex C.

To respond to the evaluation questions, the evaluation was organised into four workstreams. Three related to the unit of intervention - household, community and national level- and a fourth cross-cutting theme focused on the value for money and effectiveness questions. These are summarised in Table 2.

Table 2 Evaluation work streams and relationship to evaluation coverage

Work-stream	Evaluation Questions	Overview of methods
Household Level Impacts	Qs 1, 2 and 4.	Statistical impact assessment; mixed methods analysis of factors contributing to sustainability and scale.
Community Level Impacts	Qs 1, 2 and 4.	Qualitative assessment using <i>areas of change</i> and <i>contribution analysis</i> . Some limited quantitative analysis of a survey of Civil Protection Committees (CPCs).
National Level Policy Impacts	Qs 1, 2 and 4.	Qualitative assessment of one policy process using <i>Contribution Tracing</i> and light touch assessment of other policy work via stakeholder interviews.
Value for Money and Effectiveness	Qs 3 and 4.	Assessment of the costs associated with reaching beneficiaries with each intervention; cost benefit

¹¹ Relevance, effectiveness, efficiency, impact, sustainability. See OECD (2000) *DAC Criteria for evaluating development assistance*

analysis to assess cost-effectiveness of different ECRP interventions and their combinations.

2.2 Evaluation Approach

The evaluation used a theory-based, mixed methods approach following UK Government and industry good practice. A more detailed description of the approach and justification for the methods used is available in the Final Evaluation Approach paper (March 2017). Data collection, analysis and synthesis methods have been selected to ensure best fit given our terms of reference, the types of intervention being implemented at household, community and national level and the resources available for the evaluation.

2.2.1 Household Level Workstream

The main purpose of the household level workstream was to address the first evaluation question: assessing the impacts that could be attributed to the ECRP programme. Results from the household level workstream also fed into the other evaluation questions and workstreams described in the sections below. The main data sources for this workstream came from a household survey and focus group discussions.

The household level workstream used a theory-based impact evaluation (TBIE) approach¹² to identify and attribute programme household-level impacts. This approach combines the strengths of traditional theory-based approaches with quasi-experimental counterfactual analysis. Combining these approaches allowed the evaluation to detect statistically attributable impacts and also to provide evidence of the mechanisms through which detected impacts occurred. The household study also attempted to account for contextual factors such as weather and climate shocks along with providing impact estimates for specific beneficiary sub-groups of interest (female headed households, poorer households and households exposed to disasters).

Attributable impacts can be defined as the difference in outcomes between households exposed to an intervention and their outcomes had they not been exposed to the intervention (called the “counterfactual”) (see Figure 2 below).

Details of the intervention types and comparisons assessed for the household level workstream can be found in Annex I. To reduce the temptation to cherry-pick results a protocol was developed in the Approach Paper listing the comparisons that would be

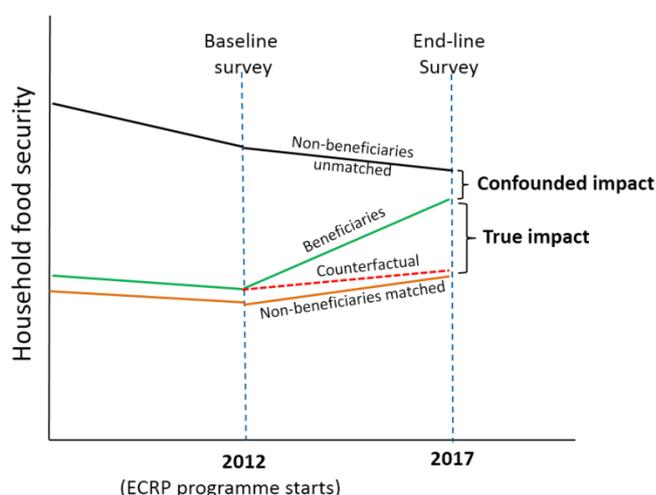
¹² White, H. (2009). Theory-based impact evaluation: principles and practice. *Journal of development effectiveness*, 1(3), 271-284.

assessed. The first set comparisons were focussed on measuring the level to which the programme increased adoption of each of the ECRP interventions along with selected intermediary outcomes resulting from adoption. The second part assessed the downstream outcomes (such as food security) resulting from adoption of combinations of interventions such as conservation agriculture, village savings and loans and post-harvest management. In this way we attempted to measure causal impacts along the intervention-impact pathway.

The impact evaluation approach used for the counterfactual analysis was based on a statistical matching with regression approach. The goal of this approach was to make the comparison groups (e.g. beneficiary and non-beneficiary) as similar as possible in terms of baseline characteristics. If matching and regression are successful then the assumption is that differences in average outcomes can be attributed to the intervention and not other factors. As shown in Figure 1 below, failure to account for baseline differences can result in confounded impact estimates which may over or underestimate impacts.

Further details of the statistical impact assessment approach used are described in section 2.4.1 along with details on how households in the beneficiary and comparison group areas were identified and surveyed.

Figure 3 True impact of the programme for beneficiaries is the difference in their outcomes after being exposed to the programme against those outcomes which would be expected had they not been exposed (counterfactual). A naïve comparison between beneficiaries and non-beneficiaries (green and black lines) can result in a confounded estimate.



2.2.2 Community Level Workstream

At community level, the focus of the evaluation was understanding the extent to which the programme worked with local institutions and the importance of those institutions in enabling programme delivery. The evaluation also investigated the contribution that the

programme made to the capacity of those institutions and the sustainability of these improvements.

The bulk of our data collection in this area focused on the programme's work to build capacity for disaster risk reduction and climate change adaptation in local Civil Protection Committees (CPCs). Prior to the assessment, we defined the characteristics of an effective CPC in line with the five high level areas identified in Twigg (2009) *Characteristics of a Disaster Resilient Community*¹³ and work done by the UK-funded *Building Resilience Against Climate Extremes and Disasters*.¹⁴ Using these criteria, the evaluation assessed the programme's contribution to local capacities in relation to the following:

- Governance arrangements for Risk Reduction;
- Risk Assessment;
- Knowledge dissemination and education about risks;
- Risk management and long-term action to reduce vulnerability; and
- Disaster preparedness and response.

The evaluation also assessed whether the availability of these capacities at community level was likely to lead to change at household level.

The community-level workstream also explored the sustainability, efficiency and effectiveness of the programme's delivery approach in areas outside of DRR and risk management. In particular, this focused on ECRP's engagement with local Government structures and community based volunteers (lead farmers, village extension multipliers, village agents etc.) in the delivery of VSL, agricultural and natural resource management activities.

Given the complexity associated with assessment of institutional change, the evaluation did not aim to statistically attribute outcomes at community level to programme activities. Rather, we aimed to use both quantitative and qualitative data to conduct a contribution analysis. This is a theory-based approach that aims to confirm that an intervention is a contributory cause to a given outcome. A contribution claim is based on a theory of change verified through evidence.¹⁵

2.2.3 National Level Workstream

At national level, the evaluation aimed to understand the extent to which the programme influenced national policy. This was mainly done via a case-study focused on one piece of programme advocacy work (influence on the National Climate Change Management Policy)

¹³ Twigg, J (2009) *Characteristics of a Disaster Resilient Community (Version 2)*

¹⁴ ITAD (2015) *BRACED Monitoring and Evaluation Guidance Notes*

¹⁵ Mayne, J. (2012). Contribution analysis: Coming of age? *Evaluation*, 18(3), 270-280.

using the *Process Tracing with Bayesian Updating* approach.¹⁶ This assessment is available as a separate document in Annex L.

We made a further light touch assessment of evidence to support the programme theory of change in relation to its communications and influencing activities which drew on an online stakeholder survey and a small number of key informant interviews with national Government officials.

2.2.4 Efficiency/Effectiveness Workstream

The evaluation follows the UK Government's value for money approach and we have re-visited the indicators that have been used to measure programme economy and efficiency since the mid-term evaluation. These draw on programme monitoring and financial data which was available by the end of June 2017.

We also produced a cost-benefit analysis which drew on assumptions agreed with programme implementers and findings from focus group and household survey analysis. This analysis captured the costs and benefits of different combinations of interventions over a 10 year period, using a discount rate of 10%. Sensitivity analysis allows the collection of minimum and maximum values. This analysis provides a guide to the potential benefits that can be accrued by the programme and the differing cost-benefit ratios of different packages of interventions. It is important to note that some activities which may strengthen the implementation quality or sustainability of the programme's outcomes may be challenging to quantify and this analysis cannot be used for decision-making without an understanding of those factors and of the wider assumptions which underlie this model.

2.3 Data Collection

2.3.1 Overview of the data collection process

Draft data collection tools were developed in March 2017 and pre-tested with programme beneficiaries and comparison households in Salima at the end of that month. The DFID Evaluation Advisor was invited to join the pre-testing and programme implementers were provided with the opportunity to comment on the tools following the stakeholder evaluation planning workshop in March 2017. Feedback was also received from the DFID Quality Assurance process – EQUALS. We finalised the Approach Paper and further developed the tools in light of this feedback during April, ensuring inputs from all evaluation team members were included.

¹⁶ Befani, B., & Stedman-Bryce, G. (2017). Process Tracing and Bayesian updating for impact evaluation. *Evaluation*, 23(1), 42-60.

Training for household survey enumerators and the qualitative data collection teams took place in early May. This training included three full days of training and classroom practice and a full day of field practice in a non-programme area close to Lilongwe. Feedback was provided by trainers and supervisors to all team members following the practice. During the training and practice period, the qualitative tools were further amended to ensure clarity for the data collection team and coverage of all evaluation themes.

Data collection was then carried out in May and data entry in the first two weeks of June. Both household survey and qualitative data collection sites were sampled at random prior to the data collection taking place. In almost all cases, the data was collected from the sampled locations, see Annex D for the full list for both teams. WhatsApp groups were established for both data collection teams to allow all team members to share queries whilst in the field. Data Collection was supervised in the field by CDM Management Team members. Household Survey Data was entered using CS Pro. Other quantitative data and qualitative notes were captured by the data collection team and were reviewed by quality assurance specialists at CDM and LTS.

2.3.2 Pre-sampling data collection on other resilience interventions in the country

There are numerous donor and Government funded resilience interventions in Malawi and many target the same districts as ECRP. Since the study sought to identify programme outcomes that could be attributed to ECRP which required sampling comparison households who were not involved in other resilience projects, it was necessary to collect information on the coverage of other resilience interventions in the ECRP districts and neighbouring areas. This data was collected from NGOs and District Government in all 11 of ECRP's districts of operation and some neighbouring districts with potential to act as comparison sites. Data was collected at the level of 'Enumeration Area' (EA) since we had spatial data on EA boundaries which could then be overlaid with vulnerability assessments and used for sampling (See 2.3.3). More detail on the other interventions identified via this process is available in the Final Evaluation Approach Paper.

2.3.3 Household Survey

A household survey of 2,236 households was conducted. 1,085 of these households were a 'comparison' group from locations where ECRP had not been operational and 1,151 were beneficiary households involved in the ECRP programme. Of these beneficiaries, 200 were specifically targeted by name as participants in the MVAC-overlap programme run by CA-ECRP. These were removed for the analysis of logframe indicators to ensure sampling

approaches remained consistent with those used previously for logframe monitoring. The following paragraphs explain the sampling process.

Classification of 'enumeration areas' (EAs) according to intervention exposure

As described in section 2.3.2, lists of Malawian EAs exposed to the programme for more than 3 years and areas in the same or neighbouring (and vulnerable) districts which have not been exposed to other similar interventions at similar levels of intensity were collected. Malawian EAs are approximately 5 km² in size consisting of around 1000 people. The list of EAs delineated in 2008 as part of the World Bank household survey was used.

Selection of beneficiary EAs and households

Based on the above beneficiary EAs (our primary sampling unit) were selected. Within each EA, clusters of households were sampled, with approximately sixteen per EA cluster. We weighted the random selection of EAs to ensure that the sampled villages are representative of the ECRP population at the district and Traditional Authority levels. The selection of households was done using a random transect walk approach. The transect lines were randomly selected crossing the diameter of the EAs. Households were then selected at equal intervals across the transects (e.g. every 125m for a 2 km transect).

Selection of non-beneficiary comparison EAs and use of statistical matching with regression at the household level

Using statistical matching non-beneficiary EAs that have similar confounder characteristics to the selected beneficiary villages were selected. Household selection within EA clusters was based on the same approach as the beneficiary household selection described above. The intervention impact estimate was then made by comparing the differences in outcome indicators between the beneficiary and non-beneficiary households after conducting statistical matching and regression analysis with household-level baseline characteristics. To identify baseline conditions, households were asked to recall their baseline conditions in the years 2010 to 2012 (when the programme started). Recall estimates were cross-checked with the baseline survey that was conducted in 2012 in the same ECRP beneficiary districts. The recall estimates were found to be accurate for both output and outcome level indicators with potential negative bias occurring, making our impact estimates conservative i.e. not likely to overestimate the programme's impact. (See Annex H for details).

2.3.4 Programme monitoring records

The two implementing consortia collect data on all programme beneficiaries and the intervention in which they are trained. This data is available on the Programme Management Information Systems. LTS obtained the final dataset from Consortium Implementers and undertook a variety of data cleaning tests to eliminate duplicate records. The outputs of this process were agreed in consultation with the programme implementers and used to generate data on programme outreach which was used in logframe reporting and value for money analysis.

2.3.5 Civil Protection Committee survey

A survey with both closed and open questions was administered to 22 Civil Protection Committees in beneficiary GVHs and 11 in non-beneficiary GVHs in ECRP districts. These interviews were evenly spread across the 11 ECRP districts and each interview involved a selection of the CPC committee members ranging from 1-9 people, but most interviews were carried out with 3-4 people.

Table 3 Numbers of men and women consulted during CPC Survey

Type of interview	# Men	# Women	Total
Beneficiary CPC Interview	60	27	87
Non-Beneficiary CPC Interview	24	11	35
Total	84	38	122

2.3.6 Intra-household dynamics interviews

We spoke with 36 women in male-headed households benefitting from ECRP and 11 women in male-headed households living in comparison sites to explore intra-household dynamics. These interviews were spread across the 11 ECRP districts and took place in both CA-ECRP and DISCOVER operational areas in Nsanje. The interviews included a combination of closed and open-ended questions relating to agriculture and marketing decision-making and labour, participation in programme activities and changes over the lifetime of the programme. Detailed notes were taken and entered into a shared coding template by the qualitative team. The small sample does not allow statistical analysis from which conclusions can be drawn but provide additional quantitative data to support evaluation findings.

2.3.7 Focus Group Discussions

Single sex small group discussions of between 6-10 participants were held to discuss key evaluation questions. For beneficiary areas, these included identifying the reasons for adoption, disadoption (where households stop practicing an intervention) and to capture beneficiary perceptions about the reasons behind the intervention benefits and how they are distributed between men and women or richer and poorer households. For comparison areas, the FGDs sought to understand non-project reasons for changes which were observed, the role of contextual changes and the provision of services by Government over the period of project implementation. We also carried out small group discussions of 3-4 respondents to identify costs and benefits associated with particular interventions. The discussions were mixed sex with respondents selected due to their knowledge of all the programme's interventions and their ability to reflect a range of wealth groups.

Table 4 Numbers of men and women consulted in Focus Group Discussions

Type of FGD	# Men	# Women	Total
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Beneficiary FGD	82	87	169
Small group beneficiary discussion on costs and benefits	24	13	37
Non-Beneficiary FGD	72	79	151
Total	178	179	357

2.3.8 Key Informant Interviews

Key informant interviews were conducted with District Officials, programme implementation staff and lead farmers in all 12 project implementation areas. National level interviews also covered representatives of ECRP Consortium Members and Technical Partners, Government officials, and other Development Partners.

Table 5 Numbers of men and women consulted in Key Informant Interviews

Type of Key Informant	# Men	# Women	Total
Lead Farmer / Chief	10	4	14
District Government Official	21	4	25
District Level Implementer Staff	20	6	26
National Level Implementer Staff	10	5	15
National Government / Other Development Partners	11	1	12
Total	72	20	92

A list of all stakeholders consulted is available in Annex E.

2.3.9 Online Survey

As part of the routine logframe monitoring, an online survey was sent to 366 people who were on the mailing list for ECRP's communications. With follow-up by email and telephone, responses from 47 people were received. This survey captured feedback on the quality of ECRP communications materials and the influence of the programme on their organisations' work.

Table 6 Numbers of respondents to the online survey

Type of Survey Respondent	# of responses
Employee of ECRP implementer	12
Other Civil Society Organisation	12
Government Staff	15
Donor/Development Partner	3
Media	2
Research Organisation	3

2.3.10 Document review

Over the lifetime of the programme evaluation we have reviewed annual reports produced by the implementing partners and tried to access as many analytical products and other literature pertinent to the programme as possible. We have also drawn on peer reviewed and grey literature in designing and implementing our evaluation approach. Where appropriate, citations have been provided in the report text but a full list of the documents reviewed is also available in Annex F.

2.4 Data Analysis

2.4.1 Household Survey Analysis

Analysis of the household survey was done in July soon after the data had been collected. After checking by a statistician for quality and entry and coding errors, descriptive statistics summaries for the logframe results and impact assessment analyses were conducted using SPSS and R statistical software.

For the impact analyses, statistical matching was first conducted to improve the overlap and balance between the beneficiary and comparison groups using selected baseline confounder variables (see Annex J for details). The R statistical package called "*MatchIt*" was used to do the matching using the propensity score approach with the nearest neighbour distance algorithm. All matching was done with replacement to minimise bias. We then took the beneficiary and matched non-beneficiary units and conducted a regression analyses to adjust for any remaining baseline imbalances. The regressions used robust standard errors to account for the effects of clustering, using the package called "*srvyr*".

To assess the robustness of our matching approach, we compared impact estimates made using the above approach with impact estimates generated using a difference-in-difference approach for a subset of ECRP interventions. The difference-in-difference approach does not use matching but rather subtracts changes experienced by non-beneficiaries from those made by beneficiaries over the same period. This assumes that without the programme all beneficiaries and non-beneficiaries would have experienced similar changes (the parallel trends assumption). When comparing impact assessments derived by two separate methods we found that the results were qualitatively similar which improves confidence in the results.

2.4.2 Mixed Methods Analysis

Quantitative analysis of household survey data to generate the results for all logframe indicators, alongside some preliminary difference-in-difference impact analysis and the analysis of the CPC Survey results was available in late June. This was discussed at a team

analytical meeting held between 27-28 June to identify links between the qualitative and quantitative results. This workshop created an opportunity to discuss explanations for quantitative findings and to explore themes for coding the data and identify patterns in evidence around each of the evaluation questions. Following this workshop, a debriefing meeting was held with the Implementing Partners and DFID in which further discussion of potential explanations for results and key priorities for the evaluation report were discussed.

All qualitative data was organised by question and documented in a series of Excel sheets. This made it easy for report authors to combine qualitative and quantitative data sources and to triangulate evidence from multiple sources as they formulated the evaluation findings. Methods used in cost-benefit analysis and in the *Process Tracing with Bayesian Updating* case study are found in Annex K and L respectively.

2.5 Communication of evaluation findings

A number of steps have been taken to ensure the evaluation findings are validated and communicated to relevant stakeholders. These include:

- Full day workshop in March to discuss the interventions, updated theory of change analysis and evaluation approach with implementing partners;
- 2-hour debriefing meeting in late June to share preliminary findings with programme donors and implementing partners;
- Full day validation workshop to discuss the evaluation findings with programme donors and implementing partners in early September;
- Development and dissemination of evaluation communication products including the evaluation full report, a leaflet of executive summary and PowerPoint presentations targeting District and national level stakeholders.

2.6 DFID cross-cutting issues

The table below provides a brief overview to highlight how key cross-cutting issues for DFID have been addressed in the evaluation.

Table 7 Approach to DFID cross-cutting issues

Issue	Evaluation Approach and relevant section
Poverty Reduction Strategies	Whilst ECRP is not implemented through Government systems, many of its interventions are reflected in the Government of Malawi's 2nd Growth and Development Strategy (2011-2016). The lessons learned from this evaluation are therefore relevant for Government as it concludes work on its National Resilience Plan and progresses with work on the next iteration of its national development strategy.
Paris Declaration	Whilst the contract for the M&E Agency is with DFID, the ECRP evaluation has been conducted on behalf of all the donors to the programme, who were invited to

on Aid Effectiveness	comment on the evaluation ToRs and preliminary findings. The programme does not use national Government systems but this evaluation has consulted extensively with Government stakeholders and identifies opportunities for DFID to make greater contribution to Government systems in future.
Human Rights	This programme contributes to the universal human rights to an adequate standard of living and the Government of Malawi constitutional provision that it should “take all necessary measures for the realization of the right to development.” The evaluation assess the programme’s contribution to food security, economic development and gender equality and through this documents its contribution to human rights.
HIV/AIDS	The programme keeps monitoring data recording those households living with HIV/AIDS and other chronic illness. This data is used in the evaluation report as well as findings from focus groups about the impact of low labour availability on the household adoption and outcomes.
Environment	Previous monitoring work identified environmental issues requiring programme action in relation to the need for catchment-level planning, improved water management alongside irrigation, more sustainable approaches to digging mud for stove production, and appropriate measures to ensure survival of tree seedlings planted. We have also previously flagged a need for more effective monitoring of natural resource management activities by implementing partners. No further work on environmental risks was required as part of this evaluation, but findings and recommendations related to the need for additional emphasis on natural resource management are included.
Anti-corruption	Earlier monitoring work assessed financial management systems for both consortia and both have appropriate internal controls and are regularly audited. It was not within our scope to undertake further detailed assessment of consortia financial management and we have not identified any new corruption risks as part of our review of financial reports for value for money assessment.
Capacity Building Power Relations	The evaluation has generated a number of findings in relation to the programme’s contribution to capacity at village, district and national level. The evaluation has assessed the programme’s support to more accountable institutions at community level and its ability to effectively support poorer and female-headed households. It explored the potential for unexpected distributional impacts of activities such as VSL.

2.7 Limitations

There are a number of known limitations which are outlined in more detail in the approach paper and are also explained and acknowledged in the text where they are pertinent to a particular finding. Methodological limitations include the following:

2.7.1 Attribution of all programme outcomes

As noted in the approach paper, the logframe indicator targets at outcome level do not contain any reference to the need for changes to be attributed to the programme and relate to income, assets and food security. Our impact assessment approach was based on recall and this was only effective for the assessment of intervention adoption and changes in assets due to low confidence in recall estimates of income.

We have used survey data and focus group discussions to estimate the programme's potential impact on adoption and incomes for use in a cost-benefit analysis. The level of confidence in such findings compared to those related to statistically significant effects from an impact assessment is lower. Nevertheless, the evaluation still considers them useful sources and the different levels of confidence in the data from different sources is flagged in the text.

We did collect recall data on estimates of food security which in this programme has been based on questions relating to the longevity of food from the rain-fed harvest throughout the year. This has been useful as a proxy for changes in the rain-fed harvest but we did not find statistically significant increases in food security as a result of the programme by using this indicator. This is possibly due to the fact that the indicator does not capture a true picture of food security where smallholders rely on cash from other sources to buy food. In future programmes we recommend the use of consumption-based indicators to measure food security.

2.7.2 Data quality issues in programme monitoring data

Programme monitoring data was collected by village-level volunteers and compiled by field officers working in remote area. It has some known errors. The first of these is its over-reporting of the number of female-headed households participating in the programme. However, data from the household survey is presented in this evaluation with an explanation of the likely reason for these differences.

The second is the presence of duplicate records in the monitoring records. Prior to this evaluation we have undertaken a more intensive data cleaning process than during previous exercises. This has removed all possible duplicates where households with the same name and same interventions were recorded, where household head and beneficiary names were switched or where duplicates exist separately only by known spelling differences. Whilst it is possible that some records which were not duplicated have been deleted, this is an acceptable trade-off given the enhanced credibility of the results.

2.7.3 Sampling for intra-household and civil protection committee interviews

Sample sizes for these interviews were lower than optimal given the extensive geographic scope of the ECRP but were constrained by resource limitations. The quantitative findings derived from these surveys are not statistically representative but provide a useful indication of trends amongst the cases which we studied.

Whilst the intra-household module could have been added to the larger household survey, this was already long due to the extensive list of interventions in ECRP and the need for recall estimates to be made. It was not considered feasible to add an additional module to this survey, necessitating the intra-household interviews to be conducted separately alongside the qualitative work.

The compromise between breadth and depth was discussed during the evaluation planning phase and this was felt to be an appropriate compromise. The sample upon which findings are based is acknowledged in the text.

2.7.4 Potential for positive bias

The evaluation made a number of attempts to reduce the potential for positive bias which included random sampling of sites to be visited, the development of question guides with appropriately open questions and the collection of data from areas where the programme was not implemented to use in contribution analysis. All data was collected by independent enumerators who did not have any links to the programme implementers. The M&E Agency has been independent from the rest of the programme throughout its work.

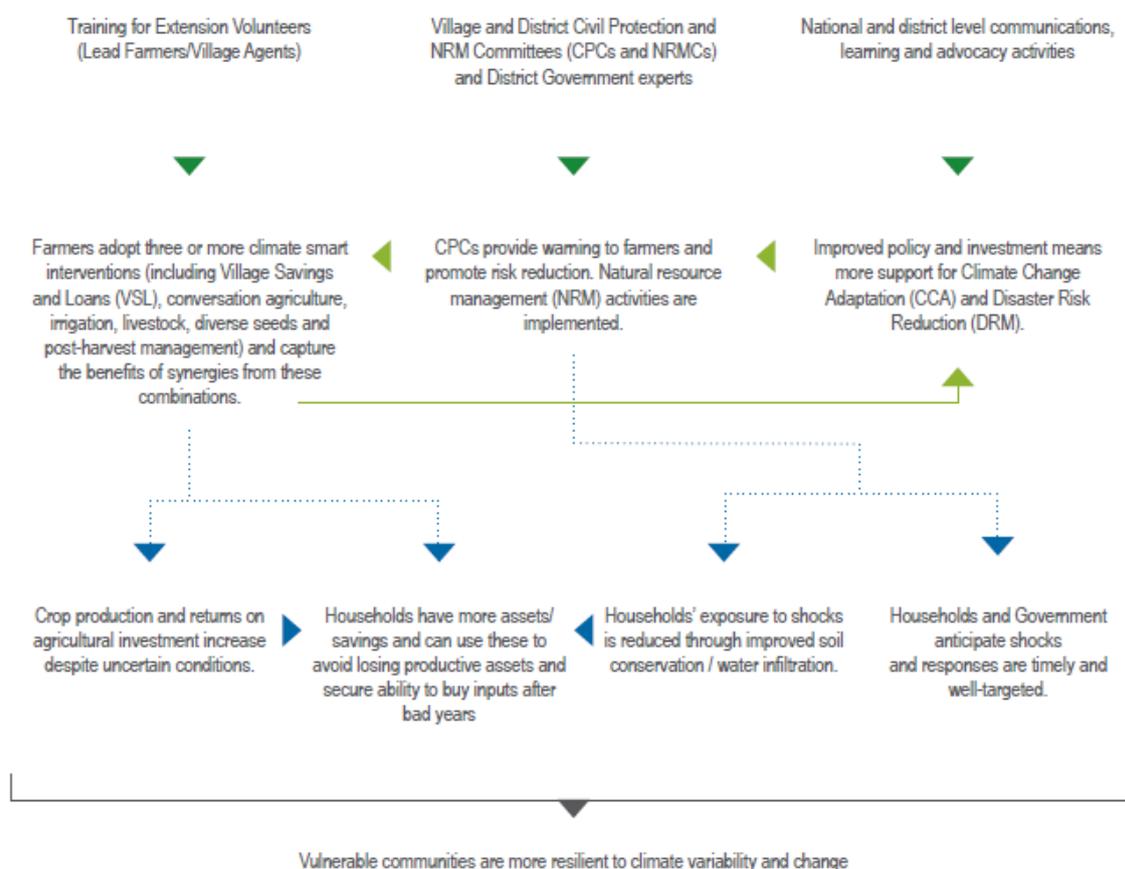
Despite these measures, there is still a small risk of positive bias in findings based on responses provided by programme participants, district stakeholders and programme implementers. These participants may all wish to give answers that they feel would be most likely to sustain DFID's investment in ways that could benefit them. This risk has been mitigated in a number of ways. First, the enumerators were trained to ensure introductory conversations with all stakeholders clearly explain the way in which evaluation findings would be used and downplayed any links between individual responses and future resource allocation. Enumerators also made a note of any respondents whose responses they found biased and this information was used during the analysis to put such perspectives into an appropriate context. Second, the analysis aimed to triangulate findings from a range of data sources and to indicate the weight of support and level of confidence behind particular findings. Finally, the evaluation recognises that all stakeholders interviewed have relevant insights to the programme that go beyond their personal interests but which may not always be consistent with each other. Where appropriate, we have provided an insight into divergent perspectives and explained the implications for the evaluations findings and conclusions.

3. Understanding the ECRP Theory of Change

3.1 Overview

The ECRP theory of change was developed during the project proposal stage and some elements of the theory were further developed during the lifetime of the programme and as a result of specific analysis carried out by the M&E Agency, including studies related to disaster risk reduction, combinations of interventions and flood resilience. In the preparatory phase of the evaluation, the M&E Agency worked with Programme Implementers to consolidate this knowledge into three Theory of Change diagrams which provided the necessary detail to help us design the evaluation. These diagrams are available in Annex G and a summarised version of the overall programme theory of change is presented below.

Figure 4: Simplified Theory of Change



3.2 Household Level

3.2.1 Interventions and targeting

The programme implemented twelve district interventions that were primarily operational at household level. Whilst the majority of interventions were targeted based on farmer interest, there were factors which influenced the likelihood of households to get involved and some variation in implementation model across the two consortia. There were also slightly different assumptions about how the interventions might be sustained or scaled. These assumptions were discussed with stakeholders during the evaluation planning phase and are documented in the table below.

Table 8: Household level interventions and their implementation model

Intervention and capacity type	Targeting	Implementation model	Hypothesis for scale / sustainability
Village Savings and Loans	Groups are established voluntarily by households who are interested and who have similar incomes and high trust between themselves.	CA-ECRP: Programme trained village agents who then trained and supported groups. Groups established voluntarily by households with similar financial capacity and high trust. DISCOVER: Initially trained groups via their standalone microfinance company (CUMO) staff, then moved to village agent model. Groups with larger volumes of saving were then supported to 'graduate' to microfinance. Nine groups now access credit from microfinance companies.	Village Agents continue to set up additional groups within their geographic range of ~10km but may also train new agents. Farmers are motivated to set up groups and compensate the village agent because they see benefits experienced by their peers.
Conservation Agriculture	Farmers trained are those who have interest and time and can access a Lead Farmer (LF / CA-ECRP) or Village Extension Multipliers (VEM / DISCOVER).	Programme staff trained Lead Farmers who then trained groups of farmers. Training was practical using LF/VEM demonstration plots.	VEM/LF continue demo plots. Spill-over effects will naturally occur through social learning between farmers.
Seeds	Those farmers with interest / access to the LF/VEM are targeted. In	Programme distributed seed / planting material of varied types	The expectation was that all those receiving seeds would 'pass on'

	some cases local Chiefs or CPCs were involved in targeting.	and quantities based on farmer needs and local extension advice.	a similar amount of seed to another farmer. Also that seeds/ planting materials could be sold by beneficiaries to other farmers in their area.
Post-Harvest Management	Those farmers with interest / access to the LF/VEM are targeted.	LFs provided training on the use of actellic, drying crops and using plastic sacks or granaries. Earlier in the programme, Lead Farmers built sample granaries which could be copied by farmers with access to resources to construct them. Farmers also worked in groups to create communal seed/cereal banks. Committees for these groups are selected by the community.	Spill-over via social learning between farmers and due to efforts of Government extension workers could occur.
Agro-forestry	Those farmers with interest / access to the LF/VEM are targeted. Only those farmers with labour capacity to engage in planting were eligible.	Lead Farmer trained those involved and the ECRP provided seedlings or seeds. In some areas, communities organise their own tree nurseries prior to planting on-farm.	Spill-over via social learning between farmers and due to efforts of Government extension workers could occur.
Livestock	Poultry/Goats: Targeting criteria were mostly applied based on poverty and a lack of other livestock. Pigs: Better off HHs with the interest and capacity to manage the care of the animal were targeted.	Programme distributed pigs or poultry or goats. Households are targeted to receive animals procured by the programme or purchased locally using a voucher at a livestock fair. ¹⁷ Training is provided and HHs must construct suitable housing. Community animal health workers are trained to support farmers with disease prevention and cure.	"Pass-on" programme continues. Community veterinary health workers continue to offer services after the programme finishes.

¹⁷ In Thyolo and Mulanje under CA-ECRP subsidised purchase was used with households contributing a proportion of the purchase price rather than receiving a free animal. No pass-on was required and targeting could not include the most vulnerable/poor.

In some areas, other vulnerability criteria (such as malnutrition) were applied by communities themselves.

Irrigation	<p>The targeting was interest-based. Those households who live close to a scheme and have the capacity to provide labour and inputs were most likely to participate. Membership to some schemes was dependent on labour contributions to canal construction.</p>	<p>The programme renovated defunct schemes or built new schemes. ECRP provided pumps to a household (treadle) or a scheme (solar/diesel) where required. The programme supported communities to enact by-laws to govern land/scheme use. In some cases it helped farmers organise into groups and trained them on operation of the scheme. District Irrigation Engineers/Extension Officers supported the process. Households are mostly expected to buy their own inputs for planting.</p>	<p>Schemes continue to be maintained by the District Government or via contributions to irrigation committees.</p>
Weather Forecast / Early Warning	<p>All households in the programme's operational areas were given the opportunity to attend training on Disaster Risk Reduction (DRR) and to access early warnings via a Village Civil Protection Committee (VCPC). Those living in most flood-prone areas were prioritised for early warning. Those with phones and who took up the chance to register received Esoko messages up to the threshold for subscribers of 10,000 households.</p>	<p>Households registered their mobile phone numbers with Esoko after attending village meetings to promote this.</p> <p>VCPCs accessed information from district DRR officers or radio, and disseminated this via loudspeaker, phone, and/or by posting information on office walls.</p>	<p>CPC will continue to disseminate information after the programme is completed.</p> <p>The Esoko subscription will not be sustained but NGOs will explore alternative local providers/linkage to Government schemes.</p>

Humanitarian Response and Recovery	Response was targeted based on MVAC assessment and the displacement camp inhabitants. Recovery activity targeted existing beneficiaries, but also included some non-beneficiaries in those geographic areas.	Flood-displaced households receive seeds, tools, solar lanterns and stoves. Drought affected households receive winter cropping planting materials (e.g. sweet potatoes) and multiply these for wider distribution.	Distribution of diverse planting materials and low carbon technologies encourages a 'build back better approach'.
Fuel Efficient Stoves	Stoves were provided for free in some circumstances where households were interested to have them. They were purchased by households with sufficient funds where they were being sold.	The programme implemented a mixture of free distribution and encouraged purchase from local producer groups. It set-up and trained producer groups and also in some areas (CA-ECRP only) trained local people on the construction of fixed stoves in their own homes.	Social learning creates demand for stove; local groups/training on construction meets demand.
Solar Lighting	Solar lanterns were sold to ECRP beneficiaries through VSL groups by agents employed by private solar companies. They were also sold by Solar Entrepreneurs who were provided with start-up capital by ECRP to purchase devices.	Private solar companies dispatched agents to the ECRP operational areas to sell devices. Households paid for the devices themselves. In some cases, the project pre-financed the devices via solar entrepreneurs selected by the programme.	Social learning creates demand; solar providers learn about how to operate successfully in rural areas.
Natural Resource Management (NRM)	Individuals joined NRM activities based on their own interest and capacity. Motivation for NRM increased following shocks such as the floods and dry spells in 2015.	Individual woodlots were established using seedlings provided by the programme and following training by LF/VEMs. Other NRM activities such as river bank stabilisation, afforestation, natural regeneration of areas closed to grazing were implemented by Village NRM Committees and Catchment Management Committees which were trained by the programme in some cases.	Skills in nursery management and year-round planting will be disseminated via social learning.

Marketing	Members joined marketing groups based on their interest and financial capacity. (E.g. for DISCOVER where share purchase was needed). Only farmers with the ability to produce the relevant product were targeted. (e.g. if linked to irrigation)	Programme provided training and linked groups to markets in some cases.	Market linkages will be sustained; profitable enterprises will grow and involve more people.
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3.2.2 Interventions and their combinations

The theory of change at household level focuses on the adoption of combinations of resilience-building technologies as listed in the table above. The detailed theory of change (Annex G) unpicks in more detail the potential synergies between many of the interventions and these relationships were studied in more depth in 2015.¹⁸ As a consequence, the evaluation approach looks at intermediate outcomes by intervention but only attributes the programme’s ultimate outcomes (e.g. food security, increases in assets) to the combinations of intervention.

In addition, the interventions are classified according to the types of resilience capacities that they are designed to support. DFID’s Building Resilience to Climate Extremes and Disasters (BRACED) programme reviewed over fifty frameworks, concluding that resilience is a product of interlinked capacities to absorb, anticipate, and adapt to shocks and stresses. Later the capacity to 'transform' livelihoods was also added in response to stakeholder feedback. Definitions of these capacities are available in the table below.

Table 9: Capacities of resilient systems used in DFID BRACED Programmes

Anticipatory capacity	Absorptive Capacity	Adaptive capacity	Transformative Capacity
Ability to undertake proactive actions to avoid upheaval from shocks and stresses	Ability of systems to buffer the impacts of shocks in the short term to avoid collapse. Examples: Saving cash to use to buy food in	Ability to react to evolving/ dynamic risk of disturbance to reduce the likelihood of harmful outcomes	Capacity to make a more fundamental change to avoid intolerable losses or exploit radically new opportunities.

¹⁸ See LTS and CDM (2015) A study of the adoption of ECRP interventions in combination. Submitted to DFID Malawi.

Examples: Receiving and acting on early warning messages.	the event of a shock; preparing for early humanitarian response.	Examples: Adoption of more resilient agricultural practices (improved seeds, irrigation, CA)	Examples: Shifting to non weather dependent livelihoods, urban migration.
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The application of these criteria to ECRP is referenced in the detailed theory of change in Annex G and is summarised below. Both alone, and in combination it is expected that ECRP interventions help households to build:

- **Anticipatory Capacity:** By sharing early warning messages, weather forecasts and new information about technologies that can help households cope with climate shocks and changes, the programme helps households anticipate shocks in order to prepare and respond to them.
- **Absorptive Capacity:** By building households' asset base, helping them store food for longer, giving them access to savings and loan facilities and providing humanitarian response and recovery support, the programme reduces the losses that households' experience when shocks strike and supports them to quickly recover their livelihood strategies.
- **Adaptive Capacity:** By providing new training and inputs, the programme helps households alter their existing livelihood strategies to better exploit current and future conditions. This includes, shifting to irrigated farming, adopting conservation agriculture, reducing fuelwood demands, investing in soil fertility and planting more resilient and higher value crops.
- **Transformative Capacity:** The programme does not have an explicit strategy for livelihood transformation but does envisage that loans from VSL schemes can be invested in new and less weather dependent businesses and that the scale of some irrigation schemes would be sufficient to shift households from a rain-fed subsistence livelihood to one that is based on cash-crop production. It is hoped that large-scale economic activity in a particular area would have spill-over benefits in creating jobs for labourers and demand for other agricultural products produced in the area.

3.2.3 Expected outcomes and impacts

At outcome level, it was expected that households adopting ECRP interventions would experience improved food security, a growth in their asset base and an increase of annual incomes. In the event of significant shocks that could potentially cause agricultural production and incomes to decline or to provoke distress sales of assets then it was expected that households with ECRP interventions would experience a smaller decline than those not adopting ECRP interventions. Ultimately, the programme expected to contribute to a reduction in extreme poverty and hunger in Malawi.

3.3 Community level

3.3.1 Interventions

At the community level, we have prioritised an investigation of the programme's activities to strengthen institutional capacity for disaster risk management (DRM) and Early Warning Systems (EWS). The original theory of change discussed the need for '*a greater understanding of forecast data*', '*a culture of preparedness within the community*' and '*increased flow of information to district level leading to a more integrated approach to development planning*.' In turn, this was expected to result in a '*functional EWS at national and decentralised levels*' and '*disaster readiness plans demonstrating their value by improving response*'. Over the lifetime of the programme, a more nuanced approach to disaster risk reduction and climate change adaptation at community level has been developed by the two consortia. This is based on close work with relevant stakeholders at different levels. This has happened despite the fact that the original activity to support national level assessment capacity through the MVAC was removed from the programme prior to implementation.

3.3.2 Expected outcomes and impacts

Further theory of change analysis during the evaluation planning process identified specific capacity improvements which were expected in relation to (1) governance, (2) risk assessment, (3) knowledge and education, (4) risk management and vulnerability reduction and (5) disaster preparedness and response. We also explore the value of CPC activities enabled by these capacities at household level, as this institutional capacity is also expected to contribute to resilience at household level and the ultimate programme impact of reduced poverty and hunger.

3.4 National Level

3.4.1 Interventions

At national level, the programme intended to share learning and manage knowledge to ensure that evidence of 'what works' was used to inform policy and planning both by the Government of Malawi and by other development partners. The programme strategies included awareness creation, generation of evidence and learning, power analysis, consensus building, and creation of public pressure through media activities and district-level advocacy.

3.4.2 Expected outcomes and impacts

Expected outcomes from advocacy were detailed in the programme's advocacy strategy and included:

- Government to enhance coherence between CC and DRM policy instruments and implementation by 2015;
- Government to increase budgetary allocations for CC and DRM from 0.9% to at least 2% by 2015;
- A revised Energy Policy by 2015 to reflect an integrated approach to rural energy provision, combining different renewable, efficient and equitable solutions to provide village energy supply systems to meet both domestic and small and medium enterprise resilience-building needs;
- An enhanced climate forecasting service to support resilience-building;
- Government to provide significant profile and priority to conservation agriculture (CA) in the draft National Agricultural Policy (NAP);
- CC adaptation and DRM plans and interventions at national, district and community level to be gender sensitive; and
- Forestry governance to incorporate messages on sustainable charcoal and to promote harmonisation of approaches to tackle deforestation/reforestation

These outcomes from the advocacy activities of the programme were expected to contribute to community resilience, to the scale-up of programme ideas and ultimately, to the reduction of extreme poverty and hunger within Malawi.

3.5 Contextual Factors

During the evaluation planning, we identified a number of contextual factors which would affect the programme theory of change. The data collection and analysis has not changed our assumptions about the importance of these factors and they are referred to in the evaluation findings, as appropriate.

Table 10 Contextual Factors Relevant to the Programme Theory of Change

Factor	Relevance to programme implementation
Household Level	
Household characteristics	Farm size and location, household composition, poverty status, labour availability, education, intra-household dynamics, existing knowledge about climate change, experience of climate shocks and proximity to market are all likely to affect households' ability to benefit from programme interventions.
Exposure to drought/dry spells, flood, crop pests during programme lifetime	Shocks can destroy productive assets, reduce productivity, require sale of productive assets. Shocks may also have multiplier effects across the rural economy limiting availability of paid labour and inputs in the market. However, shocks can also incentivise uptake of new technologies if they are shown to be effective – e.g. in the case of conservation agriculture in dry spells or NRM activities after the 2015 floods. But the opposite could also be true if adoption coincides with the experience of climatic conditions that exceed the threshold of that practice's efficacy. In such cases, this may result in disadoption.

Community leadership	The competence of community leaders and their ability to balance the needs of different interest groups in a fair and transparent manner are important in enabling or limiting the effectiveness of the programme. This is important because community leaders are responsible for supporting the implementation of programme activities.
Level of Government Resources/ Capacity	This may have enabled or limited the services available to households prior to the project. An absence of Government or alternative services might make the presence of NGO projects more important to achieving programme outcomes. However, supportive government services may make project interventions more effective.
Scale, targeting and timely implementation of input subsidy scheme	The Government of Malawi input subsidy scheme reaches ~35% of farming households in Malawi with subsidised seeds and fertiliser. It has undergone significant reform since the 2013/4 season which was the last in which substantial donor support was available for input procurement. Major changes include a removal of vulnerability targeting, increased financial contributions by beneficiaries and a greater role of private suppliers in meeting demand. These changes likely adversely affect very poor households and delays to the delivery of vouchers (such as in 2015/6) limit the benefits to all farmers.
Input and food prices	Higher prices can benefit wealthier farmers with a surplus and the ability to store that surplus until prices become favourable. However, the large majority of farmers targeted by ECRP are net maize purchasers who both sell to and buy from the Government-controlled ADMARC. Whilst the Government aims to control supply and demand to regulate prices, weak governance and rent-seeking at various levels limits its effectiveness. Price spikes during hungry periods are common and were particularly pronounced in late 2016.
<i>Community Level (focused on ECRP's support to community / district level disaster risk reduction systems)</i>	
Exposure to drought/ dry spells, flood, crop pests.	The extent to which an area is prone to shocks will have affected the functionality of CPCs prior to the project.
Level of Government Capacity	Where district Governments have capacity to coordinate humanitarian responses and are responsive to CPC analysis and requests, this incentivises CPCs to fulfil their role.
Budget availability	This has an effect on Government Capacity, for example where foreign exchange shortages or currency devaluations reduce District Government purchasing power, their functionality declines.
<i>National Level</i>	
Drought/flood	Large scale shocks raise public awareness of the importance of DRR and create pressure for Government to act.

Donor behaviour / budget availability	In 2013, 21% of Malawi's national income was from overseas development assistance. The Cash-gate scandal resulted in donors withdrawing direct support limiting public spending through Government systems but creating pressure for reform.
International agreements /platforms	These affect the degree to which an issue receives political priority and the likelihood of success. Malawi's engagement in international climate negotiations creates pressure for domestic policy action; Malawi's annual participation in the Global Platform for Disaster Risk Reduction/ progress reporting against the Hyogo Framework for Action also encourages domestic reform.

3.6 Links to other resilience interventions

There are a plethora of other resilience building programmes operational in Malawi. These include the national farm input subsidy programme (FISP), social cash transfers, free school meals and cash/food for work programmes, which complement the ECRP approach and target some of the same beneficiaries.

In the ECRP beneficiary sample, there is relatively high participation in other social protection initiatives. For example, during the six years of programme operation, 63% of beneficiaries had received humanitarian support from the main MVAC-coordinated response, 18% had received social cash transfers, 42% had engaged in cash for work programmes and 58% had received input vouchers under the Farm Input Subsidy Programme (FISP). Of those receiving input vouchers, 45% reported that they had sometimes sold the vouchers, with 3% reporting that they had always sold them. There has not been active coordination between these programmes targeted by Government and ECRP, except in specific instances such as the WFP-funded programme that specifically aimed to integrate humanitarian beneficiaries into the ECRP.¹⁹ In relation to our evaluation question on the distinctive role of the programme (Q2.2) and the lessons learned from its targeting approaches (Q2.1), we explore the links between ECRP and these Government programmes.

There are also a number of resilient livelihoods programmes that are similar to ECRP in design – in particular those funded by USAID (Njira, WALA and Ubale), those funded by the EC Global Climate Change Alliance framework and numerous smaller-scale NGO projects. However, the overlap between these and ECRP is much more limited. Only 48 of the 2000+ enumeration areas covered by ECRP also have similar resilience interventions in place. In all these cases, the intervention had begun in 2015 when ECRP was originally planning to phase out its activities in the area. Coordination and geographic targeting undertaken by Government of Malawi and ECRP implementers to avoid duplication can therefore be

¹⁹ This intervention aimed to demonstrate that humanitarian response beneficiaries could build resilience with proper targeting and investment.

considered successful. Our evaluation questions explore ECRP's distinctive contribution and also comment briefly in relation to its influence on these other "resilient livelihoods" programmes.

4. Findings

4.1 Was the programme theory of change relevant given its objectives and target groups?

Finding 1: Geographic targeting did not overlap completely with the list of Government of Malawi disaster-prone districts, but was primarily focused on disaster vulnerability or the drivers of disaster vulnerability and areas where the implementers could work effectively. Whilst Government's demand for resilience interventions exceeded the capacity of the programme, the selection process was appropriate given the programme purpose.

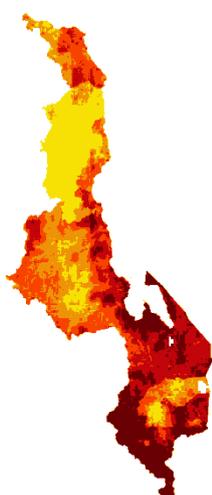


Figure: Vulnerability map of Malawi. Darker areas are more vulnerable to climate shocks. Source: Malawi Hazards and Vulnerability Modelling Tool. Regional Centre for Mapping of Resources for Development.

The programme targeted 11 districts. Within those districts, 272 GVHs were targeted. Within each selected GVH, the programme worked in all villages. The districts were selected through dialogue between National Government, DFID and the NGO implementers to take into consideration exposure and vulnerability to climate shocks, NGO implementation networks and the presence of other similar interventions. The TAs and GVHs were selected by Government and NGO implementers to take into consideration vulnerability levels, available budget and the presence of other interventions. Of the 11 districts targeted, 7 are on the Government of Malawi's list of the top 15 'disaster prone' districts.²⁰ Three of the ECRP districts which were not included on the list (Mulanje, Thyolo and Mwanza) were prioritised by the

Christian Aid ECRP consortium because they are upstream areas where natural resource degradation has been cited as a source of increased flooding in Chikwawa and Nsanje districts, which were already targeted by the programme. Kasungu was targeted because it had been subject to repeated dry spells in the years prior to 2010 and a number of CA-ECRP consortium members were already working in the district. Other districts on the list were not targeted due to budget

constraints. The Government Department of Disaster Management Affairs (DODMA) representative noted that he would have preferred the programme to cover the whole country, but several implementing agencies noted that in the early stages of the programme, the level of outreach was too great for the available staff.

²⁰ DODMA (2017) Disaster Prone Districts. The list comprises Karonga, Rumphi, Nkhata Bay, Salima, Dedza, Ntcheu, Mangochi, Balaka, Machinga, Zomba, Phalombe, Blantyre, Chikwawa and Nsanje.

Finding 2: ECRP financed activities which were found relevant by communities and the local Government and were in line with national policy.

In focus groups and interviews, beneficiaries, district Government officials and implementing staff noted that the activities promoted by the programme were relevant to the target group and to the objective of reducing vulnerability to climate shocks and changes. The activities and delivery approaches were also in line with Government policy commitments, such as the National Conservation Agriculture Framework, National Social Support Framework (VSL) and Irrigation Master Plan. The only implemented activity which was consistently found to be not relevant by beneficiaries and other stakeholders were mud-smeared granaries promoted as a post-harvest management technology in the early years of the programme. Households found these made theft of food more likely and CA-ECRP replaced them with training on other storage methods that could take place within the home.

“There is no intervention that is not useful as all interventions have been beneficial to us” Male FGD participant, Dedza.

“ECRP is one of the most relevant projects in the District. It responds well to the District plans and answers community needs” DEO Mulanje.

Finding 3: ECRP implementers avoided duplication with other projects

An assessment of all the programme’s operational areas identified only 48 Enumeration Areas out of over 2,000 where ECRP overlapped with other similar interventions implemented by NGOs. These overlaps occurred in Balaka, Dedza, Karonga, Kasungu and Salima. Considering the large number of NGO projects in the country, this shows that the existing District Government systems for NGO coordination are mostly functional. In all cases, the other interventions had begun in 2015, at a time when ECRP was planning to phase out its activities in the area.

Finding 4: At household level, interest-based targeting and a focus on agricultural activities meant ECRP tended to work with a group of households slightly better off than the average. There were some examples in which the programme had tailored its packages to farmers with different poverty or vulnerability levels, but this was an area which stakeholders noted could be improved.

Take-up of the majority of ECRP interventions was determined by households showing interest and voluntarily adopting practices. It is therefore expected that ECRP beneficiaries would at baseline, on average, be better-off than the average household within the ECRP districts. This is because adopters would likely be more innovative, less risk averse and have the resources and skills to adopt new practices compared to non-adopters. The baseline recall estimates in Annex H (Table 3 and 4) provide evidence to show this expectation was correct, since they show that beneficiary households had higher baseline asset values than non-beneficiaries.

Whilst the programme had initially aimed to target vulnerable households with labour capacity and had achieved this with some limitations (i.e. only a relatively small bias towards

better off households), both Government and implementation stakeholders commented that the programme had not set out to identify and support the tailoring of interventions for different wealth groups and that there might be opportunities to improve this in future. Further analysis on the programme’s effectiveness in reaching “very poor” households are Findings 39-40.

A minority of respondents, including local government officials, implementing staff and beneficiaries consider that focusing on better off households offers improved value for money as these households can invest their own resources and be involved in higher value, market-oriented activities and provide a demonstration effect for others. Whilst DFID has other interventions in its portfolio aimed at market development, these are commodity-based and do not necessarily target farmers in areas which are vulnerable to disasters nor do they necessarily focus on crops which have benefits from a ‘climate resilience’ perspective.

Finding 5: ECRP has successfully targeted female-headed households at a level which is representative of their occurrence nationally and has reached both husbands and wives within male-headed households.

As shown in table 9, 19-23% of the households supported by ECRP were female-headed. Both the comparison sample and a large, nationally representative World Bank survey indicate that 22% of the country’s households are female-headed. Assuming each female headed household contains the same number or fewer beneficiaries than the male headed households, the programme has not reached its logframe target (Outcome 1 - 33% of beneficiaries from female headed households). However, data from the programme Management Information System has been used for reporting against the logframe and has consistently recorded a much higher proportion of female headed households (between 41-43% of all beneficiary households). This is likely to be a result of female beneficiaries²¹ registering as female headed households due to a perception that this improves their eligibility for free inputs (KII with programme staff).

Table 11 Percentage of female headed households in the ECRP Sample versus population

DISCOVER	CA-ECRP	Comparison Group	World Bank (2014)
23%	19%	22%	22%

Source: ECRP Household Survey and World Bank: <http://data.worldbank.org/indicator/SP.HOU.FEMA.ZS>

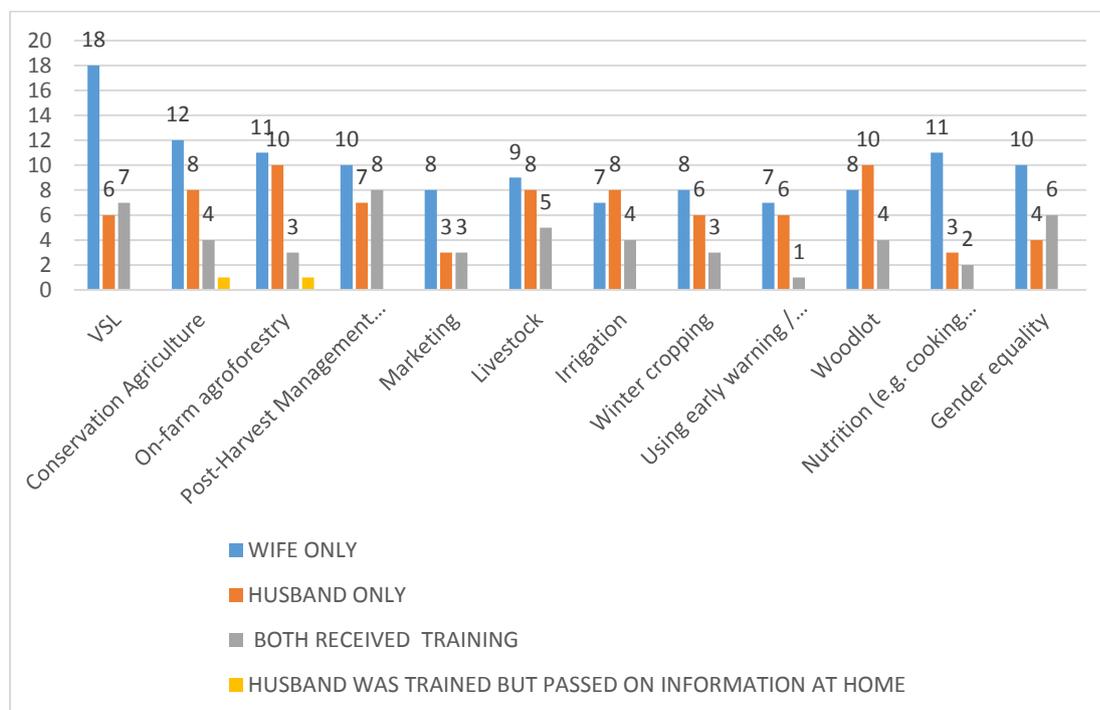
According to programme monitoring data, 66% of the ECRP’s directly targeted beneficiaries are women.²² This includes females who head households and women targeted within male headed households. Our intra-household discussions consulted a small sample of 36 beneficiary households across all ECRP districts. So whilst this is not a statistically

²¹ The same tendency to misreport is not found in the household survey data upon which most of our findings are based. However, this is a known limitation of the MIS data used for some logframe indicators.

²² Management Information System Data for both CA-ECRP and DISCOVER as at June 2017.

representative sample by any means the data supports the finding that the programme targeted women within households. Wives were generally more likely to have been trained in the ECRP interventions than their husbands as indicated in the figure below.

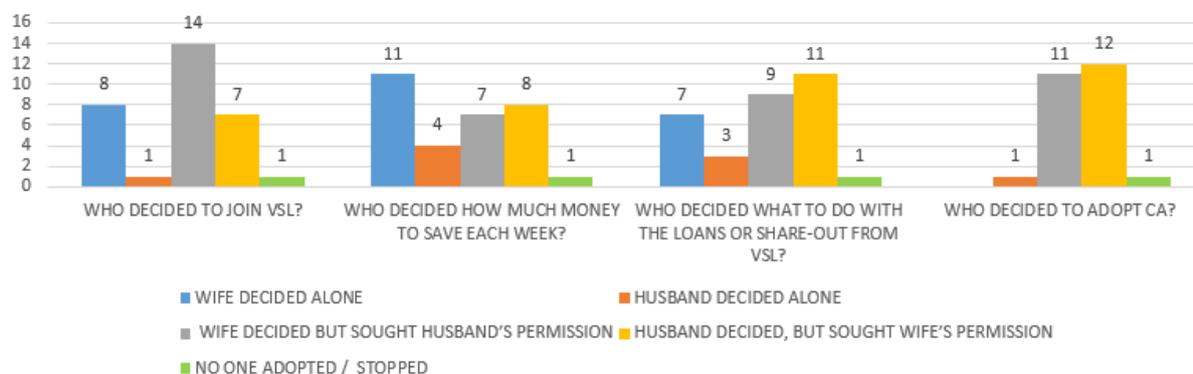
Figure 5 ECRP training recipients within male headed households (n=36)²³



Decision-making about adoption reflects gender norms in the country but also the impact of the programme targeting strategy. For example, wives were more likely to be lead decision-makers in relation to fuel-efficient stove adoption. However, decision-making around VSL is likely a reflection of the programme’s targeting and training strategy since it shows a greater number of wife-led decisions than other economically valuable interventions (See Figure 5 overleaf). Joint decision-making around conservation agriculture reflects the likelihood that one member of the household was trained in the technology and would need to consult the other prior to implementing the activity and that it would depend on the ownership of the plot as to who was able to adopt.

²³ The option for “wife was trained and passed on the information at home existed but was never selected.”

Figure 6 Decision-making in relation to Village Saving and Lending and Conservation Agriculture as reported in interviews with 31 women in ECRP beneficiary districts.²⁴



Finding 6: Both consortia included activities which aimed to promote more equitable distribution of decision-making power and incomes between men and women within the household. However, only CA-ECRP had a gender strategy.

Following the mid-term, the CA-ECRP consortium prepared a gender analysis and a gender strategy which focused on the capacity building of staff and volunteers across the programme, mainstreaming of key gender messages in all interventions and *do no harm monitoring* of gender-based violence and measures to facilitate women’s participation. As part of efforts to engage men and boys, power holders and blockers in changing social norms, CA-ECRP implemented *Gender Community Conversations* to encourage more equal intra-household relationships. The DISCOVER consortium did not prepare a gender analysis or a formal gender strategy but relied upon the experience of implementing staff to mainstream gender topics into programme trainings.²⁵ Some evidence of efforts to mainstream conversations about gender and the roles of men and women was found in interviews with programme implementers, for example COOPI in Salima mentioned incorporating gender equality messages in all trainings at community level. Both consortia encouraged women’s meaningful participation and leadership in community decision-making bodies and male-dominated spaces, including VCPCs and other project committees. However, beyond the 2016 CA-ECRP commissioned study on gender and VSL, gender disaggregated reporting and some case studies, there were few efforts to conduct ongoing monitoring of the effectiveness of the programme’s gender focused activities. There was also only relatively limited learning documented in ongoing reports on topics related to gender equality, suggesting greater focus could have been given to this area. Nevertheless, the activities which were implemented were relevant and compliant with the UK’s 2014 International Development Act (Gender Equality). Their impacts are described in the following section under Finding 16.

Finding 7: The programme design was complementary to existing Government social protection programmes but did not actively coordinate with them, except in

²⁴ Both husbands and wives joined VSLs. Where the husband decided alone, he was the member of the VSL.

²⁵ Source: Interview with PMU Staff.

the case of CUMO's links in relation to VSL and a pilot supported by WFP which aimed to specifically target MVAC beneficiaries.

Government social protection activities provide cash or food in exchange for engagement on public works or on an unconditional basis in the case of the social cash transfer for elderly or labour constrained households. ECRP activities did not overlap with this programme but there were two instances mentioned in focus groups of public works activities being complementary to ECRP's objectives where they had been used for natural resource management activities.

There are also inorganic fertiliser and input subsidy coupons provided via the Government's *Farm Input Subsidy Programme*. Most farmers were glad that conservation agriculture (CA) provided an alternative to inorganic fertiliser but also noted that using fertiliser in combination with CA was their preference. As the availability of fertiliser coupons had reduced over time, the use of pit planting meant that fertiliser could be more efficiently used. Humanitarian assistance in the form of cash or food is also distributed annually via the MVAC system.

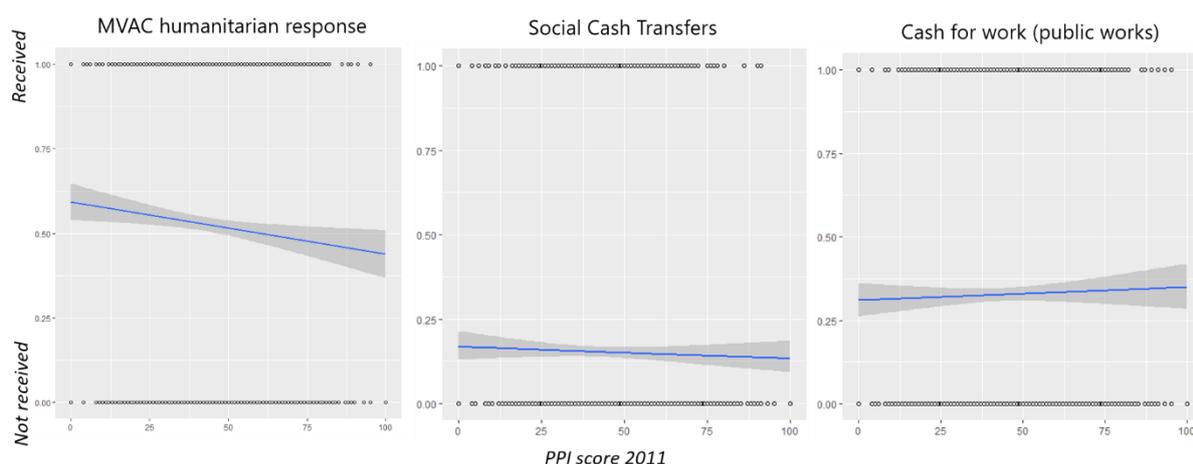
Finding 8: Household targeting which follows existing social protection targeting processes would not necessarily be a more cost-effective way to reach very poor people and risks some people being 'locked out' of support. However, in comparison to the current ECRP approach, more formal collaboration between DFID funded activities and national social protection programmes would create greater opportunities for DFID to contribute to capacity for more cost-effective targeting in future.

The ECRP household survey did not find a correlation between poverty levels (as measured by the Progress out of Poverty (PPI) index) and participation in the social cash transfer or the public works programme. A weak correlation was identified between poverty levels and receipt of humanitarian assistance. (See the figure overleaf). This is consistent with other studies that suggest both inclusion and exclusion errors are inherent with the methods used for targeting the social cash transfer and that the method used for the public works activities has, in some places, been left to Traditional Authorities who have not used wealth-based targeting despite this being mandated in the guidance. Evidence for the effectiveness of MVAC responses from self-reported surveys from households in the programme is more positive. These surveys suggest that targeting criteria are applied effectively but that they may not be necessarily identify the most vulnerable households from the wider population. This is a general challenge given the widespread and rather uniform extreme poverty, with very limited asset ownership across the majority of the population.²⁶ There is an ongoing national dialogue about the most appropriate approach to targeting Malawi's social protection programmes and about the cost-effectiveness of the Universal Beneficiary Register approach. Using a single targeting approach for all programmes risks some

²⁶ Kardan (2016) Streamlining targeting mechanisms and processes across national social protection programmes

beneficiaries being 'locked out' from any support. Finding the best approach for future resilience programming will require DFID to engage in this dialogue and to consider how it can meet its own objectives whilst supporting national capacity and donor coordination.

Figure 7 Correlation between participation in social protection interventions during the six years of ECRP intervention and 2011 poverty scores as measured by the Progress out of Poverty Index (higher values=less poverty). Data source is ECRP endline survey. Statistically significant correlation is found for MVAC response only.



Finding 9: Stakeholders considered that ECRP had made a unique contribution to the resilience sector in Malawi due to its longevity, flexibility, bottom-up approach, focus on linked combinations of interventions and commitment to monitoring and lesson learning.

Interviews with district government officials showed that the majority (17 out of 21) perceived that ECRP had been a unique programme. Interviewed officials mentioned the length of time it was implemented, the diversity of interventions, qualification of staff, flexibility and the commitment to involving Government staff in implementation as key reasons. Those who did not feel it was unique cited other projects with similar interventions. Programme implementers also noted the importance of the nine-month inception phase which allowed for more in-depth consultation and design work as well as the flexibility in annual fund allocation as key features that made ECRP unique. In interviews at the national level, DODMA noted that the main difference was that it began with a bottom-up planning process and that it had strong progress monitoring systems. Respondents from the Malawi Meteorology Service mentioned that all projects were unique but that ECRP had set a good example in disseminating climate information. Programme implementers at district and national level cited the diversity of interventions, the approach to encouraging adoption of multiple interventions in combination and the focus on community ownership and self-reliance as the most important distinctive features. One respondent noted that "ECRP modelled what a resilience programme ought to be: good funding and collaboration among

stakeholders. " More information on the influence of ECRP on other stakeholders is available in Sections 4.2 and 4.3.

Table 12 Comments from district Government stakeholders on the distinctiveness of the ECRP approach

This project was implemented over a long period unlike other projects which just take a year and their impacts are not easily traced.

I haven't seen any programme that has stayed this long in DRM ... and it has helped a lot. However, the years have still not been long enough, it would have stayed for at least 10 years as that's when we can really see impacts on climate change.

The ECRP was unique in the way it was implemented. The ECRP included the district from the time of implementation and gave powers to the district to monitor and coordinate the activities. ECRP gave direct support in areas of capacity building and resources

ECRP was flexible unlike other programs

ECRP had competent staff, technically-well qualified personnel unlike other programmes

Its integrated approach made it different

The approach of having more interventions within a single project was the difference from other resilience projects in the country.

4.2 To what extent can these outcomes be attributed to the programme activities?

Finding 10: There are increases in the adoption of climate resilience practices which can be statistically attributed to ECRP

Table 13 shows how households in beneficiary areas had higher rates of adoption compared to households in the non-beneficiary areas with similar baseline characteristics. Higher rates of adoption occurred for most practices across the sub-groups of interest which include female headed households, poorer households and households exposed to disasters in the past 6 years. The largest increases in adoption were found in relation to VSL (28% increase), Conservation Agriculture (23%), access to early warnings (16%) and adoption of irrigation farming (15%). The smallest increases were found in relation to post-harvest management (3.4%) which was as a result of high rates of adoption amongst non-beneficiaries. There was also no significant difference in the % of crops lost as a result of adopting the techniques. Whilst involvement in ECRP does not have a statistically significant impact on the receipt of food for humanitarian purposes, this is not surprising. There are many other sources of humanitarian response outside of ECRP with national coverage. However, ECRP beneficiaries were more likely to have received seeds and planting materials as part of that response (22% difference between beneficiaries and matched non-beneficiaries).

Table 13 Differences in intervention adoption rates between ECRP beneficiary households and matched similar non-ECRP households. All results are for the ECRP endline (2017). Statistically significant differences are highlighted green/red for positive/negative impacts. Sample sizes for number of beneficiary households are in brackets, total sample for ECRP beneficiaries is 1,151 households. Households are the unit of analysis for all estimates. Definitions of interventions listed in Annex I.

Interventions	Outcome type	All households	Female headed-households	Poorer households	Households exposed to disaster
Village Savings Lending	% adopted	28.1 (1151)	25.1 (241)	16.9 (86)	33.9 (568)
Conservation agriculture	% adopted	23.2 (1151)	30.2 (241)	23.2 (86)	28.5 (568)
Crop diversification	Number crops harvested in 2015/16 season	0.96 (1151)	0.98 (241)	0.72 (86)	0.53 (568)
Improved seeds	% adopted	10.0 (1151)	14.2 (241)	-1.0 (86)	10.4 (568)
Post-harvest management	% adopted	3.35 (1151)	8.5 (241)	2.9 (86)	6.8 (568)
	% total stored sacks lost due to rotting or pest damage in 2015/16	1.4 (784)	0.4 (156)	-7.9 (53)	-1.5 (412)
Agroforestry	% adopted	11.1 (1151)	13.1 (241)	12.1 (86)	12.5 (568)
Livestock – goats / pigs	Average number	0.76 (1151)	0.99 (241)	-0.74 (86)	0.80 (568)
Livestock – poultry	Average number	1.75 (1151)	1.34 (241)	1.64 (86)	1.61 (568)
Irrigation	% adopted	15.3 (1151)	19.9 (241)	20.3 (86)	16.1 (568)
Early Warning	% received warning	16.5 (353)	25.4 (78)	33.7 (21)	NA*
Weather forecasts	% receiving forecasts	8.4 (1151)	6.0 (241)	16.6 (86)	NA*
Fuel efficient stove	% adopted	9.1 (1151)	5.4 (241)	5.7 (86)	7.1 (568)
Solar lighting	% adopted	7.0 (1151)	4.5 (241)	3.8 (86)	6.3 (568)
Humanitarian assistance	% receiving food supplies	4.1 (340)	16.4 (72)	-4.4 (22)	STC**
	% receiving seeds	22.2 (340)	31.6 (72)	21.1 (22)	STC**

*NA = not applicable as all results are only for households exposed to a disaster ** STC = sample size too small to make impact estimate

Finding 11: The reasons given by programme participants for their decision to adopt these practices mostly relate to the benefits envisaged in the programme theory of change

Table 14 summarises reasons given by focus group participants for adopting the ECRP interventions. As can be seen, the majority fit well with the programme theory of change and with the extension messages communicated by the programme staff about the benefits of the interventions at household level, with a small number of comments referencing instructions from local leaders or the fact that inputs were provided for free.

In all focus groups, the number of participants adopting interventions exceeded those who were not able to adopt. The most common reason given for not-adopting interventions related to the need for money or time. Whilst female-headed or poorer households would be more constrained in these respects, the programme was still able to create larger increases in adoption rates for these groups (e.g. 25% for FHH in VSL or 20% for poor households in irrigation) because the matched households were even less likely to adopt. There is further evidence of the role of disaster and climate risk analysis and awareness creation in motivating adoption under Findings 12 and 22.

Table 14 Reasons for adoption and non-adoption cited in 24 beneficiary focus group discussions

Intervention	Reasons for adoption	Reasons for non-adoption
VSL <i>"The VSL is like a drive that moves us from poverty to prosperity; there are many examples of this."</i> F, Thyolo	<ul style="list-style-type: none"> • Access to finance and favourable interest rates (All FGDs) • It is easier to save in a group than on your own (Male, Salima) • Do not need to travel far to access savings, (Male, Nsanje. • Heard about the benefits on the radio (Female, Mwanza) • Can borrow money for food without waiting for my husband (Female, Machinga) • Saw the benefits for those already in a group (Female, Mwanza, Dedza, Chikwawa) • VSL Group is a contact point for other extension services (Male, Kasungu) 	<ul style="list-style-type: none"> • Lack of time to attend meetings (Male, Chikwawa, Balaka) • Our spouses have joined (M, Salima) • Fear of high interest rates and "that people will remove the roofs of our houses" (Male, Dedza) • Poor experience with past VSLs (Male, Mulanje) • Too hard to find money to contribute (Male, Mulanje; Karonga & Balaka) • Wanted to observe how others benefit first (Male, Chikwawa) • Already involved in another investment-focused VSL with higher loans (Male, Salima) • VSL has a limit of 20 per group (Male, Mwanza)
CA <i>"We don't receive much rains in our area...we started practising CA because we were eager to harvest</i>	<ul style="list-style-type: none"> • Able to harvest more on a small land size and with uncertain rains (4+ FGDs) • Improves water retention (4+ FGDs) • Improves soil fertility as mulch decomposes (4+ FGDs) • Workload is reduced during weeding (4+ FGDs) • Saw the benefits on the farms of others who adopted (Mwanza, Chikwawa) 	<ul style="list-style-type: none"> • Lack of interest • It is laborious, especially in pit planting (Male, Chikwawa) • Because it is difficult to weed in pits (Female, Chikwawa) • It is hard to find enough mulch (Male, Mulanje) <p><i>Fetching enough material to mulch a field is very tiresome work so I do not take part in that because I have no one to help me. Besides I look after my</i></p>

more." M, Salima	"CA keeps the ground wet even in times of little rainfall. It is not time consuming Female, Nsanje	chronically ill grandmother so I cannot manage. Female, Mulanje
Seeds	<ul style="list-style-type: none"> • Seeds are provided for free (All FGDs) • Varieties improve yield and are faster maturing (All FGDs) <p>"When we plant different kinds of seeds we still harvest even if one seed fails." Female, Nsanje</p>	<ul style="list-style-type: none"> • Seeds distributed were not enough for everyone (Female, Mwanza)
Agro Forestry	<ul style="list-style-type: none"> • Provided seedlings for free (4+ FGDs) • Improves soil fertility (All FGDs) • Improves shade/water retention (All FGDs) • Trees act as wind break (4+ FGDs) • Protects river banks (Thyolo) • Trees are a source of firewood (4+ FGDs) • Produces fruit (Female, Karonga) • Forced by Chiefs to plant trees (Male, Salima) 	<ul style="list-style-type: none"> • Did not have interest. Male, Nsanje • We have no reason for not adopting. Female, Mwanza <p>"I feel that it is too much work for me as I am already involved in other interventions like the stove making, which requires much energy." Female, Mulanje</p> <ul style="list-style-type: none"> • Tree seedlings were distributed late and due to inadequate rainfall, most of them did not grow. Female, Kasungu
PHM	<ul style="list-style-type: none"> • Reduces crop losses (All FGDs) • Training helps know how much food to keep / sell (Male, Salima) • Knowing that sleeping in same room as treated maize can damage health (Female, Mulanje). • Adopted plastic sacks because it is more cost-effective than chemicals (Female, Chikwawa) 	<ul style="list-style-type: none"> • Cannot afford to buy chemicals because they are expensive. (Female, Nsanje & Mulanje) • Not enough yield to keep it in plastic bags (Female, Mwanza) • Granaries leave produce vulnerable to theft (Male, Thyolo)
Livestock	<ul style="list-style-type: none"> • Livestock were free (All FGDs) • Provide manure which improves agricultural production (4+ FGDs) • Provides a source of cash to pay school fees, pay medical bills and buy fertiliser (4+ FGDs) • Subsidy made it affordable (Male, Mulanje) • Managed to buy our own without subsidy (4+ FGDs)²⁷ 	<ul style="list-style-type: none"> • Waiting for pass-on scheme (4+ FGDs) • Pass-on is not functional (Male, Chikwawa & Mwanza) • Did not have money to purchase Female, Mulanje; Male, Mwanza)

²⁷ Whilst livestock were distributed for free in most programme areas. A purchase with subsidy approach was piloted in Mulanje and Thyolo. In other focus groups, households who were not involved in the programme reported purchasing livestock because they wanted to access the benefits experienced by other households in the programme.

<p>Irrigation <i>"In irrigation we can choose when to irrigate – it is like making our own rain"</i> M, Nsanje</p>	<ul style="list-style-type: none"> • Get an extra harvest and improve food security and incomes (4+ FGDs) • Irrigation reduces pests since water-stressed crops are vulnerable to disease (Male, Nsanje) • Were chosen to be part of the scheme by the project (Male, Mwanza) 	<ul style="list-style-type: none"> • No suitable land (Mulanje) • Membership is too expensive (Male, Chikwawa; Female, Mwanza)
<p>Winter Cropping</p>	<ul style="list-style-type: none"> • Used to practice before the project (Male, Salima, Mwanza) • New varieties improve output – e.g. sweet potatoes (4+ FGDs) • Generates cash to purchase household goods (Female, Salima) 	<ul style="list-style-type: none"> • No suitable land (Male and female, Mulanje) • Discouraged by past losses from army worms (Female, Salima)
<p>Stove</p>	<ul style="list-style-type: none"> • Use less firewood (all FGDs) • Installation was free (Male, Mwanza; Female, Chikwawa) • Easy to use and have less smoke so that even men use them without problem (F, Thyolo; F, Mwanza; F, Machinga) • Were told to use by the Chief (Female, Salima; Male, Dedza) • Can heat water for washing without using additional wood (Male, Mulanje) • Saves time which can be used for other economic activities (Female, Chikwawa) 	<ul style="list-style-type: none"> • No money (Male Mulanje) • Lack of interest in them although in-built stoves were being installed for free (Male, Chikwawa) • Stove damaged (Male, Mwanza) <p><i>"My goats damaged the stove and I believe it is the work of my wife to make sure it is installed again."</i> Male, Mwanza.</p>
<p>Solar</p>	<ul style="list-style-type: none"> • Save money on paraffin and candles; lower risk of fire; fewer health problems from smoke (4+FGDs) • Lamps are strong and long-lasting (Female, Thyolo) • Lamp has a warranty for two years (Female, Mwanza) • We use them to charge phones at a fee. We use it for the radio as well. (M, Mulanje) 	<ul style="list-style-type: none"> • Expensive, they cannot afford (4+ FGDs) • Solar lanterns came after VSL share-out so we had no money to buy. It is only men who have managed to buy. (Female, Nsanje) <p><i>"If solar products could be available on credit then we could afford them"</i> F Mulanje</p>

Finding 12: The role of community level DRR work in motivating adoption at household level is dependent on a functional CPC (See Section 4.3) and at household level is particularly important for those activities without an immediate economic benefit.

Focus group discussions explored the role of risk analysis and awareness raising about disaster risk in motivating adoption of the ECRP interventions. Participants in 18 out of 24 focus groups reported that risk awareness had increased as a result of the actions of the CPC and that this had motivated adoption of the ECRP interventions. Whilst responses citing CPC communications as a factor in adoption frequently mentioned community level natural resource management activities such as tree planting and the cessation of river-bank cultivation, they also mentioned household level technologies such as conservation

agriculture, VSL and the use of early maturing or improved seeds. Six groups were unable to describe information on disaster risk had influenced their adoption. For example, women in Mulanje who did not feel this information was useful remarked *"many would have adopted [VSL, CA, Irrigation etc.] anyway given the effects of climate change we are facing"* whereas others from Balaka and Mwanza noted that they were not aware that any risk analysis or communication activities had taken place.

Finding 13: There are only a small number of instances of disadoption, with the most likely intervention to be disadopted being conservation agriculture.

In this evaluation, households who have disadopted are those who had started practicing an ECRP intervention and then stopped doing that intervention during the lifetime of the project. Only four participants in the 24 focus groups mentioned disadopting an intervention. Three of these said that they did not have time or money to continue with the activity and two expressed an interest to re-join. For example, in Balaka, one male FGD participant commented *"I just wanted to take a break from VSL because I had some issues that needed sorting out. I will re-join in June after they have shared out."* Survey results only capture disadoption for agricultural practices but show relatively low rates of disadoption across all practices, with only 65 or fewer disadopters of CA practices out of 664 adopters. The most common reason for disadoption of these practices was *"I didn't get a good result when I tried"*, with the time or inputs required being secondary reasons. Higher rates of disadoption (over 100 household) were found for the use of chemical fertiliser or the use of chemicals in post-harvest management with affordability of inputs being a common reason for disadoption. In focus groups, households did not discuss disadoption of CA so it is challenging to identify whether this is due to poor fit between the practice and the context, the technical quality of training provided or the severity of drought conditions experienced when first testing out the practice.

Finding 14: Statistically significant increases in household asset values can be attributed to each of the combinations of interventions studied. Benefits are lowest for the basic package and highest for the package involving livestock.

Table 15 shows how households who adopted the core package of interventions (Village Savings and Loans, Conservation Agriculture and Post-Harvest Management) had MKW 24,946 worth of additional assets²⁸ ((in 2012 Malawi Kwacha values – roughly equivalent to £68 today²⁹) than matched non-beneficiaries who did not adopt this package. Those adopting the core package, plus irrigation had, on average, MKW 31,073 (£84 in 2017 values) more assets. Those who had received goats or pigs, had over MKW 50,459 (£136 in 2017 values) higher asset values, which would include the value of the animals provided and

²⁸ Assets counted in the survey include livestock, bicycles/vehicles, generators and electronic equipment as well as a range of farm tools and domestic items. It does not include housing (e.g. cement floors/iron sheets) or land.

²⁹ Multiplied by 2.54 to get 2017 Malawi Kwacha values and used £1:MK938 to convert to GBP.

therefore indicates that households are able to retain herd sizes without distress sale or death. For those households exposed to disasters at any point in the last six years, benefits were higher for DRR/EWS and for livestock, but slightly lower for irrigation and for the core package. Benefits for female headed households were lower. The results from calculating impact estimates using matched comparisons are similar to those calculated using difference-in-difference estimates which allows greater confidence in their robustness (See Annex J).

Table 15 Differences in mean asset values (2012 Malawi Kwacha values³⁰) between ECRP beneficiary households who adopted the package combinations and matched similar non-ECRP households who did not adopt the packages. All results are for the ECRP endline (2017). Statistically significant differences are highlighted green/red for positive/negative impacts. Sample sizes for number of beneficiary households are in brackets, total sample for ECRP beneficiaries is 1,151 households. Households are the unit of analysis for all estimates. Definitions of interventions listed in Annex I.

Package	All households	Female headed households	Households exposed to disasters
Core package (VSL, PHM and CA)	24,946 (339)	22,830 (57)	20,876 (196)
Core package plus irrigation	31,073 (176)	22,059 (36)	26,804 (108)
Core package plus received goats or pigs from programme**	50,459 (101)	STC*	54,621 (62)
Core package plus DRR and EWS	33,651 (174)	24,473 (27)	46,210 (125)

*STC = sample too small to make impact estimate **Sample size for adopters of the core package plus poultry was insufficient to make impact estimates for that group of adopters. A larger standard error and smaller sample size meant that differences were not all statistically significant for female headed households and households exposed to disasters.

Descriptive statistics and qualitative findings provide greater insight into the reason for these benefits and to the synergies between different elements in the package. As indicated in previous studies and reiterated in focus groups for this evaluation, VSL has a strong consumption smoothing effect which means that households are not as likely to sell productive assets when participating in VSL since they can use loans to meet their immediate needs. This is supported by findings that the most popular use for both loans and share-outs is to buy food. Loans and share-outs are also frequently used for buying agricultural inputs and for small business capital. Whilst VSL members are more likely to have small business income than those who are not in VSL and have a marginally higher median income from small businesses, this was the same prior to the programme's inception and changes cannot be attributed to ECRP's activities. Asset increases as a result of property improvements were not directly captured in the increases mentioned in table 14. However, such improvements

³⁰ Multiply by 2.54 to get 2017 Malawi Kwacha values

are important for household well-being and were frequently mentioned as an ECRP benefit in beneficiary interviews and focus groups. According to the ECRP household survey, 17% and 15% of VSL members have improved their dwelling's roofs or walls respectively since 2011, whereas only 10% and 9% of non-beneficiaries were able to make such improvements.

Table 16 Use of VSL Loans and Share-Outs (multiple responses are possible)

	% who have ever used share-out for this purpose since the programme began (n 767)	% who used a VSL loan for this purpose in 2015/6 (n = 557)	% who used a VSL loan for this purpose in 2016/7 (n=568)
To buy food	53%	37%	33%
To buy agricultural inputs	31%	24%	27%
As business capital	18%	26%	27%
To pay school fees	21%	18%	15%
To buy livestock	12%	4%	3%

Source: ECRP Household Survey.

These findings are consistent with a separate study commissioned by United Purpose that showed that 84% of the 734 beneficiary households sampled by DSICOVER reported increased asset values through participation in DISCOVER interventions.³¹

Finding 15: Beneficiary food security and incomes have worsened since the mid-term evaluation. This is likely due to the repeated climate shocks and weak economy. However, there is evidence that ECRP interventions have reduced the decline.

Table 17 overleaf shows that the programme did not achieve many of its logframe targets at the impact or the outcome level and that in general beneficiary poverty levels, incomes, assets and food security have declined since the programme's mid-term. However, this should not be seen as programme failure – Malawi has experienced a series of massive climate shocks which also affected ECRP programme areas. Nationally, floods in 2014-15 affected over 1 million people with drought affecting nearly 2 million people in the same year. Drought in 2015-6 then affected 6.5 million people.³² This has been accompanied by low rates of donor support and fiscal policy limiting public spending amidst high rates of inflation (~20%) and low rates of growth (2.8% in 2015, up to 5.1% in 2016).³³ In focus groups with non-beneficiaries, all participants noted that their situation had got worse, with respondents citing population growth, declining plot sizes, poor availability of casual labour

³¹ Bondo A. and Mulwafu, A. (2017) Household Asset Building and Welfare Improvement Survey

³² Malawi Vulnerability Assessment Committee data

³³ World Bank (2016) <http://www.worldbank.org/en/country/malawi/publication/malawi-economic-monitor-analysis-predicts-continued-weak-growth-in-2016-amid-low-agricultural-production> and Reuters (2017) <http://www.reuters.com/article/malawi-economy-gdp-idUSJ8N1HK02M>

opportunities and a decline in Government support for input subsidies. One group in Karonga noted improvements in roads as a result of the Government supported public works and another in Balaka said that food aid provision had increased, but in general responses indicate that the past 6 years have been extremely challenging for rural families.

Table 17: Progress against logframe impact and outcome indicators at programme level (See Logframe in Annex B for results at consortium level and for all programme years) Endline targets have not been reached for many of the indicators. Those indicators which have worsened since mid-term are highlighted in red, those which have improved are in green.

Logframe Indicator	Baseline	2014 (Mid-Term)	2017 (Endline)	Endline Target
Population living below the national poverty line	86%	86%	95%	75%
Food insecure population in the districts	1,097,868	895,611	573,906 ³⁴	988,081
% of targeted households that passed through at least 9 months with food from their own production	9 mths: 51% 12 mths: 28%	9 mths: 56% 12 mths: 34%	9 mths: 44% 12 mths: 25%	9 mths: 70% 12 mths: 47%
Real household income for targeted direct beneficiaries (2012 MKW values)	ALL: 28,000 FHH: 16,000	ALL: 41,180 FHH: 22,295	ALL: 29,900 FHH: 25,000	ALL: 61, 215 FHH: 34,020
Median capital asset value per targeted household (2012 MKW Values)	ALL: 18,750 FHH: 9,950	ALL: 39,541 FHH: 10,945	ALL: 34,400 FHH: 19,100	ALL: 40,530 FHH: 12,537

Source: ECRP Household Surveys at baseline, mid-term and endline

³⁴ Whilst this indicator has been achieved and the number of households requiring humanitarian assistance was lower than expected in this year this is primarily related to improved rainfall performance or political factors associated with the identification of MVAC beneficiaries rather than a programme effect. In the previous year, we found no correlation between the % of a TA population which required humanitarian assistance and the presence of ECRP.

Table 18 (overleaf) shows that beneficiary adopters of ECRP packages have experienced a smaller decline in food security (as measured by the number of months households are consuming cereals from their own production) as compared to non-beneficiaries, though,



"After 4 years of irrigation farming, I no longer need to rely on casual labour to find food. I grow maize and beans which I use as food as well as selling it to meet household needs.

I have also managed to lay 6000 bricks to build my own house as am staying in my mother's house but the house was not like you see now before... now my mother has a cement floor because of VSL and irrigation" Annie Jackson, Chikwawa.

several of these differences are not statistically significant. However, for households which were exposed to disasters, there are statistically significant improvements for adopters of both the core package and the core package plus livestock. It is possible that such households are more aware of risk management approaches and are practicing CA on a larger area of land given average land sizes captured in this survey (See table 17 are larger than in previous qualitative exercises). According

to the measurements used food security improvements for households involved in irrigation are not statistically significant but this is possibly due to an emphasis on how long food from the main rain-fed harvest lasted in the logframe indicators and the framing of the survey questions. A study carried out by DISCOVER in 2016 found that ECRP beneficiary households fared better than unmatched non-beneficiaries when using the Household Food Insecurity Access Scale and the Dietary Diversity Index.³⁵ Qualitative evidence also points strongly to improvements in food security and dietary diversity from the production of both cash and food crops under irrigation. Such benefits were mentioned in focus groups in all districts and in small group discussions used to quantify potential benefits. Future quantitative food security assessments would be more useful if they focus instead on questions related to dietary diversity, food access (from production or purchase) or frequency of hunger indicators³⁶ rather than narrowly on production from the rain-fed harvest.

As well as food security, we investigated whether access to climate information and disaster risk reduction increased the likelihood of households adopting less weather dependent livelihoods or households' confidence about their abilities to cope with climate extremes. We found increases for all groups but these were only statistically significant for female headed households and those households exposed to disasters who reported changing their livelihood strategy to reduce weather dependence. This links to qualitative evidence

³⁵ Bondo, A. (2016) Household Food Security Survey. DISCOVER Programme Management Unit.

³⁶ See FANTA Project – Household Dietary Diversity Score (HDDS) or Household Hunger Scale available at <https://www.fantaproject.org/monitoring-and-evaluation/>

suggesting that the awareness creation activities in the DRR component have had an impact on household's decisions to adopt at household level.

Table 18 Differences in outcomes between ECRP beneficiary households who adopted the package combinations and matched similar non-ECRP households who did not adopt the packages. Statistically significant differences are highlighted green/red for positive/negative impacts. Sample sizes for each estimate in brackets, total sample for ECRP beneficiaries equals 1,151 households. Households are the unit of analysis for all estimates. Package definitions listed in Annex I.

Package	Outcome type	All households	Female headed households	Households exposed to disasters
Core package (VSL, PHM and CA)	% Food secure 12 months in 2017	1.6 (339)	2.0 (57)	8.9 (196)
	% Food secure 9 months in 2017	3.57 (339)	-1.38 (57)	14.05 (196)
	% Food secure 9 months in 2016	10.86 (339)	11.4 (57)	20.38 (196)
Core package plus irrigation	% Food secure 12 months in 2017	4.1 (176)	10.5 (36)	6.7 (108)
	% Food secure 9 months in 2017	1.77 (176)	12.3 (36)	6.8 (108)
	% Food secure 9 months in 2016	8.77 (176)	26.2 (36)	13.2 (108)
Core package plus received goats or pigs from programme**	% Food secure 12 months in 2017	14.6 (101) ³⁷	STC*	19.9 (62)
	% Food secure 9 months in 2017	18.5 (101)	STC*	20.75 (62)
	% Food secure 9 months in 2016	-0.8 (101)	STC*	34.98 (62)
Core package plus DRR and EWS	% Food secure 12 months in 2017	6.2 (174)	27.3 (27)	9.7 (125)
	% Food secure 9 months in 2017	5.0 (174)	5.2 (27)	7.5 (125)
	% Food secure 9 months in 2016	7.5 (174)	15.02 (27)	15.7 (125)
	% Changing livelihood strategy to reduce weather dependence	12.1 (172)	59.2 (26)	32.7 (125)
	Level of confidence to cope with climate extremes (three-point scale, 1 confident, 0 unchanged, -1 not confident) ³⁸	0.16 (172)	0.62 (26)	0.16 (125)

Source: ECRP Endline Household Survey *STC = sample too small to make impact estimate **Sample size for adopters of the core package plus poultry was insufficient to make impact estimates for that group of adopters.

Finding 16: There is evidence that ECRP has encouraged more equal decision-making between men and women in male-headed households

14 out of 36 beneficiary households interviewed in the intra-household survey noted that improvements in equal decision-making had occurred as a result of the programme activities, and a further 10 reported that they already shared work and made equal decisions prior to the programme intervention. No wives in non-beneficiary areas reported changes in decision-making over the lifetime of the programme. Evidence from the intra-household survey also showed an increase in wives' involvement in decision-making around crop choices and

³⁷ Close to being statistically significant. (p -value was 0.062, significance = < 0.05).

³⁸ This compares beneficiaries and non-beneficiaries with access to weather forecasts.

marketing on plots owned by husbands between 2011 and 2016. For example, the number of households reporting women-led crop choice decisions increased by 30% and those reporting joint marketing decisions increased by 15% amongst beneficiary households with no change in comparison households. Whilst the majority of husbands (57%) were solely responsible for marketing decisions amongst beneficiary households, this had declined from 71% in 2011 and was lower than non-beneficiary households in which 100% of wives reported their husbands were sole decision-makers in both 2011 and 2016. Similar trends were observed on dambo land owned by both wives and husbands. Decision-making about wives' rainfed land had not changed substantially for either group, but there was a slight increase in the number of wives' noting that they led decision-making rather than doing equal decision-making. There were also small increases in the ability of wives to decide or influence decisions to buy and sell most assets amongst beneficiary households without similar changes in comparison households.

The reasons for changes in beneficiary households were most frequently cited as being related to women's increased economic contributions via VSL but in some locations the gender community conversations were mentioned as having helped raise awareness of the impact of unequal power relationships on overall household well-being. For example, a female respondent in Dedza district reported *"since I joined VSL, whatever I get from there, whether in form of a loan or share out money, we jointly decide how to spend the money which was not the case before 2010. Then my husband was the sole decision maker on monetary issues"*. A male FGD participant in Machinga noted *"gender sensitisations have helped us men to start helping our wives... in the past we could go to the field and on our way back, the wife carries the hoes, but now we help our wives. Sometimes, we even assist with cooking using the fuel saving stove. (In addition) our wives are also now able to help buy things for the household, even buy us clothes as well, because of their access to money through VSL"*.

Finding 17: ECRP activities made contributions to all types of resilience capacity, but did not catalyse livelihood transformation.

Using the definitions set out in the approach paper and discussed in interviews with programme implementers, the evaluation found that the programme made some contribution to all forms of adaptive capacity set out in the BRACED resilience framework.³⁹ A summary of the evidence available for each type of capacity is available below.

Anticipatory Capacity

Anticipatory capacity is defined as the "Ability to undertake proactive actions to avoid upheaval from shocks and stresses." Beneficiaries were 16% more likely to receive a disaster warning than matched non-beneficiaries, with female-headed household beneficiaries 25%

³⁹ Bahadur, A. V., Peters, K., Wilkinson, E., Pichon, F., Gray, K., & Tanner, T. (2015). The 3As: Tracking resilience across BRACED. *Working and Discussion Papers*. London: Overseas Development Institute (www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9812.pdf).

more likely to receive the warning. Of those beneficiaries who received a warning, 30% reported taking action as a result of the warning. Whilst we did not find significant differences in the value of assets destroyed by disasters amongst those households receiving disaster warnings compared with those who did not, qualitative information from the focus groups indicated that warnings influenced decision-making and saved lives and property. More than half of focus groups mentioned the value of early warnings as a key part of the work of civil protection committees.

Absorptive Capacity

Absorptive capacity is defined as the *"ability of systems to buffer the impacts of shocks in the short term to avoid collapse."* VSL is a critical part of the programme's contribution to absorptive capacity, with VSL loans and share-outs enabling households to manage shocks when they appear. In particular, VSL helps beneficiaries to cope with shocks affecting an individual household. As one female beneficiary commented *"Whenever there is a problem that needs money at home, I do not panic when I do not have any, I simply go and get a loan from the VSL. Before the project, life was very difficult, we would go hungry."*

The work of civil protection committees is also strengthening absorptive capacity. 54% of the CPCs surveyed had provided response to shocks. This ranged from small-scale support to help households cope with localised shocks, such as small-scale flooding or the destruction of property by strong winds, to involvement in targeting and distribution of NGO or Government funded responses to drought. Despite the fact that this was not part of the programme's original design, programme funds were also deployed for humanitarian response and recovery. One beneficiary in Salima commented *"We feel that CPC committee is doing a tremendous work...for those affected (i.e. their houses were destroyed), they have an immediate shelter at the church and the CPC has provided them with mosquito nets, food and buckets."*

The provision of livestock has also strengthened absorptive capacity as animals can be sold when there is a need for cash, one implementing agency staff commented that “livestock are a living bank for communities”. The proportion of beneficiaries reporting income from livestock was higher than in the comparison group and focus groups also cited the importance of livestock as a source of cash to pay school fees, medical bills and buy fertiliser.

Adaptive Capacity

Adaptive capacity is defined as the “ability to react to evolving and dynamic risk of disturbance to reduce the likelihood of harmful outcomes.” Given the mainstay of many rural livelihoods is their agricultural activities, the programme has supported various activities which aim to make households’ subsistence farming activities more resilient to dry spells and more productive in a range of uncertain conditions. For example, the adoption of conservation agriculture aims to improve moisture retention and levels of soil organic matter. Numerous examples in focus groups and interviews were given by farmers describing its positive impacts on moisture retention and yields. In addition, 80% of adopters questioned in the household survey reported positive impacts on water availability for their rain-fed crops as a result of adopting one or more of the CA techniques. There is also quantitative and qualitative evidence of the role of VSL in supporting the purchase of improved seeds and other inputs for planting on CA fields and of ECRP’s impact on crop diversification. Together, it is likely that these approaches are responsible for the statistically significant increases which our impact assessment found amongst the % of ECRP households adopting the core package and exposed to shocks who reported that they were food secure for 9 months or more in both 2016 and 2017. The level of benefits likely to accrue as a result of CA are dependent on the type of practices and the size of land area on which CA is practiced. There are smaller percentages of households practicing multiple CA techniques at the same time, but those which do are likely to adopt the practices on larger land areas (See Table 19).



“Our area has been experiencing dry spells for the past 10 years, with the old method of farming we could barely harvest. I used to go to Mozambique to find

money to feed my family. I received two goats from the project. They had kids and I managed to pass-on the same year. Now, I have 12 goats. I sold 5 to help me buy agricultural inputs and to meet household needs. Also since I joined the project, I have never ploughed my plot. I cover my field with mulch, use manure and plant in pits. My yields have been improving each year. Frank Lekitala, Mwanza

Table 19: Conservation Agriculture Practices and Median Land Areas on which conservation agriculture technologies have been practiced by ECRP beneficiaries

CA practices	% of beneficiaries who have practiced this in last six years	Median of largest land areas on which households have practiced this approach
Minimum tillage or planting pits only	55%	0.5 acres
Mulching with crop residues only	57%	0.5 acres

Both min till/planting pits and mulching with crop residues	41%	0.5 acres
All three of min till/planting pits, and mulching and inter-cropping/cover-cropping with legumes	23%	0.75 acres

Natural Resource Management improvements at community level are also likely to make contributions to adaptive capacity since they can reduce exposure to shocks (e.g. by limiting soil erosion and protecting river banks) but it is challenging to assess impacts given these became more important later in ECRP and take time to demonstrate impacts.

It is important to note that despite these improvements in adaptive capacity, for households which are dependent on rain-fed agriculture, they are insufficient to completely reduce the risk of ‘harmful outcomes’ from climate shocks and disasters, particularly where these are severe and large-scale.

Transformative Capacity

This is defined as “*capacity to make a more fundamental change to avoid intolerable losses or exploit radically new opportunities.*” In this category, we assumed that commercially oriented irrigation or off-farm businesses would be relevant contributors to transformative capacity.

Previous reports noted that the projects work to support commercially-oriented irrigation had been successful where schemes were sufficiently large-scale and where farmers were closer to roads and therefore more attractive to buyers, for example in the case of rice production in Dedza.⁴⁰ However, the majority of ECRP irrigation work has been on a smaller scale and the programme has made limited investments in marketing activities.

In the second half of the ECRP implementation period, efforts to engage more beneficiaries into irrigation work have been successful with beneficiary numbers exceeding their targets (See table 20) and 42% of beneficiary households reporting some irrigation activity in 2016/7.⁴¹ Focus group participants in areas where schemes were already constructed commented on how useful irrigation is for meeting their household food needs. For example in Chikwawa, Karonga, Mulanje, Mwanza, Nsanje, Thyolo and Salima, FGD participants all noted the importance of irrigation in supporting food security and in providing vegetables for home consumption. Whilst larger commercial schemes have been supported by ECRP (for example in a large rice producing area in Dedza), they were not the focus of data collection for the final evaluation. According to the ECRP household survey, the median land area cultivated under irrigation was 0.6 acre and this reportedly yielded a median value of only 8,000 kwacha (£8.50)

⁴⁰ See LTS (2015) Cost Benefit Analysis of Livestock and Irrigation activities

⁴¹ This includes those with access to irrigation options prior to the programme intervention.

per acre in crops consumed and sold. However, the distribution of the data was uneven due to the very different effects of the different types of irrigation being practiced, with 68% of the sampled beneficiary irrigation farmers involved in very small scale enterprises involving the use of head loading, watering cans or treadle pumps to move water. As a result the median income per acre from irrigation was much lower than the mean which ranged between £25 per acre in 2015/6 and £79 per acre in 2016/7. The mean was much higher due to a small number of irrigation farmers making large volumes. Implementing partners were keen to point out the potential for high value impact from irrigation but there is insufficient data to explore the amount of money spent on different types of schemes, training or pumps with the different benefits which are experienced by farmers involved in those schemes. Hence this evaluation could only present aggregated figures. In focus groups and in interviews with implementing partners, the timing of irrigation benefits was cited as importance since it gives farmers an income source outside of the rain-fed harvest and allows the same land to be cultivated multiple times per year. IPs report cultivation occurring 2-3 times per year. The mean number of times land was cultivated under irrigation according to the survey is 1.5.

Table 20: Performance against logframe output indicator 2.1.1 – Number of additional households practising irrigation

	2014	2015	Endline	Variance	Endline target
Additional households	5,395	10,615	51,509	+120%	23,400

Source: IP monitoring data

Whilst DISCOVER had a greater focus on marketing activities from the programme inception and reports that 13,377 farmers are members of 'marketing associations' in its monitoring data, other partners also responded to feedback from M&E exercises and started to work on marketing. For CA-ECRP marketing activities were small-scale in comparison to the wider programme which reports supporting 1,544 farmers to form 141 market groups for, amongst others, sesame, beans and pigeon peas. A lack of markets for irrigation produce remains a challenge with focus group participants in Chikwawa noting that they needed ongoing support and in Karonga noting that their highest priority was identifying markets for new crops introduced by the programme. In Mulanje, one male FGD respondent noted *"When we started to grow some of the crops like pigeon peas, the idea was to be in clubs so that we could sell our produce as one entity. However, we have not been able to do that to date and finding profitable market as individuals is quite a challenge."* In Salima, a male farmer noted *"we lack a stable market for our produce."* Off-farm group marketing activities have focused on bamboo, stove-making, briquette making and beekeeping. Progress in these activities remains limited overall though efforts to develop beekeeping associations in Salima and Dedza are exceptions.



ECRP provided training and four machines to mould fuel-efficient stoves in Ng'omba village. Members walk 3km to collect clay to make the stoves. Of the original 32 members, 12 remain. The CBO has 103 stoves

in stock and has produced over 1,300 stoves since the project started. Many of these were distributed in the community for free. Their best sale was for 77 stoves at K600 (63p) each and this was in April 2016. Members note they do not have a reliable market and the stoves are too heavy to take to local markets. They acknowledge the benefits in terms of fuel consumption at home, but lament that production is not as profitable as they had hoped.

As has been documented in previous reports, off-farm business in the production and sale of low carbon cooking and lighting technologies has been mixed. In a small number of areas, fuel efficient stove businesses have found good markets and sufficient supply of material to generate a sustainable source of income (cited in FGDs in Dedza), but in many cases the local market has been saturated and devices sold at a loss. Solar devices face high demand but a key challenge is affordability of the devices and working capital for

the village agents to re-stock and sell-on. The programme worked with two suppliers, Maeve and SolarAid and linking the demonstration and sales to VSL groups was cited as a successful strategy in both cases and Solar Aid also noted the promising future for 'pay as you go' devices. There is also qualitative evidence of project-supported Solar Entrepreneurs sustaining a profitable business – for example one beneficiary in Nsanje had made several orders for cartons of 24 lamps and sold each at a MKW1,000 profit. She also had a brother operating a motorbike taxi business which may have helped with reaching more distant markets for the lanterns. However, in most focus groups, beneficiaries were not aware of suppliers who continued to sell the lamps after an initial dissemination event. In general, the volumes of devices sold and the number of agents involved did not make a large contribution to incomes for the majority of beneficiaries. Previous studies had questioned whether ECRP as a programme, with its focus on vulnerable districts and households, was best aligned with goals to establish a viable private sector market for solar products.

Finding 18: Unexpected outcomes at household level include failure to repay VSL loans resulting in confiscation of property or marital conflict. Whilst some interventions do increase women's labour burden, this is not universal. No other substantial safeguarding issues were identified.

In most FGDs, participants noted that VSL groups had resulted in some households being worse off due to being unable to repay VSL loans. High interest rates and a shortage of income to repay loans had resulted in the confiscation of property and / or conflict between household members. Cases of fraud in VSL groups were mentioned in three areas. In two cases the perpetrators had property confiscated to repay the group, in a further case the VSL

group was defrauded by its Village Agent who did not return leaving the members out of pocket.⁴²

Safeguarding issues related to land-use change in irrigation schemes were briefly explored in focus group discussions but no examples of any conflicts over water-use or lack of consent for land-use change were identified. However, one implementing agency staff noted that two schemes had used the same stream in one area which had resulted in the stream drying. Land conflicts in the scheme were mentioned by staff in Dedza and Machinga.

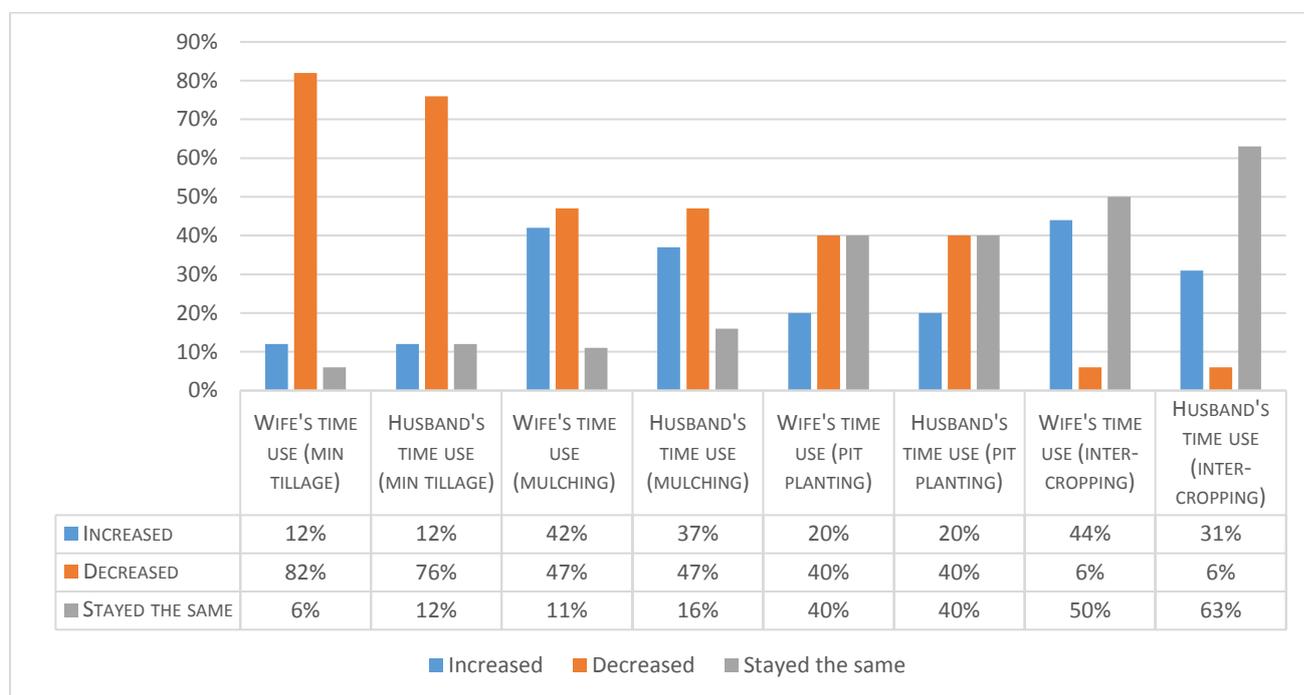
Theft of maize from individual mud-smeared granaries have been reported in previous studies and were a key reason for the cessation of support for this form of post-harvest management. Water-logging in CA fields has also been mentioned in previous qualitative studies, but this problem is not particularly wide-spread with only 9 out of 978 adopters mentioning this problem in the household survey.

Conflict between targeted and non-targeted households was occasionally reported but this was not seen as intense enough to pose a safeguarding risk as it could generally be mitigated through explanations from project staff. The reasons for potential conflict included a lack of transparency with targeting (female FGDs in Chikwawa and Mwanza), the failure of recipients of livestock to pass-on (Male FGD, Mwanza; female FGD Salima) and a lack of understanding of the programme targeting approach (Female and Male FGDs Mulanje).

Changes in the distribution of work between men and women were explored in the intra-household survey. This did not highlight any unmanageable increases in time-use for women and the use of fuel-efficient stoves were responsible for significant time-savings for women. Conservation Agriculture activities had a mixed effect on time-use with some activities such as mulching and inter-cropping increasing the time used by both men and women. However, there was no evidence that women were bearing this burden alone nor that wives' time availability was a barrier to adoption. One comment indicated that it was the husband's reluctance to take on additional work that had limited their household's willingness to mulch their fields.

⁴² This ignored general guidance that group members should not give money to Village Agents.

Figure 8 Percentage of respondents to intra-household survey (n=36) who perceived that their or their husbands' time-use had increased, decreased or stayed the same with the adoption of CA practices.



4.3 What is the programme's contribution to increased capacity for disaster risk reduction and climate change adaptation at community and district level?

This section discusses outcomes in terms of capacities for DRR and CCA as outlined in the Characteristics of a Disaster Resilient Community. As detailed in the Approach Paper, these are assessed in terms of improvements to governance, risk assessment, risk awareness, long-term risk reduction and preparedness and response. Findings from the CPC survey are correlated with those from FGDs in comparison and beneficiary CPCs.

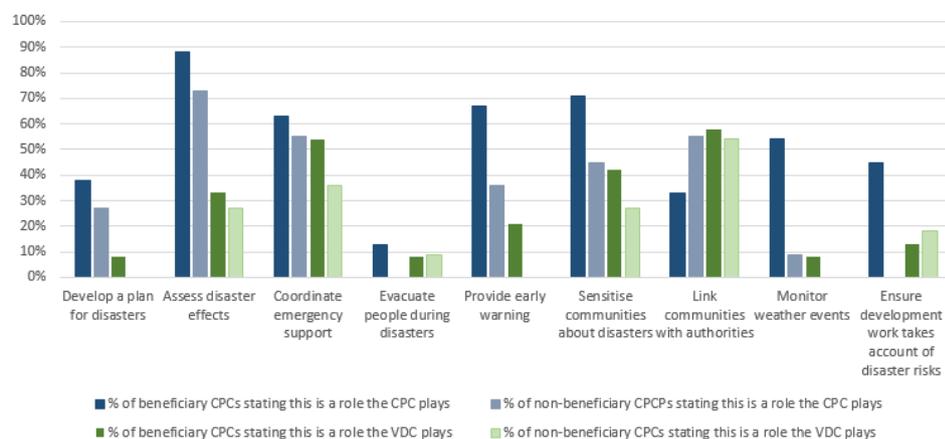
Finding 19: The project has made improvements to VCPC governance but their existence is largely due to a Government of Malawi initiative.

VCPCs exist at GVH level in both beneficiary and comparison areas. Only one comparison GVH in Thyolo did not have a CPC. Project staff and district officials confirm that the CPC structure was established by Government. However, there were a number of key differences between CPCs in beneficiary areas and those in comparison areas. For example, CPCs in beneficiary areas attributed a wider set of roles and responsibilities to their committee, with no CPCs in non-beneficiary areas identifying a role for themselves in ensuring development work takes account of disaster risks or evacuation during disasters and only one noted a role in monitoring weather events. Project-supported CPCs were less likely to see a role for themselves in linking communities to authorities which could be due to a clear division of responsibilities between VCPCs and VDCs or ACPCs but also in some cases is due to a dependence on project staff to play that role (Figure 8). Whilst there are some overlaps between the roles and responsibilities of VCPCs and VDCs, this is as a result of the VCPC reporting to the VDC which had oversight of all activities in the community and was not a result of duplication. All beneficiary CPCs had received training from the project, and most had received some equipment, either to support their work as a committee or to carry out development work in the community. Beneficiary CPCs all had a workplan and some also had a schedule of meetings. Over 70% of non-beneficiary CPCs had neither or just had a schedule of meetings.

Responses in beneficiary and comparison focus groups about their awareness of the CPC committee also varied. In 10 of 22 comparison focus group discussions, respondents were unaware of the VCPC or remarked that it was not functional. This is compared to only 3 beneficiary focus groups, of which one group was unaware and the other two felt that the CPC was insufficiently active. In the household survey, similar results were found, with only

39% of respondents in comparison areas aware of the existence of a VCPC in their area, compared to 80% of households in beneficiary areas.

Figure 9: Understanding of roles and responsibilities of VCPCs and VDCs as explained by beneficiary CPC (n = 24) and non-beneficiary CPCs (n=11).



Source: CPC Survey

Governance improvements suggested by beneficiaries in focus groups include the need for a maximum term for committee members to keep motivated individuals in the committee (Balaka), the need for the CPC to be more independent of the Chief (Mwanza), the need for greater representation of different villages in the GVH (Chikwawa) and for CPC members to be provided with transport to more easily reach all parts of the GVH (Chikwawa, Karonga, Kasungu, Machinga, Mwanza).

Finding 20: Both beneficiary and comparison VCPCs have gender balanced committees and members who represent youth, women, elderly people and people with disabilities.

VCPCs in beneficiary areas had a median of 15 committee members, with a median of 7.5 male members and 6.5 female members, which conforms with the Malawian Gender Equality Act, which requires that decision making positions are allocated no less than 40 percent and no more than 60 percent of either sex in any position of power.⁴³ In non-beneficiary areas, there were a median of 12 committee members, evenly distributed between men and women. However, these averages conceal quite a lot of variation between individual CPCs. For example, of the two committees surveyed in Mulanje, one committee had 24 men and only 6 women whereas the other had 16 women and only 9 men, indicating that local dynamics and individual interest affect the gender balance in committees and no strict quotas were applied. Both non-beneficiary and beneficiary CPCs indicated that members of the committee were tasked with ensuring the views of vulnerable groups were represented with slightly higher rates of positive responses amongst beneficiary CPCs.

⁴³ Scotland Malawi Partnership (2014) The Malawi Gender Equality Act A Teaching Guide for Primary Schools

Table 21 Positive responses by Beneficiary CPCs (n=24) and Comparison CPCs (n=11) to the question "Do you have any members that represent specific groups or take special care to ensure they are included in your work?"

Specific group	Youth	Elderly	Women	People with disabilities	People living with HIV/AIDS	Orphans & vulnerable children
% beneficiary CPCs making a positive response	94%	71%	88%	82%	53%	59%
% comparison CPCs making a positive response	80%	70%	60%	50%	50%	40%

Source: CPC Survey

Finding 21: The project has enabled the majority of its supported VCPCs to conduct risk assessments, and the majority of these assessments have, according to CPC members, helped to inform local development or contingency activities.

As can be seen in Table 22, beneficiary CPCs are more likely to carry out risk assessments than comparison CPCs and they are also more likely to use the results in planning. These assessments focused on those hazards which community members perceive to pose the most significant risks in their areas. This covered major climate hazards, such as drought, floods and strong winds and climate-linked risks such as fire, crop pests and cholera. In several GVHs, risk maps were published in public locations. Actions which were carried out as a result of risk assessments were most frequently (13 out of 18 beneficiary CPCs) related to planting trees or vetiver grasses. It was noted in several instances that the risk assessment helped inform where trees should be planted. Four CPCs noted that they had used the risk assessment to strengthen recommendations about crop diversification and adoption of ECRP interventions, such as conservation agriculture. In three CPCs, risk assessments were used to recommend home improvements and in one CPC resettlement had occurred as a result of the risk assessment. Implementation of soil conservation measures was mentioned only once.

Table 22 Percentages of beneficiary CPCs (n=24) and comparison CPCs (n=11) which have carried out and used disaster risk assessments

Specific group	Did a risk assessment	Did not do a risk assessment	Used risk assessment to plan activities
Number of beneficiary CPCs	22 (91%)	2 (8%)	18 (81% of those with risk assessment)
Number of comparison CPCs	7 (63%)	4 (37%)	2 (30% of those with risk assessment)

Source: CPC Survey

The programme also conducted *Participatory Vulnerability and Capacity Analysis* in 2011 as part of the programme inception. This covered 40 GVHs (CA-ECRP) and 36 GVHs

(DISCOVER). The cost and time involved in the PVCA process meant it was not possible for programme implementers to support a project-led PVCA in all of the targeted GVHs. However, a sample of GVHs were covered to give programme stakeholders an insight into hazards, vulnerabilities and coping strategies and both reports provide some indication of programme strategies which could be used to tackle the issues identified. Whilst district and national stakeholders appreciated the 'bottom-up' nature of the ECRP planning process, it is hard to assess the extent to which the PCVA uncovered issues which were new to experienced community development practitioners in Malawi or to which programme design changed as a result of this analysis. Given the cost of such processes and their more limited coverage, it may be worth considering whether it makes sense to repeat such an exercise or whether it could be better integrated into a more routine community-led risk assessment process which was also promoted.

Finding 22: The project has supported VCPCs to carry out community level awareness events which have encouraged a culture of risk management at the household level. Whilst comparison VCPCs hold similar events, beneficiary VCPCs do this more frequently and reach greater numbers of people. Capacity improvements at district level support this outcome.



A Disaster Risk Information Centre in Salima disseminates information on seasonal weather forecasts and appropriate practices. Mr San John, Emergency Operations commented *"We use the chart produced by DISCOVER to educate farmers on the use of conservation agriculture practices. A hazard map has also helped indicate where people can build new houses."* Whilst other projects have also supported the Centre, DISCOVER has helped build the capacity of VCPCs to understand and disseminate forecast information at village level.

The CPC Survey found that 83% of beneficiary CPCs and 54% of non-beneficiary CPCs reported organising community events to discuss disaster risks. The median number of meetings for beneficiary CPCs was 4 per year, with a median of 230 participants. Comparison CPCs organised a median of only 2 meetings per year and reached a median number of 95 participants. More women than men attended in both cases, and both types of CPCs generally reported including

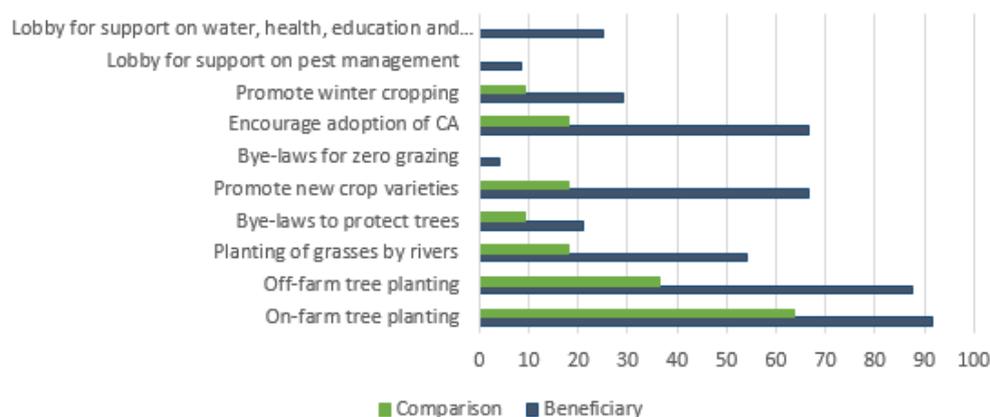
vulnerable groups in such meetings. There is also a difference between the beneficiary and comparison CPCs in terms of the likelihood of community members to follow CPC advice. This is reflected in both the CPC survey and the focus groups held in both beneficiary and comparison areas. For example, a male beneficiary FGD participant in Dedza commented *"because of such meetings, people in our area have stopped cultivating near the river banks and our children are no longer playing near the rivers. We have also planted trees around our houses."* A female beneficiary in Machinga noted *"The information [shared at meetings] helped us a lot. We did not know the importance of planting trees until now."* Support at District level, such as in Salima (see the Box) has also improved long-term support to VCPCs from the District Government. In several instances, CPCs reported challenges that community members faced in following the recommendations disseminated through such meetings. These included a lack of financial resources or time but also noted that sometimes messages

are not disseminated in a timely manner or that community members do not trust the message.

Finding 23: Long-term risk reduction activities have focused on natural resource management. Many beneficiary FGDs note the importance of CPC messaging in motivating these behaviours. However, the benefits take time to materialise.

Both beneficiary and comparison CPCs are most likely to be involved in the promotion of on-farm tree planting, but beneficiary CPCs are more likely to have taken a wider range of long-term actions than non-beneficiary CPCs (Figure 8). 18 out of 24 beneficiary CPCs note that they work closely with special natural resource management or tree planting committees whereas only 3 out of 11 non-beneficiary CPCs do the same. A district official in Dedza commented favourably on the programme’s ability to promote joint work noting that the projects integrated approach had resulted in *“the members from different committees – VNRMcs, Village Forest Management Committee and VCPCs working together.”*

Figure 10: Percentage of beneficiary VCPCs (n=24) and comparison VCPCs (n=11) responding that they had taken the following long-term risk management actions



As noted in previous reports, there are a range of NRM activities promoted under ECRP (see Table 23) and these have generally been found to be managed by motivated and active committees. However, the benefits of many of these activities are yet to start accruing due to being initiated later in the lifespan of ECRP. Recent efforts in the programme have tried to take a catchment conservation approach with greater focus on soil and water conservation in upstream areas.

Table 23 Natural Resource Management Activities Promoted under ECRP

Forestry activities	Water management activities	NRM Enterprises
<ul style="list-style-type: none"> • Development of village forest areas, with both indigenous and exotic species • Bamboo production • Woodlot development • All year planting of indigenous trees • Farmer managed natural regeneration 	<ul style="list-style-type: none"> • Construction of water harvesting structures • Construction of dykes • River bank rehabilitation • Construction of permanent checkdams 	<ul style="list-style-type: none"> • Stove / briquette production • Household fruit orchards • Beekeeping • Construction of fish ponds

Work on natural resource management has been supplemented by advocacy work at district level. Some examples of success reported by implementing partner staff include:

- Initiation of total catchment planning for all VCPCs in Kyungu and Wasambo and support for bye-laws preventing river bank cultivation;
- Joint work with Nsanje and Thyolo district officials to address deforestation within Kalulu forest. The success of the re-forestation using Government funds and the role of the project in coordinating efforts between Nsanje and Thyolo was also mentioned by Thyolo Government officials but in Nsanje officials mentioned that ‘progress had not yet materialised.’
- Work in Mulanje and Thyolo to combat banana bunchy top disease. This was mentioned by IPs, District Officials and in beneficiary FGDs. All bananas were uprooted and 35,000 clean banana suckers have been issued to the area.
- Development of by-laws on the management of community forests in Balaka.
- Improved coordination between ADCs and local Chiefs in the protection of Thambani Forest (Mwanza).
- Advocacy for implementation of bye-laws in relation to conservation agriculture and zero grazing of livestock in Karonga and Nsanje.

Previous reports noted the challenge in measuring outcome level change in NRM activities as there was insufficient record keeping on tree survival rates and the areas successfully covered with NRM activities at local level.

Finding 24: Beneficiary CPCs are better equipped for early warning and are more likely to transmit warnings and share weather forecast information. However, there are still many households which do not receive warnings in beneficiary areas.

Beneficiary CPCs have more of all types of early warning equipment than non-beneficiary CPCs and only 3 out of 11 non-beneficiary CPCs have any equipment. 95% of beneficiary CPCs which had experienced a disaster reported that they communicated a warning compared to only 50% of non-beneficiary CPCs. In the focus group discussions, not all of

those households living in areas where CPCs had mentioned providing warnings had received them. Only 11 out of 24 beneficiary groups mentioned they had received warnings provided by the CPC and only one of the comparison focus groups identified that warnings had been provided by a CPC. This finding is supported to some extent by the household survey which records relatively low numbers of households receiving warnings for disasters experienced in 2016/7 (Table 22). Weather forecast information is also more likely to be available in beneficiary areas, with over 80% of beneficiary CPCs sharing seasonal forecasts with the community, compared to less than 40% of non-beneficiary CPCs. Again, the household survey show that not all households in an area are able to access forecasts but those in beneficiary areas are more likely to receive them.

Table 24 Percentage of households receiving warnings for disasters in 2016/7

	% of those who experienced a disaster and received a warning	% who received any weather forecast	% who received a seasonal forecast
Beneficiary (n = 1151)	41%	64%	42%
Comparison (n=1085)	21%	49%	31%

Source: Endline household survey

In those focus groups where warnings and weather information had been received, communities were positive about the impacts.

Table 25: Comments on early warning in focus groups

"No one died during the 2015 floods because VCPC and VDC members went around in the night waking people up." Female respondent, Nsanje

"The committee tells the community on early warning signs for disasters. This has helped us during evacuations, safety of children during rainy season and also livestock safety. In our village some of the people have moved away from the river banks." Male respondent, Karonga

"Every season the CPC shares weather information e.g. expected rainfall. For example this year, they warned the community rainfall was going to be above normal hence should prepare for floods. People listened and took precaution such as not crossing rivers when it was raining. No life was lost due to floods. Some activities, for example, the ESOKO messages don't look useful when all is alright. They become useful during rainy season." Male respondent, Salima

We went to a community meeting where the CPC gave us a warning message forecasting heavy rain and thunderstorms. Community members were advised to take proper measures such as finding cover if it started to rain while you were in the open, not to take cover under a tree as that would be putting yourself in danger of being hit by lightning or falling tree branches. We were also encouraged to plant Kanyani (early maturing Hybrid) maize seed during the same meeting as a result of weather forecast information. Male respondent, Mulanje

At district level, a number of partners have promoted the dissemination of early warning messages using local radio stations. This can be an effective way of reaching a large number of households even where local structures are not functioning. For example, a participant in a comparison FGD in Mulanje commented *"we only got warnings from the radio. The committee is just there to get help for themselves. They did not warn us."*

Finding 25: Beneficiary CPCs are more likely to be involved in humanitarian response activities and are more likely to receive favourable responses to their requests to District officials for humanitarian assistance than those in comparison areas.

According to the CPC survey, 54% of the beneficiary CPCs provided support to households affected by disasters. The numbers of households supported ranged widely from some CPCs which used their own resources to help 2-5 households affected by localised shocks to those which reported involvement in large-scale distributions reaching over 1,500 households. Only 2 non-beneficiary CPCs reported providing relief and then only to 6 and 7 households, respectively. VCPC fundraising activities supported by the project have been useful here, including the establishment of CPC farms, with selling crops and collecting donations from the community being the most likely way that CPCs raise funds. The median expenditure of beneficiary CPCs was MK43,457 (£45), compared to MK 8,000 (£8.50) for non-beneficiary CPCs showing that beneficiary CPCs were carrying out more activities than those in non-beneficiary areas.

A key function for VCPCs within the Government of Malawi system is assessing the impacts of disasters and submitting reports to the District via Area Civil Protection Committees to allow Government response to reach the people. Beneficiary CPCs were more likely to participate in the MVAC assessment (58% compared to 36% of non-beneficiary CPCs) and were also much more likely to receive a positive response to their reports of disasters at any time, with 78% of those submitting reports in beneficiary areas noting that action was taken by Government, compared to 0 positive responses in comparison areas. In both CPC and District Government responses, the importance of training to submit timely and accurate reports was mentioned. For example, one district official noted *"the ECRP trained CPCs on how they could assess objectively unlike non ECRP CPCs. For example, in non ECRP areas, there could be reports with names of the entire village and not just names of those affected. In ECRP areas, there was minimal political intervention in disaster reports. In non-ECRP areas the assessment report could come from the councillor but in most ECRP areas, disaster assessment reports come directly from the CPC members."* Another commented *"Nowadays, we obtain true information about disaster issues unlike in the past when phone calls would be received from Members of Parliament with exaggerated figures."*

Finding 26: The project has contributed to capacity for Disaster Risk Management at district level but Government resources for disaster preparedness remain limited.

At District level, the project has provided DRR training for Government stakeholders. Assistant District Disaster Risk Management Offices (ADDRMOs) were unanimously positive about this support, citing the benefits in terms of revamping local structures, financing DCPC meetings, providing training, supporting the functioning of the early warning system and developing and updating contingency or DRM plans at district level. Two groups noted improved coordination and the value of WhatsApp groups for DCPC communications,

another noted support to the sectoral clusters at district level. However, there remain challenges for districts to use this knowledge due to staff turnover and also the need to access resources to implement the contingency plans and to provide further support to communities. Several district officials noted that the ECRP had not covered many of the TAs in their area and they would wish for it to be scaled up. One district official touched on funding shortages remarking, *“On a serious note, the Government cannot achieve much without its partners.”*

District level advocacy activities also touched upon disaster risk management topics. Progress has been mixed with the most positive outcomes arising where there were very specific goals or where the project could use its resources and presence in the communities to help Government to act. Some of the progress reported is available in Table 26 but there were insufficient resources to conduct contribution analysis in relation to these claims.

Table 26 District level advocacy on disaster risk reduction

Advocacy Issue	Progress Reported
Inclusion of disaster risk issues into sectoral plans	Greater understanding of roles and responsibilities reported by District officials in most cases.
Support for CPCs at Area level	Balaka, Dedza, Kasungu, Nsanje, Salima. Activities included in contingency plans and some training provided but limited progress on action from Government side reported.
Limited funds for disaster response	All districts. Government continues its usual resource mobilisation activities. No major success stories.
Need for more boats for flood evacuation	Nsanje. Government purchased boats in 2016.
Construction of a dyke along RUO/Thangadzi river banks	Nsanje. No reported progress.
Army worm preparedness and response	Dedza, Salima, Mulanje, Thyolo, Nsanje. Project provided coordination and practical support which enabled chemicals and sprayers to be pre-positioned (Dedza) or rapidly deployed (other districts).

4.4 What is the contribution of the ECRP to improved policy at national level?

A light touch assessment of programme communication and advocacy work is presented here based on stakeholder responses in interviews and the online survey. As explained in the Approach Paper – it was not possible to conduct detailed contribution analysis for most advocacy outcomes reported by IPs. However, summarised findings from a more detailed contribution analysis case study of work to advocate for the National Climate Change Management Policy are presented. The full report from this case study is available in Annex L

Finding 27: The ECRP has been active in national level advocacy across a range of sectors. It has effectively brought together CSO voices to national policy processes and was influential in informing the design of other resilience programmes by the consortium members, donors and development partners.

In its annual reports, ECRP has collected data on its efforts to influence 20 different programmes and policies. These are detailed in the table below. However, the major advocacy priorities for the programme since 2016 have been lobbying for approval of National Climate Change Policy, lobbying for finalisation of the National Energy Policy, lobbying for finalisation of the Meteorological Policy and providing input into the National Resilience Plan based on ECRP experiences.

Table 27: Policies and programmes which ECRP has targeted with advocacy actions

National Policies	Government Strategy	Other Programmes
1. National DRM Bill	7. National Resilience Plan	15. Cost of Hunger Project
2. Agricultural Policy	8. DRM Communication Strategy	16. EU Climate Change Programme
3. Energy Policy	9. DRM Devolution Plan	17. World Bank PPCR
4. Climate Change Management Policy	10. National Budgetary Allocations	18. Sustainable Energy for All Initiative
5. Meteorological Policy	11. Malawi MDGs Reporting	19. National Climate Smart Agriculture programme
6. Gender Policy	12. National Early Warning System	20. WFP MASAF activities
	13. Budget for radar purchase	
	14. Government projects in irrigation and natural resources	

Detailed findings related to these four advocacy priorities follow but it is important to note that online survey and external stakeholder interviews also reinforced some of these claims of influence. For example, in 2016 a stakeholder from the European Union noted “*The FAO grant contract EU fund was mirrored on ECRP. There is active dialogue and synergy between ECRP and GCCA.*” Online surveys in 2016 and 2017 also contained responses from various international and local NGO employees noting that ECRP activities had influenced the design

of other donor-funded projects and that participation in CEPA/ECRP events had supported the development of personal skills and knowledge.

Advocacy work on national budgetary allocations provided ongoing tracking of expenditure, highlighting extremely low levels of Government investment in DRM and CCA (less than 1% of the national budget). With no changes in response to CEPA's reporting on this from 2011/1-2014/5 and in an atmosphere of cuts to public spending, CEPA did not prioritise the annual reporting after 2015. However annual budget submissions were made in collaboration with other NGO networks.

Due to poor stakeholder availability, this evaluation could not triangulate evidence related to ECRP's influence on WFP and the World Bank. Response from the Department of Land Resource Conservation noted that ECRP had been a member of the National Agriculture Conservation Task Force and confirmed that they had received training but was not aware of CEPA's influence on the national Agricultural Policy and National Climate Smart Agriculture programme. Stakeholders interviewed at IFPRI for a previous review confirmed that CEPA had submitted a model policy as part of the process to gather CSO inputs into the agricultural policy but that there were other larger donors and agricultural research projects which were likely more influential in developing that policy.

Finding 28: A case study investigating ECRP's influence on the policy context found that CEPA played a unique role in influencing the National Climate Change Management (NCCM) Policy.

The Government initiated the process of developing the NCCM Policy with support from donors and development partners in 2012, channelled through UNDP. In early 2012, CSOs led by CEPA undertook a review of key policies and legislation related to climate change and disaster risk management and prepared a policy brief entitled *Policy Framework for Climate Change Adaptation and Disaster Risk Management in Malawi: A Review of Key Policies and Legislation*. The policy review informed the formulation of the Issues Paper, White Paper and the draft National Climate Change Management Policy which were developed by Government through a team of independent consultants led by LEAD SEA. In the same year of 2012, CSOs led by CEPA also prepared a policy position paper entitled *Towards Development of Climate Change Policy in Malawi* which proposed elements for the draft National Climate Change Management Policy. The contents of this position paper were evidently reflected in the Issues Paper and White Paper that formed the basis for NCCM policy development. In the same period, CEPA was nominated to be part of the team of Subject Matter Specialists to work alongside the Government of Malawi consultants to develop the NCCMP.

The case study found with high confidence that CEPA was managing information and knowledge in relation to this process of policy development, covering a wide spectrum of stakeholders, and linking communities with the policy making platform. Whilst this role might not be unique to CEPA: anyone with the same convening power and ability to link different

sectors of society might potentially play a similar role in the future. However, at the time where this policy process was unfolding, their role was unique.

NGO advocacy and a process structured in the same way as it was for this policy can potentially influence the content of policies without slowing down the speed of adoption. The major delays connected with policy drafting were due to administrative problems with the team of consultants, and with format issues and political priority issues at the approval stage. Multiple stakeholders involved in the process does not mean only multiple rounds of feedback collection and incorporation; it also means multiple sides from which lobbying and pressure for adoption comes at the approval stage.

Finding 29: Inputs from ECRP were used by DODMA in its National Resilience Plan. DODMA also confirmed ECRP's support to the development of the National Disaster Risk Management Policy and DRM awareness activities at national level.

The respondent to this evaluation at DODMA noted that ECRP had "*heavily supported the Government,*" noting that ECRP had supported in disseminating the National Disaster Risk Management Policy. Whilst the policy was already in front of the Cabinet when ECRP was beginning its work, the programme did contribute to the DRM Communications Strategy and the development of a national training manual on DRM. The support to the celebration of the International day of Disaster Risk Reduction was also highlighted as very welcome, as Government viewed it to be a platform for public dissemination of Disaster Risk Reduction policies in Malawi. He also noted that a number of the activities in the ECRP had been included in the National Resilience Plan (NRP) and expressed a wish for ECRP to continue to implement the NRP following its approval. Whilst the National Resilience Plan involved inputs from a large number of development partners, ECRP was invited to play a role in the NRP Task Force since June 2016. The ECRP also used the Forum in December 2016 to develop a further submission to the process, preparing a position paper reflecting inputs from a large number of stakeholders and drawing on evidence generated by the ECRP. The Advocacy Officer and DISCOVER Programme Manager also then participated in task force teams (Catchment Management and Agriculture) to work on the finalisation of the document.

The NRP has not yet been launched. Some development partners have expressed concerns about duplication between the NRP and existing sectoral strategies. At present, it also lacks a financial mechanism to enable its implementation. This is a challenge given donors' unwillingness to channel finance through Government systems and the lack of effective multi-donor initiatives in the resilience sector. Whilst, resolving such issues goes beyond the scope of NGO advocacy under ECRP, it has been the focus of some of DFID's wider policy engagement.

Finding 30: The Department of Energy appreciated ECRP's communication and input on the importance of promoting fuel-efficient stoves in the revised energy policy and noted sustainable supply of trees was as important as improved kiln technology in increasing the sustainability of charcoal use as a fuel source.

CEPA, supported by ECRP, had been engaging in Energy Policy issues since the Ministry of Energy initiated a Policy Review process several years ago. A Ministry of Energy respondent noted that CEPA had prepared a Policy Review paper that was used by the Ministry and its consultants in development of the new policy. The Ministry representative also noted the value of joint-demonstrations undertaken with Christian Aid that raised awareness amongst Government stakeholders of improved stoves and efficient charcoal kilns, but highlighted that sustainable sources of raw material for charcoal production would be a greater focus than efficient kiln technology in future. The role of the National Steering Committee on Cook Stoves, supported by United Purpose was mentioned as a useful forum for CSO-Government engagement and inputs to the *Sustainable Energy For All* process were mentioned but no detail on the technical added-value of the CSO inputs was mentioned. The Ministry respondent commented that it would be helpful if NGOs could coordinate more effectively amongst themselves and that a major gap was financing for energy initiatives rather than additional advocacy inputs.

Finding 31: ECRP has supported the Department of Climate Change and Meteorological Services (DCCMS) to issue more user-friendly forecast updates, strengthen national early warning and to learn about Participatory Scenario Planning (PSP).

CEPA also coordinated CSO inputs to the National Meteorological Policy and made a number of edits to the draft process which was under development by Consultants hired by the Government. ECRP and UNDP jointly financed consultative meetings held between the Department of Climate Change and Meteorological Services (DCCMS) and other key line ministries. The draft policy is currently under review in the Office of the President and Cabinet.

CEPA report that *Participatory Scenario Planning* was included in the draft policy as one of the strategies for communicating forecasts and warnings. The respondents from the DCCMS interviewed for the evaluation stated that whilst they had been trained in PSP and felt the approach was very useful, it had not officially been adopted into national policies or guidance. They also noted that other similar methods were also being promoted, mentioning that WFP's *Radio Listening Groups* also discuss seasonal forecasts and potential actions.

DCCMS also reported that the ECRP facilitated Early Warning Stakeholder workshop had been extremely useful in identifying new strategies for delivering early warning messages and had resulted in the creation of WhatsApp forums for the dissemination of downscaled early warning and weather information at district level. One DCCMS official commented "*We started to send updates for specific districts...also we started to send weekly and monthly updates which are beneficial for farmers... The ECRP revolutionised our way of thinking. ECRP also has influenced our approach with language, as for the first time we have forecasts being given in local language. Now we give more thought and work to interpreting*

scientific/technical language to local language, something we never considered much before ECRP.”

4.5 Was the programme efficient and effective in the way it delivered its results?

Finding 32: ECRP has consistently exceeded the majority of its output targets, reaching 19% more direct beneficiaries than expected.

Table 28 provides an overview of ECRP performance against key logframe indicators. The programme significantly exceeded its targets in many cases. When performance is compared with the logframe targets, the programme has exceeded the number of households accessing key resilience interventions by 120% (irrigation), 60% (livestock), 45% (conservation agriculture), and 20% (VSL). In terms of outreach to GVHs, the programme exceeded expectations by working in 272 GVHs. However, not all those met the definition of having ‘fully functional’ CPCs or EWS resulting in performance being slightly below target. The proportion of VSL members who are women was also below target (68%, rather than 75%). This reflects growing interest in VSL by men as the proportion of women has dropped since mid-term when 72% of VSL members were women. Since the groups are self-forming it was not possible for the programme to prevent men from establishing and joining VSLs having seen the potential benefits. The results for low carbon technologies show the number of households with solar lights exceed the target. This is as a result of renewed efforts of both partners to disseminate solar products and perhaps overall growth in the pico-solar market in Malawi. However, the proportion of the beneficiary sample reporting the use of improved cookstoves or woodlots have declined since 2016. The reason for this decrease is not clear from comments in focus group discussions although it is possible that some stoves are broken or no longer in use. Although not used in the logframe, IP monitoring data indicates that 65,774 households have been reached with stoves and 111,291 with agro-forestry or forestry activities.

See the completed logframe in Annex B for the breakdown by consortium. See also the full progress update available in the DFID Programme Completion Review Report.

Table 28 Progress against logframe indicators within the control of the programme

Indicator	Endline target	Endline actual	Variance
O.1: Number of direct beneficiaries	840,000	999,316	+19%
O 2.3: % of direct beneficiaries using a combination of at least three CC / DRR transformative strategies*	90%	96%	+7%
O.1.1: % of HHs with knowledge of at least 3 interventions likely to enhance individual and community resilience*	32%	55%	+72%

O.1.2: Number of targeted districts and GVH with functional EWS	240 GVHs in 11 districts	Fully functional: 202 GVHs Partially functional: 272 GVHs Districts: 11	-15% +13%
O.13: Number of districts and targeted GVH with functional Community Protection Committee	240 GVHs in 11 districts	Fully functional: 226 GVHs Partially functional: 272 GVHs Districts: 11	-6% +13%
O2.1: Number of households directly benefitting from the programme that use a combination of at least 2 climate smart agriculture techniques per growing season*	146,234	172,944 (~97% of households)	+18%
O2.1.1: Number of additional households practicing irrigation	23,400	51,509	+120%
O2.1.2: Number of additional households practicing conservation agriculture	62,000	90,111	+45%
O2.1.3: Percentage of households that grow drought tolerant crops*	87%	90%	+3%
O2.2: Number of households adopting low carbon energy interventions*	Stoves: 62,500 Solar: 20,600 Woodlot: 77,690	Stoves: 53,033 Solar: 34,813 Woodlots: 40,938	-6% +69% -47%
O2.3: Number of direct beneficiaries participating in Village Savings and Loans Schemes supported by the project	92,000 75% women	109,752 68% women	+20% -9%
O.2.4 Number of direct beneficiary households receiving livestock	29,100	46,610	+60%

Source: Programme monitoring records. Indicators with * are monitored using household survey results.

Finding 33: ECRP costs per output have remained consistent from previous reports. For some interventions, there might be opportunities to bring costs down by emulating the approach of those consortium members with lower costs.

Table 29 shows the programme-level costs per output and the breakdown per consortium members is available in Annex K. The overall expenditure per beneficiary household has been £134 over the full 6-year lifespan of the programme.

Table 29 Costs per output reported by programme implementing agencies

Indicator	Cost per item (total programme costs over 6 years)
Cost per direct beneficiary households	£134
Cost per direct beneficiary individual (all household members)	£24
Cost per beneficiary reached through early warning systems and CPCs (population of GVHs reached)	£2
Cost per GVH with functional CPC (both fully and partially functional CPCs)	£10,036
Cost per household accessing drought tolerant seeds	£14
Cost per farmer using conservation agriculture	£14
Cost per hectare under conservation agriculture	£27 / (£110)*
Cost per household trained in post-harvest handling	£5

Cost per household participating in irrigation	£71
Cost per hectare under irrigation	£142 / (£1,194)*
Cost per livestock beneficiary (all beneficiaries)	£40
Cost per member of VSL	£17
Cost per household using solar energy	£18
Cost per household using fuel-efficient cookstoves	£17
Cost per farmer participating in forestry or agro-forestry	£9

Source: Programme monitoring records and financial reports up to June 2017. Hectare calculations marked with a * include calculations based on multiplying median area reported in household survey by total number of beneficiaries from monitoring records. Figures in brackets are based on IP reporting on hectares which are collected by programme staff and have been much lower than those recorded in the survey.

Programme costs per VSL beneficiary are in the middle of international benchmarks for similar programmes. The SAVIX average cost per member was estimated at between USD 17-32 or £13-24.⁴⁴ There are slight differences between the two consortia, with DISCOVER's approach of working through a microfinance institution – CUMO being slightly more expensive per beneficiary (£23.42) than Christian Aid which provided training to Village Agents via existing partners which ultimately cost £13.69 per beneficiary).

At mid-term, programme costs per hectare irrigation costs looked very high. However, it is possible that this was driven by IP monitoring under-reporting the total extent of adoption. Estimates based on the number of beneficiaries and the median reported areas for irrigation are in table 27. These results are substantially lower than benchmarks produced by FAO for Malawi, which estimated costs per hectare of between £208-£454.⁴⁵

Costs per GVH with functional CPC vary substantially across consortium members. The lowest cost was recorded by United Purpose which spent £4,249 per CPC, compared to the highest (Christian Aid) which spent £17,012 per CPC and had initially used CPCs as an entry point for other interventions. All other agencies within the DISCOVER consortium spent between £11-13,000 per CPC with Care spending the second lowest amount at £5,930 and ActionAid just under £10,000. Reviewing the results of the IP interviews, it is likely that this variation is due to increased supervision in the three Christian Aid districts which all highlighted DRR as in the "top 5 most supervised interventions" whereas this was not the case in any other districts. It is also possible that some costs related to Christian Aid's technical leadership role on DRR were included in their reported costs. In the case of the higher costs in other DISCOVER consortium members, this is likely a result of higher expenditure on equipment and response simulations. Simulations were only undertaken in

⁴⁴ Data taken from www.thesavix.org for the mid-term evaluation in 2014. The data on implementation costs is no longer available from the website but other reports highlight similar numbers such as those reported as \$22 per beneficiary at www.vsla.net of and costs of \$20 to \$60 per beneficiary in Africa; and from \$10 to \$20 in Asia at http://www.mastercardfdn.org/pdfs/VSLA_Website_Brief.pdf.

⁴⁵ See the M&E Agency (2014) Mid-Term Review Value for Money Report for more details.

one of the three Christian Aid districts and the approach to early warning in Mulanje and Thyolo focused on chalkboards and dissemination of weather forecasts in local groups which might be lower cost than practiced in DISCOVER areas where phones, megaphones, life jackets, bicycles and first aid kits were among the equipment distributed to CPCs.

The cost of post-harvest management training has also varied significantly with United Purpose again recording the lowest cost per beneficiary at £1.71 with COOPI having the highest at £22.39. CA-ECRP partners' costs vary between £3.53 (Christian Aid) and £8.60 (Care). As reported previously, COOPI's high costs are as a result of investing more in village level infrastructure for storage, including support to the construction of buildings to store crops for cooperatives and for CPC grain banks.

Costs per livestock beneficiary are also very different across consortium members, which may be a result of both the types of livestock being procured and also the types of training and support offered. Care, the technical lead on livestock for the CA-ECRP consortium, records the highest costs at £237 per beneficiary whereas the lowest costs are recorded again by United Purpose at £14 per beneficiary. Since livestock procurement is a major driver of cost it could be expected that those costs explain most of the minor differences between other partners which vary from £33-56 per beneficiary. However, Care's high costs are likely a result of procuring livestock from outside of the community, for additional training and veterinary support, follow-up on pass-on, as well as the potential for some costs related to "technical leadership" and monitoring remaining within the Care financial report.

Finding 34: For every £1 invested by ECRP, benefits were estimated to fall between £2 and £3, depending on the package of interventions included in the analysis. Variation in programme costs per beneficiary had the largest impact on this result.

The cost benefit analysis looked at programme impacts on beneficiary income flows, which was different to the household level impact assessment data which had a greater focus on asset accumulation. In comparison to previous cost benefit studies, the model used in the final evaluation only counted benefits for those households for which adoption of the intervention could be attributed to the programme (Finding 10) and made greater use of the household survey data to estimate benefits which had previously been estimated based on responses in focus group discussion.

Based on this assessment, the core package of interventions (conservation agriculture, improved seeds, post-harvest management and VSL) had the largest quantifiable benefit at £2.71 of benefit for programme beneficiaries for each £1 invested. Adding irrigation to the package resulted in benefits of £2.51, while the core package plus livestock (including livestock bought by participants as a result of the ECRP) is £2.45. The benefits per £1 invested decline for the more expensive packages because the additional benefits from these

packages are not sufficient to offset their additional cost. If implemented without the core package, irrigation results in benefits of £2.37 for every £1 invested and livestock alone has just £0.73 per beneficiary. Based on this analysis, the livestock intervention does not appear to be economical due to the relatively low level of benefits in comparison to the high costs. Given the major benefit is asset transfer, cash is likely a more cost-effective approach to achieve similar results. It should also be noted that some benefits from irrigation and livestock are likely to spill-over into the core package through increased income to invest in VSL and purchase agricultural inputs, and improved food security reducing need for undertaking *ganyu* work during farming periods and our CBA model did not capture the improved performance of the core package which might occur with the adoption of other interventions.

Sensitivity analysis considered the impact of differences in programme implementation costs, beneficiary costs and benefits. The analysis found that differences in implementation costs has the highest impact on these results, with benefits per £1 invested in the core package increasing from £2.71 to £5.11 when costs from the highest to lowest cost-per-beneficiary IP are used for each intervention. Since the high programme cost of providing irrigation is likely to be a major reason why it appears to be less economical than the standalone core package, suggesting that a focus on learning about how to deliver this efficiently is as important as the need to make decisions about whether or not to include it in future programmes.

When interpreting CBA results, it is also important to understand that results only reflect quantifiable benefits and cannot be used on their own to draw conclusions about the relative importance of different activities, particularly given the extent to which beneficiaries and local Government stakeholders highly value livestock and irrigation interventions in focus group discussions. Such activities have other non-quantifiable benefits which are important – for example they provide food and income at a different time of year - outside of the main rain-fed harvest. Furthermore, our assessment does not consider thresholds of resilience or suffering. ECRP's basic package has not been sufficient to allow households to grow their income and food security in the face of the severity of shocks that they had faced. The cost-benefit analysis therefore only tells us that it would cost less to help a greater number of households to make smaller improvements in their livelihoods, than to help a smaller number of people to make slightly larger ones. It does not tell us what the level of investment required per household to protect them from the majority of disaster and climate risks would be. We did not factor the costs of humanitarian response into our assessment. To date, we have not found that adoption of ECRP interventions reduces the need for humanitarian assistance and whilst food security assessments focus on the performance of the rain-fed season as a proxy for humanitarian need and the level of need consistently exceeds the capacity of the response, this is unlikely to change.

Finding 35: Most stakeholders report that ECRP has provided intensive field supervision compared with other interventions. There is quite a bit of variation between the levels of staffing under different implementers but all have relied upon volunteers in the community. Beneficiaries report that field supervision has helped them adopt and practice the interventions over time.

Stakeholders at national level comment that the programme had more supervision than other interventions, with multiple layers of monitoring in place from PMU technical leads, external M&E exercises, and consortium member headquarters. One respondent noted that coordination of these activities improved over the lifetime of the programme.

Implementation Agencies in the field have varied ratios of field staff, lead farmers and VSL village agencies to beneficiaries, as outlined in Table 28. The majority of focus groups agreed that levels of supervision and visits on ECRP were greater than other previous projects, with only one group (ROLEC area in Nsanje) mentioning that previous projects had provided greater support and two groups noting that they had no examples to compare with.

Agencies with the smallest numbers of employed field staff in comparison to the villages covered included United Purpose Dedza which had only 4 field staff to cover 308 villages and Heifer which had 3 staff covering 195 villages. Those with the most staff per village were Self Help Africa with 16 staff covering 145 villages and Card in Mulanje which had 4 staff to cover 45 villages.

The programme relied heavily on volunteers at the community level, such as lead farmers or village extension multipliers. LFs/VEMs covered between half a village to 3 villages each, with United Purpose in Dedza operating with the fewest lead farmers per village and Self Help Africa the most. It is possible that this has aided United Purpose in being one of the lowest cost implementers in several interventions. Lead farmers themselves report working directly with between 25-500 farmers and spending between 1-10 hours per week on ECRP tasks.

Content from the FGDs support some of these findings. Those agencies with the highest staff to village ratios were in areas where FGD participants expected to see field officers twice a month or more. Whereas, Heifer with only one field officer for 65 villages opted for a training of trainers approach relying more heavily on lead farmers for ongoing support. For example, female focus group participants in Kasungu noted *"We have never interacted with the Heifer staff, it is the lead farmer who was trained at their offices and then trained us."* However, despite this relatively limited interaction, they still reported that *"the level of interaction was just right since we all need time for doing other things."* Most beneficiaries appreciated the more frequent support they received from lead farmers with the majority noting that support was available weekly or on demand. Even in Balaka, where according to IP reports lead farmers were covering the largest area, respondents still felt that they had sufficient interaction with lead farmers.

Table 30 Numbers of field staff and lead farmers as reported by implementer staff at district level

Implementer	No. of villages covered	Ratio of field staff: Villages	Ratio of LF: Villages	No. of VSL Village Agents	No. of Livestock LF or Community Animal Health Workers (CAHW)	No. of Stove Promoters
ActionAid	100	1:14	1:1.5	14	15 CAHW	
ADRA	116	1:29	1:1.9	34	20 CAHW	25
CADECOM - Kasungu				40	14	27
CARD – Mulanje	45	1:11	1: 0.8	18	11	
CARD – Thyolo	50	1:17	1:0.5	14	7 CAHW	
COOPI	179	1:14	1:2.4	27		
Eagles	58	1:19	1:0.8	18	4 CAHW	32
EAM	92	1:18	1:2.3	30		
Emmanuel	69	1:35	1:1.2	48		10
GOAL	216	1:31	1:0.4	37		
Heifer	195	1:65	1:1.7	40	10 CAHW	
Maleza				40	30	
ROLEC	41	1:10	1:0.8	11	10 CAHW	50
RUO	70	1:18	1:0.7	16	14	
Self Help Africa	145	1:9	1:0.25	25	57	
United Purpose - Balaka	170	1:17	1:2.8	30		
United Purpose – Dedza	308	1:77	1:4.3			54

Source: Implementing Partner questionnaire

It is not possible to quantify the benefits of additional field support as it is not always correlated with improved quality. Whilst there are costs associated with larger teams, the majority of district implementers felt that there were insufficient staff to carry out all of the programme's interventions. Staff requirements may also vary depending on context and the individual organisation's procedures and standards. The Self Help Africa respondent commented that they had recruited additional staff after the first two years of implementation to better enable them to hit programme targets. Heifer highlighted a shortage of staff as their major challenge. Staff turnover was also mentioned as a significant challenge by 9 out of the 17 implementers interviewed, which suggests that working conditions in the programme are unlikely to have been particularly attractive compared to other projects or opportunities in the country so one might conclude that given the programme's objectives the level of investment has not been excessive.

Beneficiaries note that detailed explanations of interventions, ongoing training and problem solving support has all helped them to make a success of the interventions. In focus groups, beneficiaries gave examples of other programmes where they were told to start activities

(e.g. VSL or CA) but were not able to do so for lack of detailed explanation or training. Working through lead farmers and village agents also has substantial benefits in terms of sustainability which are described in the next section of the report.

Finding 36: ECRP engaged Local Government officials to provide much of the programme training. Limitations in Government staff availability mean there is not much more that could be done but more formal joint working arrangements or secondments could be explored.

ECRP staff worked closely with their Government counterparts, frequently involving them to deliver training and to carry out joint monitoring in the field. Implementing agency staff confirmed that co-training had taken place across all the interventions but with closest collaboration on agriculture and DRR. In several districts ECRP beneficiaries noted that Government extension personnel had visited them more frequently since the start of the programme, with visits of once or twice per month being the most commonly reported. District officials commented that by working within existing structures, the programme had increased its impact and Government felt ownership of the activities (for example in Dedza, Karonga, Machinga, Mulanje, Salima). In a small number of cases, Government officials commented that ECRP had conducted work alone with inadequate coordination and limited reporting (e.g. Balaka, Mwanza, Kasungu). Implementing Agency staff noted that close work with Government officials provided much needed human resources and technical support as well as helping with the sustainability of the work. For example, an Emmanuel International staff member working in Machinga commented:

"We benefited from [District Government's] technical knowledge because we had a few staff implementing many different activities and it is difficult to know everything. Government staff helped with training but there were also gaps identified in their knowledge, so ECRP provided training to government staff on these aspects. So the relationship was mutually beneficial."

Major challenges associated with working closely with Government include the cost of allowances. A policy to pay only reimbursed expenses (full board) was introduced by the Development Partner coordination group in the first years of the programme. This has been followed by some agencies and not by others and therefore remains a source of conflict between Government employees and NGO partners. Whilst paying these allowances is a cost to the programme, it is unlikely that the expertise provided by Government experts could be found for a lower cost outside of the system.

The availability of Government personnel also remained a challenge since there are limited funds channelled through Government systems and multiple NGO or development partner projects in a district. Staff therefore tend to be overstretched and may not be available for all programme activities.

Opportunities for improvement mentioned included closer collaboration with NRM staff, including to support the creation of committees at local levels to oversee tree planting activities and ensure forests are protected, sustained communication of exit strategies and more continued refresher trainings to support handover in the case of staff turnover. Efforts to place more responsibility for fund management with Government had been tested (for example in the provision of a pooled contingency fund in Dedza) but were not successful due to mismanagement by the council. Whilst the UK may not be able to fund the Council directly, there may be opportunities to create more formal joint management structures for programme activities in order to provide resources which further enhance the management and coordination systems in District Governments.

Finding 37: There is conflicting data about the achievements of pass-on schemes and several lessons learned related to the most cost-effective approaches for asset transfer

It is expected that the pass-on programmes would enable more equitable distribution of the value generated by livestock and seed transfer and would multiply the number of beneficiaries in the programme. Implementing Partner staff at the Programme Management Unit level are convinced that pass-on programmes have been successful and DISCOVER's monitoring data shows that there were 4,812 pass-on beneficiaries from the initial 3,579 livestock beneficiaries showing high success rates and pass-on taking place more than once during the programme lifetime for some fast-breeding animals.

Whilst CA-ECRP believe the pass-on approach has been successful they did not provide data on their pass-on records. District-level Implementing Staff and FGD participants in several locations noted the failure of some households to pass-on seeds or livestock that were received by the project – with livestock death and lack of support from local leadership being reasons mentioned. In the household survey, 21% of beneficiaries reported receiving goats from the programme (236 out of 1151), 13% (157) reported passing-on offspring – approximately 67% of goat beneficiaries) but only 2% of beneficiary households (18) reported receiving goats from a pass-on programme. There are two possible explanations for this discrepancy – first that enumerators did not adequately check whether livestock was received from the programme direct or from pass-on or second, that respondents claim they have passed-on when they have not.

Given there are costs associated with supervising pass-on (it was the most frequently supervised intervention according to programme staff), it is important to be sure that it can work as the benefits are lost where it does not function. For example, if it costs £100 to distribute livestock to 5 households and pass on functions with 100% success for two rounds, then total beneficiaries will be 15. However, if pass-on costs a further £100 to administer and only half the recipients pass-on in each round, then all the benefits of pass-on will be lost and it will be better to use this money on supporting additional beneficiaries with asset transfer.

An alternative to pass-on is the subsidised purchase model tested in Mulanje and Thyolo where households were asked to contribute to the cost of the animal but were not required to pass-on. This approach is appreciated by beneficiaries. However, it does not allow targeting of the 'most vulnerable' as was the case in several district's livestock intervention but is less open to elite capture (mentioned as influencing targeting of free livestock in two districts by both FGD respondents and implementation staff).

The Implementing Partners have extensive evidence that livestock keeping is a viable and profitable business for the ECRP target group and have provided support to livestock businesses via direct transfer, training and through the establishment of improved animal health services. Given the lessons learned up to mid-term related to the importance of purchasing livestock locally in avoiding high mortality rates, it could be worth experimenting further with subsidised voucher or cash schemes to see if that lowers costs and increases beneficiary numbers. There is also conflict between livestock keeping and natural resource management activities in some cases so profitable alternatives to livestock businesses that can support NRM could also be explored in future programmes.

Monitoring data on seed pass-on was not provided but there is a more positive picture from the household survey with similar numbers of beneficiaries (approximately 50% of those who received any seed/planting materials) reporting that they received seed as a pass-on and had passed-on seed. In one interview, a lack of transparency in seed distribution and elite capture by the lead farmer was mentioned. In focus groups, seed distribution was highlighted as a challenge for very poor households who had a tendency to consume or sell seeds prior to planting them. However, in the household survey, only 10% of those who received seed reported selling seed prior to planting. In the case of seeds, cash transfers would not necessarily allow beneficiaries to purchase the same types of seed and it is clear that the programme has played an important role in introducing new varieties of seed and in providing seed at times when it might not otherwise be readily accessible to beneficiaries. Only 36% of seed beneficiaries noted that the seeds distributed were currently available in the market and only 45% noted that they had been on the market at some point prior to distribution by ECRP. However, 60% did indicate that they would be interested to buy these seeds if they were on the market and 30% of seed beneficiaries also noted that they had sold some of their harvested seeds to others within the community. This indicates that there might be scope for market-based seed supply work. With appropriate use of vouchers and local procurement, this may not be in conflict with the desire to distribute free seed for humanitarian purposes.

Finding 38: Other implementation challenges include lack of adherence to technical standards, livestock mortality, delays in providing seed, breakdown of irrigation pumps and death of tree seedlings.

Lack of adherence to technical standards was mentioned on 10 occasions in the interviews with implementing staff. This included challenges with demonstration plot layout, the understanding of weather information, the collection of monitoring data, role confusion

across different community committees, village agents skipping parts of VSL training and failure to follow instructions on the application of post-harvest storage chemicals. These are typical occurrences in programme implementation and highlight the important role being played during follow-up supervision to clarify issues and ensure interventions met agreed quality standards.

Livestock deaths were mentioned in focus groups in Salima (as a result of efforts to promote hybrid breeds), Balaka, Chikwawa, and Mwanza. Insufficient livestock was also mentioned as a challenge in two focus groups. For example in Mwanza, beneficiaries remarked that 3 goats for a village of over 60 families was insufficient and in Machinga, respondents expressed a desire for more people to receive livestock. It is likely in any programme that distributes free assets that beneficiaries will want to increase volume and outreach, but it is worth identifying approaches which can limit livestock deaths. Respondents noted that training for community animal health workers and more sustainable supply chains and payment mechanisms for veterinary drugs could help.

Delays in seed provision resulting in delays in planting were mentioned in Salima, Kasungu. Insufficient seeds were also mentioned in a number of groups. Respondents were either concerned that the seeds were not distributed to enough beneficiaries (Karonga, Kasungu, Machinga and Mwanza) or that volumes provided to each individual were insufficient (Kasungu, Nsanje, and Thyolo). In two groups, the suggestion that seed packs should cover 0.5acre was mentioned, but in others they noted that the seed was sufficient and that it was enough to allow for multiplication and onward sharing (Balaka, Chikwawa, Dedza, Mulanje, and Salima). Again, a desire for more free inputs is logical and complaints about timeliness had decreased since the mid-term indicating improvements in procurement and distribution systems.

Finding 39: Given its focus on productive activities, the programme has not consistently targeted the poorest or most labour constrained households. However, it has promoted inclusive approaches to reach people living with chronic illness and disabled people. Poverty-based targeting is challenging given the high poverty rates and a lack of easily identifiable poverty differentiators.

Responses to focus groups were mixed on the ability of “very poor people” to benefit from ECRP interventions. Some noted that high poverty rates and interest-based targeting meant that all households could potentially benefit. However others highlighted the challenges faced in accessing funds to contribute to the VSL groups as well as the ability to pay fees or purchase the inputs – such as seeds and fertiliser – necessary to join irrigation schemes. Some noted that targeting vulnerable people for livestock or seed distributions with pass-on obligations had been challenging where livestock had died and poor households had not been able to replace them or seed had been consumed prior to planting. FGD respondents also noted the challenge that very poor households face in finding the time to participate: *“Most of the time very poor people are looking for paid labour, so they don’t have much time to cultivate their own land and they only have very small pieces of land.”* (Male, Machinga).

Nine out of 17 implementing agencies mentioned they had implemented activities to promote inclusion of vulnerable groups. The activities included training that raised awareness of the importance of non-discrimination/inclusion amongst lead farmers/village extension multipliers and specific training focused on the inclusion of people with disabilities. In two districts, this included partnerships with specialist organisations to provide mobility devices or adapted training. This was successful with households from a range of vulnerable groups participating in the programme. An implementing staff from Care commented “*We have seen a disabled person become a lead farmer, which is a good example of successfully targeting the very vulnerable*”. In addition, in some cases IPs facilitated land sharing arrangements for irrigation schemes, where poorer households were able to farm on better off households’ land during the winter (dry) season, either for free or through a lease agreement (e.g. in Thyolo and Machinga).

As seen in table 29, using the *Progress out of Poverty Index*, the programme was able to reach ‘very poor’ households who are defined as being more than 50% likely to fall in the bottom 50% of those households below the poverty line. This could be seen to be roughly correlated with the ‘ultra poor’ households who are targeted by Government social protection programmes.

Table 31 %s of beneficiary and comparison groups that met the criteria for “very poor” at baseline

	Beneficiary	Comparison
% with PPI score of 20 or less	8.4%	8.6%

Of existing targeting mechanisms, our study showed that using MVAC participation offers the best chance of a correlation with poverty and vulnerability to shocks (see Finding 8). Focus groups with those households participating in the MVAC-ECRP overlap indicated that the activities promoted by the programme could be relevant for this group, where they have access to sufficient land and labour and some initial support with inputs.

Finding 40: There are opportunities to better tailor intervention design to poor households

Programme stakeholders shared a number of ideas reaching very poor households more effectively. Lead farmers reported that they had spend longer trying to encourage very poor households to adopt and in some cases had shared their own inputs with such households. They also reported other ways in which activities were made more accessible – for example by allowing payment of irrigation scheme fees after harvest, establishing VSL groups with very low savings rates or accessing community support to construct livestock housing. However, these modifications were *ad hoc* rather than a formal part of the programme’s standard operating procedures.

Other ideas shared by beneficiaries and lead farmers for reaching poorer households included: enhancing the time spent explaining the interventions, delivering standalone training, creating demonstration plots on very poor households’ farms, scaling up livestock, especially poultry or doves which are more manageable and providing more free inputs or food assistance. Some respondents noted that social protection programmes already exist for these groups and that scaling up such programmes may be more beneficial.

Finding 41: ECRP was able to adapt its approach to changes in context to some extent but uncertainty about the programme end date limited its ability to make more radical changes in direction.

Interviews with stakeholders noted a number of adjustments made to the programme implementation approach over its lifetime. These included decisions to intensify work on irrigation and natural resource management whilst introducing work on marketing. A focus on recruitment of larger numbers of lead farmers and the introduction of youth volunteers at community level were also highlighted as a response to the challenge of reaching large numbers of beneficiaries without increasing costs. The introduction of humanitarian response to the programme's activities was praised by both programme implementers and district officials. DFID's rapid decision-making around the deployment of resources to respond to the massive floods in 2015 was cited as critical in enabling this. However decision-making about the ultimate length of the programme was mentioned as having inhibited adaptation. The programme lifetime was extended in six-month increments from 2015 which meant that implementers were reluctant to introduce large-scale change to the model since they believed these would be best suited to the follow-on programme. Whilst ultimately the long duration of the programme was one of its key strengths, stakeholders noted it would have been better to have fixed a realistic end date from the beginning of the process.

4.6 To what extent are programme outcomes likely to be sustained without further intervention?

Finding 42: The interventions at household level are mostly likely to be sustained since they focused on activities which would be feasible with existing resources available at local level.

Cost-benefit analysis investigated beneficiary costs associated with each assignment. For example, irrigation user fees, maintenance of livestock housing and purchase of vet services and inputs for agricultural production. This found that the interventions should be profitable at household level and that cost should not be a barrier to them being sustained. However this assumes households are economically rational and does not take into consideration cash flow issues which frequently affect smallholder households exposed to multiple risks and with no insurance and limited savings. In general, focus group discussions showed limited disadoption and a desire by households to continue with ECRP interventions. A separate survey conducted by DISCOVER in its operational areas in 2017 found that eight out of ten households participating in livestock, drought tolerant crops and stove production indicated that they would sustain the interventions while seven out of ten households participating in participating in Conservation Agriculture, Irrigation, natural resource based enterprises, VSL, crop diversification, agroforestry, seed systems and stove use indicated that they would sustain the interventions. Six out of ten households participating in community based forestry and

post-harvest management and five out of ten households participating in micro-solar use indicate that they would sustain the interventions. In terms of the reasons for this sustainability, 71% of the households indicated that they would sustain the interventions because they are not difficult to manage, while 56% of the households cited high economic impact of the interventions, 49% indicated that the interventions are not labour demanding while 24% percent of the households mentioned about the potential of the interventions in building soil fertility. Few households (15%) cited other reasons such as food security and climate change response.⁴⁶

Finding 43: There is evidence that self-scaling approaches have been responsible for growth in beneficiary numbers. The programme also created new partnerships and 'spin-off' interventions which enhanced benefits and outreach.

In focus groups, several beneficiaries noted that they had adopted ECRP interventions as a result of observing the benefits accrued by other farmers involved in the programme. Lead Farmers and Village Agents have continued to recruit new farmers and groups during the lifetime of the programme. A small number of household survey respondents also reported having purchased inputs or begun work on irrigation because they had observed others benefitting through programme-supported activities in these areas. For example, in Thyolo, one female FGD participant commented *"VSL has now gone everywhere, even irrigation, down along the river almost everyone is now doing it now"*. This is also reflected in the generally higher number of beneficiaries captured through the household survey than IP reporting.

Indirect beneficiaries are also noted as benefitting from seed distribution in communities, since some beneficiaries are able to sell surplus seeds produced from their initial crop. In areas where additional cash is available in the local economy because of increased productivity (usually a result of irrigation) then some report an increase in casual labour opportunities. The programme's work on advocacy, early warning and humanitarian response also results in additional beneficiaries. Since Lead Farmers, Village Agents and CPCs report their interest to continue with the roles established on the programme it is possible that these will continue in a modest way beyond the lifetime of the programme.

The ECRP also created a number of new partnerships and 'spin-off' programmes which enhanced the benefits for existing beneficiaries or resulted in new beneficiaries being targeted. These include the partnership between DISCOVER and ICRAF and ability to secure match funding from DFID for a large-scale NRM programme, the partnership between DISCOVER and ICRISAT/CIP in Karonga and the work CA-ECRP did with WFP to reach MVAC beneficiaries. Detailed assessment of these programmes was not within the scope of the evaluation.

⁴⁶ Bondo, A. and Mulwafu, A (2017) United Purpose Household Asset Building and Welfare Improvement Survey for DISCOVER.

Finding 44: The work done to train Lead Farmers, Village Agents and CPCs, whilst working closely with District Government, creates a solid foundation for sustainability. Insufficient oversight of natural resource management activities and parallel lines of communication may limit sustainability.

One of the most striking aspects of the ECRP to emerge during the fieldwork was the importance of local structures and committees in ensuring the sustainability of the programme. Respondents commented repeatedly that the skills and knowledge created by the programme was available at village level. All beneficiary CPC respondents commented that they would continue to function after ECRP phased out, with key drivers of sustainability being the training received, availability of equipment, availability of resources from CPC farms and links into the Government system. Challenges to sustainability included a lack of refresher training, inability to replace first aid or river gauge equipment and challenges with mobilising resources for humanitarian response. In one case, the CPC noted that the project played an intermediary role in communicating to Government and that without this they would not know who to contact. Both in previous reports and in focus groups and interviews during this evaluation, challenges in monitoring natural resource management activities were highlighted. Given the programme has spent less time and resource building the capacity of NRM committees, it may be a challenge to ensure the survival of trees planted and continuation of catchment management activities. District Government ownership of the activities is also a contributing factor to sustainability, implementing staff noted the willingness of the District Government to make repairs to flood damaged irrigation systems in Dedza which indicates the level of ownership required for Government to continue to support ECRP investments after the programme's exit. In Chikwawa, the ADDRMO noted that the Government had updated the District's contingency plan in 2016 without project support. One District official in Machinga remarked *"The ownership of the activities was enshrined in the district by involving the district officer from the time of implementing the project. This was the best way ECRP put forward its exit strategy. This will ensure continuity of the activities. The training sessions the ECRP conducted was part of exit strategy because the capacity to carry on with activities was built in. At local level, the link between VDC and VCPC seems to have increased the smooth exit strategy."*

Finding 45: Given the growing frequency and severity of climate shocks and the lack of broad-based economic growth in Malawi, the level of investment made by ECRP per household was insufficient to have an impact on total levels of humanitarian need and this could threaten future improvements in livelihoods.

ECRP has spent £134 per beneficiary household over the past six years. Whilst ECRP beneficiaries have seen increases in asset values as a result of their involvement in the programme, overall poverty levels and food security have worsened since mid-term as a result of the repeated climate shocks and weak economic conditions. Many programme beneficiaries expressed a desire for greater volumes of direct asset transfers given the

challenges that they have faced from drought and floods. ECRP has piloted a relatively low-cost model to encourage self-reliance and to limit 'free handouts', primarily within the existing livelihood and market systems. In the context of chronic food insecurity and few economic opportunities, there are limits to what such approaches can achieve and there is a risk that beneficiary gains could be eroded by future climate shocks.

5. Conclusions

ECRP has been a successful programme which has reached over 177,000 vulnerable households and exceeded many of the logframe targets which were within its direct control. Work to strengthen village-level warning systems has indirectly benefitted over 1.5million people. ECRP implementers spent around £134 per direct beneficiary household and approximately £2 per indirect individual beneficiary.⁴⁷

For its direct beneficiaries, the programme was responsible for statistically significant increases in the adoption of resilience building practices such as conservation agriculture, the use of drought tolerant seeds, joining village savings and loan groups (VSL), irrigation, and the use of early warnings and weather forecasts. Statistically significant increases in the adoption of low carbon technologies such as solar lights and fuel efficient stoves were also identified although the programme did not hit its output targets for these activities.

At the outcome level, the evaluation attributed statistically significant increases in the value of household assets of between £68 and £136 to the adoption of combinations of ECRP interventions.⁴⁸ Assets are an important characteristic of household resilience because they include farm tools that are essential for farming and livestock or household items which can be sold during hungry periods. Whilst ambitious targets for increases in asset and income levels for beneficiaries were not met, ECRP has helped its beneficiaries to maintain more of their assets than the non-beneficiaries we compared them with⁴⁹ despite the repeated and severe climate shocks which occurred during the programme lifetime. A cost benefit analysis of the programme's impact on crop production and income flows show that over a 10-year period it generated between £2 and £3 of benefits for each £1 invested. Income flows are important for resilience because households use income to purchase food and household essentials and to invest in assets and new and less weather dependent businesses. The programme did not reach its targets related to food security and we could not attribute statistically significant increases in food security to the programme. However, there were limitations in the methodology used to assess this and during focus group discussions,

⁴⁷ Refers to costs of DRR activities not total programme costs.

⁴⁸ Whilst on first glance this might appear lower than expenditure per household, it does not capture the additional income or food consumption which has also occurred as a result of ECRP. It was not within the scope of the impact assessment to statistically attribute increases in income but quantitative data was used to assess likely impacts on income and food security via the cost benefit analysis described later. Therefore the total value created by ECRP exceeds the increase in asset values alone.

⁴⁹ Using statistical matching to ensure they were sufficiently similar to make a meaningful comparison.

beneficiaries repeatedly explained that many ECRP interventions have helped them produce or purchase food.

A contribution analysis showed that the programme has played a critical role in strengthening capacity for disaster risk reduction at community level in 272 GVHs. It has also initiated natural resource management activities which, if sustained, can reduce household exposure to shocks. Around 70% of the 24 CPCs sampled in our evaluation met the programme's definition of being fully functional and all were partially functional, whereas none of 11 non-beneficiary CPCs were fully functional.⁵⁰ Capacity which the programme created at village level has delivered life-saving early warning messages, tackled crop pest outbreaks, encouraged farmers to use seasonal and short-term weather forecasts and implemented NRM activities include tree planting, river bank management and the enforcement of by-laws protecting existing forest areas, but these were mostly at an early stage and could not be assessed in detail by this evaluation. Feedback from stakeholders about the value of the programme at community and district level has been overwhelmingly positive. The use of low-cost interventions and focus on building the capacity of village-level volunteers and District Government has enhanced the sustainability of the results.

Advocacy directed at District Government has focused on increasing the speed and level of District Government response to crop pests and diseases (especially army worm and banana bunchy top disease), increasing District Government action on the enforcement of forest conservation plans and on increasing the allocation of resources to DRR – especially early warning and disaster preparedness. There is evidence that Government has acted in line with Programme advocacy messages, though Government allocation of budget to DRR is still limited by overall funding constraints. Whilst it was outside of the scope of our evaluation to make a detailed assessment of the role of ECRP in relation to other district stakeholders in influencing these outcomes, District Government stakeholders frequently commented positively in relation to ECRP's role.

At the national level, the programme has influenced the development of new resilience programmes by other NGOs and donors, with at least one major donor-funded programme being modelled on the ECRP approach. It has also developed strong relationships through advocacy with the Environmental Affairs Department in the Ministry of Environment and Climate Change Management (MECCM), the Department of Disaster Management Affairs

⁵⁰ Due to resource constraints we were only able to sample 7% of all the 272 Civil Protection Committees. Full functionality of the VCPC is defined as: 1) Has workplan 2) Meets at least 4 times per year 3) Has carried out risk assessment 4) Has raised awareness of disaster risk in the community 5) Has implemented long-term risk reduction activities Full functionality of the Early Warning System at GVH level is described as: 1) Has mechanisms and equipment to detect disasters (to include: phone; river/rain gauge); AND 2) Has provided early warning messages for flood/storm in the last year AND/OR has disseminated weather forecasts AND 3) Has engaged in facilitating/delivering humanitarian response.

(DODMA) and the Malawi Meteorological Service but it has not actively engaged with the national Social Support programmes with which it shares a target group.

The following sections provide more detailed discussion of the conclusions and lessons learned under each of our four evaluation questions.

5.1 Was the programme's theory of change relevant given its objectives and target groups?

Conclusion 1 ECRP's interventions were relevant to the target group and the objective of the programme, but could be better tailored to poorer target groups.

In line with programme documents, ECRP's household-level interventions required moderate amounts of land and labour capacity to be successfully adopted. When combined with interest-based targeting, this resulted in a target group which before the programme had started was slightly better-off, on average, than farmers randomly selected from comparison areas. More clarity on target groups could enable greater tailoring of specific interventions.

Outreach to vulnerable groups was successful, but with a clearer strategy for segmenting households, the programme could have tailored its interventions and resources more effectively. The programme documents were clear from the beginning that ECRP was not designed for households with no land or labour capacity, who are the targets of the national social cash transfer programme, but its target group did overlap with those households targeted through national public works programmes. ECRP's targeting was mostly interest-based and the programme reached a wide range of households with the same interventions. Malawi has extremely high poverty rates with limited opportunities to differentiate between households whose incomes and assets fluctuate annually. However, to ensure resources do reach very poor households which are mostly dependent on casual labouring jobs for income and which have very small land availability for farming, it would be possible to better tailor future livelihood interventions. For example, cash and asset transfers, poultry or dove rearing, low-value VSL, small-scale irrigation on borrowed land were more viable for this group. Off-farm employment or natural resource based businesses may also be viable depending on their complexity and running costs. For households with larger plot sizes, interventions focused on the marketing of agricultural crops could be relevant. Access to improved seeds, conservation agriculture and Natural Resource Management remain important for all types of households but the types of incentives would vary – with poorer households more likely to participate in public works or free seed distributions and richer households more likely to purchase seed in markets or to manage NRM activities under payment-by-results schemes.

Conclusion 2 Different targeting approaches have different costs and benefits.

The goal of targeting is to more effectively target resources to ensure those that need the programme most are able to benefit. Targeting can also avoid waste or prevent programmes from worsening existing inequalities. However, the process of targeting has both economic and social costs which may exceed the possible losses from waste without it. Malawi has widespread poverty and in targeting its national programmes, Government has found it extremely challenging to identify the poorest beneficiaries without significant inclusion or exclusion errors. ECRP's interest-based targeting approach is low cost compared to National Government's social protection targeting. MVAC humanitarian targeting approaches are both cheaper and more likely to target poorer households. The appropriate approach for DFID in future programmes will depend on its objectives. If DFID is interested to contribute to national dialogue on targeting to a greater extent, then funding programmes using Government targeting systems and endeavouring to develop new models or evidence about the best approaches could be an appropriate response and in line with Paris Declaration commitments on aid effectiveness. However, if DFID is primarily concerned with the cost-effectiveness of its own programmes in the short-term then light touch NGO-led targeting which relies on interest or on simple community targeting processes may be more appropriate.

Conclusion 3 ECRP's longevity was extremely important in its success. Clarity about the end date rather than a series of extensions would have further improved programme efficiency and learning from adaptation of the approach.

A six-year implementation timeframe allowed for greater efficiency, with delivery systems taking time to establish but ultimately reaching large numbers of households in a cost-effective manner. The programme directly reached over 177,000 households containing almost 1 million individuals and strengthened early warning systems for at least 1.5million people. The long time period has also allowed lesson learning and adaptation of the approach over time. In addition, it contributed to the programme's credibility with external stakeholders which has facilitated its policy influence. However, greater predictability about the programme's end date, rather than a series of short-term extensions would have enabled programme implementers to make more substantial alterations to the programme's approach and also potentially to retain more of its staff.

5.2 What impacts can be attributed to ECRP at household level and what contribution has the programme made to change at community, district and national levels?

Conclusion 4 At household level, ECRP exceeded 11 out of 15 of its implementation targets and met its outcome level targets for asset increases amongst female-headed households. Programme participants had assets worth £68 to £136 (2017 values) more than similar households who did not participate and reported improvements in incomes and food security as a result of programme activities.

However, the programme did not reach its ambitious targets for overall increases in income, asset or food security. Challenges meeting outcome goals are as a result of ECRP's relatively modest spend per beneficiary, the repeated climate shocks affecting its beneficiaries and weak economic growth limiting job creation or improvements in Government services. ECRP implementers spent around £134 per direct beneficiary household or £2 per indirect individual beneficiary.⁵¹ At this level of spend per beneficiary, the programme is responsible for statistically significant increases in asset values of £68 - £138 depending on the package adopted. Results from the cost-benefit analysis studying income flows suggest that over a 10 year period, the programme will deliver between £2 and £3 of benefits for every £1 spent. Given the extremely high poverty rates in Malawi and the severity of the shocks experienced, it has not been possible to identify a reduction in humanitarian need as a result of ECRP. This does not mean that the programme has been a failure but rather that the investments per household have not been sufficient to deliver the level of improvement in household resilience that DFID expected. If DFID is interested to understand the level of investment required to sustainably improve resilience to a level that reduces humanitarian costs, then it should potentially explore how the level of investment per household could be increased. However, this would likely reduce the total number of people who could benefit from future programmes. Given the widespread poverty in Malawi and targeting challenges, too great an investment in a small number of households in one area could result in inequality or conflict between beneficiaries and non-beneficiaries and would not be sustainable in the long-run. A relatively moderate increase, combined with continuation of existing social protection and humanitarian support, is therefore recommended.⁵²

Conclusion 5 At community level, the evaluation found that ECRP had played a critical role in facilitating positive changes in the performance of VCPCs in its operational areas. Evidence from focus groups and key informant interviews shows these changes encouraged the adoption of household-level interventions, improved the coverage of life-saving flood early warnings and led to more effective humanitarian targeting and response. Statistically significant improvements to households' ability to access disaster warnings can be attributed to ECRP, with particularly good results for female headed and poorer households who are less likely to receive warnings in comparison areas. There is also a statistically attributable increase in asset values for those households exposed to a disaster in 2017 and who had adopted the core ECRP package, and received early warnings. The assets of this group were, on average, £125 more valuable (in 2017 values) than those who had not adopted any package nor received a warning and were, on average, £57 higher than those who had adopted the core package alone.

⁵¹ This figure is based on an estimate of the population in the GVHs where ECRP was operational since it is expected that the majority of the population could benefit from early warnings, disaster risk management planning and natural resource management activities. The costs relate to DRR activities only plus a proportional share of management costs.

⁵² The UK must also continue broader policy dialogue to encourage measures promoting broad-based economic growth, job creation etc. which are critical to reducing dependence on agriculture but are not within the scope of resilience programmes.

It is not possible to put DRR and early warning impacts into a cost-benefit analysis or to offset them against the costs associated in reaching all GVHs in the programme's operational areas.⁵³ However, there was a relatively wide range in costs incurred by implementers working with CPCs suggesting that a streamlined, lower-cost and standardised approach to DRR capacity building is possible. The approach used should be tailored to the hazard context of a given GVH. Rainfall/river monitoring and early warning is most important for flood-affected GVHs, whereas crop pest monitoring, using seasonal and short-term weather forecasts, participating effectively in MVAC targeting and the wider links between vulnerability and land degradation are a priority for all GVHs.

Conclusion 6 Improved VCPC capacity created some increased motivation for natural resource management activities, but more incentives and improved monitoring could result in stronger performance in future programmes.

At all levels, stakeholders note the importance of NRM in ensuring sustainability of programme interventions and of reducing household exposure to shocks. However, NRM was not a major focus in the early versions of the programme theory of change. Whilst implementing agencies have increased investment in this area in the second half of the programme, it is acknowledged by stakeholders that these activities require a catchment-level approach and take time to deliver meaningful results. A lack of short-term incentives amongst farmers to engage in NRM activities with uncertain long-term gains was also noted as a constraint. By-laws and advice from the VCPCs about the links between natural resource degradation and disaster exposure were found to be a useful motivator for community participation in NRM. NRM businesses promoted by the programme were largely at an early stage or involved insufficient numbers of farmers to make a significant shift in patterns of resource exploitation. Fuel-efficient stoves were widely adopted and highly valued due to poor availability of fuelwood, but were not always replaced when broken. Linkage with national public works programmes which can pay farmers for their work on NRM were only exploited in a handful of cases and the programme did not experiment with other incentive structures. Monitoring data on NRM activities was also relatively limited. A greater focus on NRM activities in future programmes, more catchment level planning and experimentation with a range of potential incentive-mechanisms (e.g. public works, payment by results, NRM businesses) and better monitoring and evaluation of this area would be useful.

Conclusion 7 Analysis of results for different packages does not lead to a firm conclusion about an "optimal" ECRP combination which offers the greatest improvements in all aspects of household resilience for every £1 invested by DFID but a programme incorporating a combination of direct asset transfer, VSL, Conservation Agriculture, Seed Systems and Irrigation and DRR is likely to have the

⁵³ This is because the cost benefit model looks at annual income flows and not a steady accumulation over time. Not all households experience a disaster every year and it is challenging to model the numbers of those affected since households perceive 'disasters' differently. Figures on potential annual asset savings as a result of warnings from the survey also cannot be directly compared without more detailed information on the localised effects of specific shocks. This was outside the scope of our evaluation. Reported benefits also include reductions in the loss of human life which cannot be valued or quantified.

most meaningful results for beneficiaries and offer the best prospect for value for money especially if costs can be reduced for irrigation and DRR.

The combination of interventions which was cheapest to implement (VSL, Conservation Agriculture and Post-Harvest Management) had the highest benefits per £1 invested based on analysis of income flows over 10 years offset against programme implementation costs. However, this package had the smallest statistically significant impact on household asset values and is most useful for resilience to moderate dry spells or isolated shocks. Post-harvest management approaches promoted by the programme had minimal benefits and were widely adopted by non-beneficiaries, so the majority of benefits in this package are derived from VSL, the use of improved seeds and CA.

Adding a livestock distribution intervention to the core package resulted in the greatest impact on assets (unsurprising since it is a direct asset transfer), but made the intervention substantially more expensive without a commensurate gain in income flows over the lifetime of the CBA. The data on the success of the livestock pass-on programme is inconclusive and there may be more cost-effective ways to deliver livestock to beneficiaries. However, the livestock component was one of the most highly valued by beneficiaries who particularly desire sources of income that are not dependent on rain-fed harvest and who also access agricultural benefits from the use of manure. It is possible that cash-based asset transfer which would enable households to either purchase their own livestock or invest in other diversified livelihoods would be as effective as the livestock programme. Support to extension services around animal husbandry or animal health could still be valuable but could be targeted at a wider audience. Other sources of out-of-season income which are not dependent on using biomass in the community could also be explored.

Adding irrigation to the core package causes a small decrease in the benefits accrued for each £1 spent since it generates additional income for beneficiaries but was also relatively high cost per beneficiary involved. Nevertheless, even implemented without other aspects of the core package, irrigation would still generate over £2 in benefits for each £1 invested. In qualitative data, it is clear that households highly value irrigation because it allows them to access food and income at different times of year and in the event of failure in rain-fed harvests. This is a crucial aspect of household resilience and if households are also enabled to produce more profitable crops and access higher value markets then this can be transformative.

Conclusion 8 Despite a lack of formal gender analysis during the design of the programme, the programme has successfully involved both female headed households and wives in male-headed households and has had a positive effect on intra-household decision-making.

The programme's gender activities have been both mainstreamed within its activities (e.g. through including gender messaging in agricultural training and by ensuring women are targeted for training) and implemented separately through *Community Gender Conversations*. We did not detect a difference between the two approaches but did not have a large enough sample to draw firm conclusions. Qualitative data indicates that greater

investment in behavioural change activities for both men and women to encourage greater labour-sharing on domestic tasks as well as investment in marketing of women's agricultural products could strengthen these achievements in future.

Conclusion 9 ECRP has been actively engaged in advocacy at national level with positive feedback on their influence from stakeholders.

At least one other donor-funded programme was reportedly modelled on the ECRP approach, and it is clear that ECRP has contributed to improvements in the accessibility of weather forecast information, communication of the DRM policy, the formulation of the national Climate Change Management Policy, dialogue around national resilience planning and policy related to energy from fuel-wood. The flexible approach enabled the programme to take advantage of opportunities but more resources dedicated to advocacy and a narrower focus would have enabled deeper understanding of Government's needs in relation to policy development and implementation and a more targeted response. In addition, support from donors which have different types of leverage and influence on Government was lacking in ECRP's advocacy efforts.

5.3 Was the programme delivery efficient and effective?

Conclusion 10 ECRP approaches were mostly cost-efficient, but there is scope to reduce costs through learning from the most efficient members of each consortium.

In particular, as mentioned above, intervention costs for irrigation and DRR activities offer the most scope for improvements by harmonising across consortium members. The programme's core post-harvest management activities do not appear effective as many non-beneficiaries use the same approach and there are no detectable improvements in avoided losses. However more recent innovations may generate different results.

Conclusion 11 Levels of supervision were higher in ECRP than in other similar programmes in Malawi, which was associated with the programme's success.

However, staff investment varied substantially across consortium members suggesting opportunities for greater efficiency. ECRP used local Government experts to support technical delivery and village-based volunteers to provide ongoing support; the employed programme staff organised activities, managed resources and consolidated monitoring records. This was efficient and effective. However, the numbers of staff employed varied substantially across consortium members.

Conclusion 12 ECRP's partnership with Local Government was considered unusually strong for an NGO implemented project by both District and National level Government stakeholders. However, programme planning and reporting was not

aligned with Government systems and the transfer of knowledge and skills was mostly at the individual level.

In future programmes, more formal joint management⁵⁴ could be trialled but would likely require higher staff costs or mean slower progress in the early stages whilst those systems are being established. ECRP had involved Government staff in the delivery of almost all of its activities and coordinated with Government and other NGOs through the District Executive Committee. District officials were actively involved in the selection of implementation areas for the programme but were less involved in the operational design and management of the activities. Due to limitations in staff time and the existence of numerous NGO projects in each district, Government staff would not necessarily have had the capacity to be any more involved but some did note that ECRP did not report on time, that they were not always informed about the activities and that they considered the programme something 'parallel' to them.

Without direct investment in Government staff numbers, it would be difficult for any programme to build the capacity of Government systems and improvements in individual staff capacity will always be subject to the high staff turnover amongst district staff. There may also be a lack of political incentives for performance management within Government systems. There are two options to improve this. The first is to maintain a separate management system but to focus more on developing technical manuals for Government staff and working throughout the system to create the political incentives for their adoption. The second is to move to a formal joint management approach as described above. This could involve NGO implementation of a nationally agreed programme with strong Government-led national oversight and evaluation or a similar management approach to ECRP at national level but with formalised District Government management. The secondment of programme staff into district structures would be required to allow District Government to effectively manage the investments and fund management arrangements would need to be appropriate given DFID's assessment of the fiduciary risk involved in using Government financial management systems.

5.4 To what extent are the programme impacts likely to be sustained without further intervention?

Conclusion 13 Few free inputs and extensive work through local Government and Community Volunteers has contributed to the sustainability of programme interventions.

Most of the ECRP interventions do not require substantial investment by beneficiaries beyond what has proved manageable for them already, which means that beneficiaries are confident that they can continue to use them. There are some instances of disadoption of

⁵⁴ Joint management is necessary because UK funds cannot be spent through Malawian Government systems due to fiduciary risk. Therefore joint management would be an approach that could use and strengthen Government's planning, monitoring and reporting structures but would have independent financial management. This would usually require supplementary staff hired from project funds but embedded into Government management systems.

conservation agriculture, of households being unable to manage VSL contributions or of stoves being broken and not replaced. However, there are also signs of new VSL groups being formed, a surplus of stoves being manufactured and of growing areas being put under conservation agriculture. So, it is expected that the interventions will continue to be widespread in ECRP areas without the programme support.

The use of Government-mandated structures, such as CPCs for Disaster Risk Reduction activities and the involvement of District Irrigation Offices in scheme monitoring is extremely valuable in enhancing sustainability. However, both Village and District Government capacity improvements are vulnerable to staff or volunteer turnover. VCPC members may also require refresher training or feedback indicating their work leads to action by Local Government to remain motivated. Whilst the programme has developed and is using some technical manuals or written guidance for Government, this has not been done systematically and is not frequently mentioned by District staff who have engaged with the programme. Further development of technical guidance might enhance handover in the case of staff turnover at district level and help embed cost-effective approaches to delivery into Government systems nationwide.

Conclusion 14 Asset transfers can be provided in-cash or in-kind, through direct procurement or through market-based approaches using vouchers. ECRP's in-kind transfers of seed and livestock enabled beneficiaries to access productive assets they may not have found in the market. However, there may be limitations to the sustainability of these approaches.

In some cases seed pass-on programmes were only effective for a few years where improved seeds are only viable for 2-3 seasons. Livestock pass-on programmes were also at risk of failure without substantial oversight from programme staff and cooperation from community leaders. ECRP's seed and livestock interventions have focused on direct asset transfer, with assets procured by the programme. Whilst transferring livestock increases household assets, the supervision costs can be high and the benefits of pass-on can be reduced if not all households cooperate or if deaths prevent pass-on from happening. That does not detract from the fact that livestock production is a profitable business for ECRP's target group and there are multiple resilience and social benefits that come from livestock ownership. However, ruminants also place demands on limited biomass and there may be other off-farm business options which could be explored.

Given the relatively low cost-benefit ratio associated with livestock programmes and their high supervision costs, it may be more cost-effective to transfer assets using cash in future, but it is important to note that livestock programmes are highly valued by beneficiaries in focus group discussions. Given many of the seeds supplied by the programme are not readily available in the market for beneficiaries to buy, there is scope for further intervention on seed systems in future programmes, but it is not clear whether seed supply businesses run by better off households would have a better result on seed availability for poor households than a free transfer approach targeting those who are less likely to have cash to purchase seed. ECRP's current approach has a greater effect on adoption of seeds by female

headed households than for the wider population but has had not made a statistically significant change to the use of improved seeds by very poor households.

6. Recommendations

Given the ECRP will close in September 2017, we have included here the priority recommendations for the design of future resilience programmes. Recommendations are drawn from the conclusion with the same number and are presented here to summarise the key actions arising from these conclusions.

Recommendation 1: For future programmes, DFID and resilience programme developers could be more specific about target groups and only offer interventions that are appropriate to the level of land, labour and market access of that group. For example, activities for very poor households could include cash and asset transfers, poultry or dove rearing, low-value VSL or small-scale irrigation on borrowed land. Off-farm employment or natural resource based businesses with low running costs may also be viable. These households can also be involved in NRM activities under public works and can benefit from free seeds. Activities for better off households should focus on marketing of agricultural products and engagement in NRM via payment-by-results schemes. They may also be involved in seed production for market or purchasing seed produced by others.

Recommendation 2: Resilience programme funders must decide whether they feel targeting offers value for money. This will depend on whether they wish to maximise the efficiency of programmes which they directly support in the short-term or if they want to engage more effectively in strengthening Government systems for targeting, which could have more wide-reaching impacts or greater value in the long-term.

Recommendation 3: Resilience programme funders should ensure funding is committed for programmes lasting at least five years. This will allow time to establish systems and maximise efficiency in delivery.

Recommendation 4: Resilience programme funders and implementers should make moderate increases to the level of investment per household in future resilience programmes. Using asset transfer as an incentive for natural resource management is a potentially cost-effective option. Piloting and research will help to identify the optimal level of investment which does not create conflict between households and generates sustainable results – it is suggested that investments of between £50-£100 per beneficiary per year, of which at least 50% is direct asset transfer, could be a starting point for research.

Recommendation 5: Future resilience programmes should sustain investments in village and district level DRR systems but identify approaches to streamline the method and reduce costs. Costs could be reduced through the development of national manuals, better tailoring of training packages to the hazard context of each district, less repetitive training and placing less emphasis on early warning in areas which are not prone to flooding.

Recommendation 6 Future programmes must place a greater emphasis on the design and implementation of natural resource management activities from the programme design phase. This should include identifying an appropriate range of incentives for sustainable management of these activities, ensuring coordination with public works supported under national social protection programmes and improving M&E systems to track progress and generate lessons learned.

Recommendation 7 Future programmes should incorporate combinations of direct asset transfer, VSL, Conservation Agriculture, seed systems, irrigation and DRR. Further research is needed to identify the best approaches to supporting livestock production which could include livestock pass-on programmes, livestock extension services and animal health support, cash or voucher programmes or identification of business opportunities within livestock value chains such as fodder production, or marketing of livestock products.

Recommendation 8 Sustain commitments to gender mainstreaming and the ‘leave no one behind’ approach⁵⁵, ensuring strategies are documented in programme design. Gender approaches should include approaches which enhance women’s economic empowerment and promote equality in intra-household decision-making. Approaches to ‘leave no one behind’ should set realistic targets and allocate resources for linking with specialist organisations that can support disabled and chronically ill people to be included.

Recommendation 9: In future programmes, it would be useful to identify a more focused set of policy or implementation capacity gaps at national level and then resource joint work with Government to meet these appropriately. A flexible process is essential to take advantage of political opportunities and to ensure value is added to existing support from other development partners. Allocation of time by donors to support programme advocacy efforts through high-level policy engagement with Government would enhance effectiveness.

Recommendation 10 Implementers of resilience programmes should continue to monitor and benchmark costs per output to ensure cost-efficiency. This should form part of a process to reduce unit costs for DRR and irrigation and to identify more innovative and cost-effective approaches to post-harvest management, if required.

Recommendation 11: Resilience programmes should continue to work through village-based extension volunteers and district Government. The median ratio of 1 field staff: 18 villages may be a useful benchmark for future programmes using similar approaches but staffing arrangements will vary based on context and programme objectives.

⁵⁵ “Leave No One Behind” refers to approaches which can be inclusive of all vulnerable groups. This includes children, youth, persons with disabilities, people living with HIV, and older people.

Recommendation 12: Future programmes could consider a more formal joint-management option where implementation is coordinated by District Councils and programme budgeting and planning years are aligned to those used by District Councils.

Recommendation 13: Continue to involve District Officials and local volunteers in the implementation of activities and work to ensure technical manuals and political incentives are in place to ensure sustainability.

Recommendation 14: Future resilience programmes should build on ECRP's lessons and identify opportunities to reduce costs in asset transfer programmes. Alternative approaches to direct transfer and pass-on could be considered, with a greater role for the private sector if possible. More research is needed in relation to the cost-effectiveness of local models of seed supply which might include the promotion of open pollination varieties, voucher programmes and work with private sector input suppliers, community seed banks and establishment of outgrower schemes for seed companies.

Future programmes could also explore different delivery options in future asset transfer programmes. This could include: 1) Identifying whether market-based approaches to enabling transfer of specific assets (e.g. cash or voucher programmes) would reduce costs compared to direct procurement; 2) Identifying if lower cost ways of improving livestock production without making direct transfers (e.g. sole focus on animal health interventions and training) are relevant to the target group; or, 3) Exploring if the transfer of alternative productive assets for off-farm enterprises could create stronger incentives for natural resource management (e.g. bee-keeping, bamboo production, sale of forest products).

Annex A: Terms of Reference

Enhancing Community Resilience Programme in Malawi Terms of Reference: Final Evaluation

1. Background to the programme

The Enhancing Community Resilience Programme (ECRP) was designed to address the context of chronic climate vulnerability faced by rural people in Malawi. It started in 2011 and is closing in 2017. The purpose of the *ECRP* is to increase the resilience of vulnerable communities to climate variability and change. DFID, Irish Aid and the Norwegian Embassy fund the ECRP.

The programme has the following elements:

- NGO work with communities in 11 target districts. 5 are covered by the DISCOVER consortium led by United Purpose (formerly known as Concern Universal), 7 are covered by the ECRP consortium led by Christian Aid (with one district covered by both);
- Both consortia work with the Centre for Environmental Policy and Advocacy (CEPA) to deliver advocacy and policy influence.

A list of the organisations working with each consortium is available at the end of this document.

In the original programme design, support was also provided to the Malawi Vulnerability Analysis Committee (MVAC) to enhance the timeliness, comprehensiveness and accuracy of early warning information. This was withdrawn along with other direct budget support to the Government of Malawi in 2011. Whilst the absence of this support changes the programme's theory of change, the MVAC has continued to function, supported by other partners throughout the lifetime of ECRP.

ECRP's theory of change includes five major components that aim to build resilience to climate change at the household, community and district levels. They include 1) improved capacity of local authorities (especially village, area and district civil protection committees), 2) improved and resilient livelihoods, 3) enhanced early warning response and 4) informed policy and 5) humanitarian response and recovery.

A key part of the ECRP model is that households are encouraged to adopt multiple disaster risk reduction or climate change adaptation strategies in combination. The programme also aims to ensure that local institutions have increased knowledge of local risks, vulnerabilities and capacities with the goal of improving programme and government investment and

targeting. In 2015-6, the programme recognised the importance of humanitarian response and recovery activities to protect beneficiaries from large-scale drought and flood shocks. The humanitarian and response component was therefore only added at this point in the programme's lifetime.

As part of the Evaluation Approach paper, the original theory of change will be re-visited and updated. Final evaluation questions and methods will draw on this theory of change analysis, which can be discussed with stakeholders during a planning mission scheduled for early March.

2. Background to the work of the ECRP M&E Agency

LTS International and CDM have been working together as the M&E Agency of ECRP since 2011, during which time they have supported the development of an online management information system and released a number of studies in line with their mandate of increasing accountability and promoting learning. A list of prior M&E outputs is available in the supplementary information at the end of these ToRs.

3. Background to DFID's global resilience work

It is expected that this evaluation will contribute to DFID's ongoing efforts to understand the most effective approaches to building the resilience of vulnerable communities in sub-Saharan Africa. In particular, the evaluation will draw upon evidence generated by DFID's investment in the *Building Resilience to Climate Extremes and Disasters (BRACED)* programme. We will therefore ensure that key evaluation questions posed by the BRACED knowledge manager are used in developing the terms of reference for this evaluation. These questions are organised around three key themes, as follows:

Pathways to resilience – To what extent are the four BRACED areas of change important for resilience in ECRP? These relate to changes in knowledge and attitudes⁵⁶, changes in capacities and skills, changes in decision-making processes and outcomes from partnerships⁵⁷.

Resilience outcomes – To what extent do the ECRP outcomes contribute to anticipatory, adaptive and absorptive capacity? How do these capacities overlap and which appear most important in contributing to household resilience?

Resilience in context – To what extent does the context in which ECRP has been implemented enable or constrain change?

⁵⁶ ECRP has focused on knowledge and practices (adoption). The approach paper will explore whether there is scope to examine the role of attitudes in adoption. Otherwise we will limit our focus to knowledge and practices as defined in the ECRP theory of change.

⁵⁷ We will be most interested in support to the capacity of CPCs at local and District level but may touch upon other capacity development outcomes if key informants highlight them as important.

The evaluation of ECRP offers a particular opportunity because it is a longer-term investment than the current suite of BRACED projects. A recent BRACED publication highlighted the challenges in assessing resilience outcomes for short-term (3 year) projects.⁵⁸

4. Scope of final evaluation

It is proposed that the final evaluation can review progress reported by the end of June 2017. However, the optimal date to use for IP monitoring data reported in the final evaluation will be agreed during consultation with implementing partners and DFID.

The Project Completion Review (PCR) will capture progress to the end of the programme (using IP final reports). The date at which these reports become available and therefore the timeline for our work on the PCR will be agreed in consultation with IPs and DFID.

All aspects of the programme theory of change will be included in the evaluation, which will review changes at household, community and national level. Data collection will take place in all 11 districts.

ECRP has collaborated with several other initiatives. Most significant is DFID's joint funding of an ICRAF-implemented forestry initiative under DISCOVER. Households reached through the ICRAF project are included in DISCOVER's ECRP reporting against their agro-forestry and natural resource management targets, but the extent to which beneficiaries of the two initiatives overlap is not yet clear. We do not plan to disaggregate household survey results by ICRAF beneficiaries, but we may include ICRAF-funded activities in discussions in focus groups and key informant interviews where this yields useful learning on evaluation questions. The ICRAF operational areas are available in the supplementary information to this ToR.

CA-ECRP received funds from WFP to integrate humanitarian beneficiaries into ECRP. We may target some of these individuals in survey work to 'oversample' households from poor socio-economic backgrounds in Machinga district. We will also explore issues relating to humanitarian response in focus groups and interviews. However, we will not disaggregate survey findings by participation in this initiative as the number of beneficiaries are too small. Smaller scale collaborations, such as that with UNDP (on a sustainable charcoal pilot), and with the Malawi Oil Seed Transformation project (MOST) and the Malawi Ministry of Trade and Industry on market development activities, will not be a particular focus of the evaluation. They may, however, be mentioned if stakeholders find them particularly significant in relation to key evaluation questions.

⁵⁸ Paula Silva Villanueva, Catherine Gould and Florence Pichon (2016) Routes to resilience: A summary of lessons from BRACED Year 1.

5. Objectives of the Final Evaluation and evaluation questions

The review will use OECD-DAC criteria in assessing the programme's achievements and in documenting lessons learned for future programmes. The work will have four main questions and will investigate changes at household, community and national level.

Potential data sources and methods are indicated in relation to each question in Table 1 below. These draw on previous methodological work by the M&E Agency, but detailed methods will be presented by the M&E Agency in the Evaluation Approach Paper for DFID's approval.

Table 32: Evaluation questions and data sources

<i>Question 1: What are the impacts that can be attributed to ECRP at household, community and district and national levels?</i>	
1.1 <i>What outcomes at <u>household level</u> can be attributed to the programme activities?</i>	
1.1.1 To what extent do households involved in ECRP experience improvements in income, assets, food security, poverty and ability to use early warning or weather information (in comparison to similar households not involved in the programme)? ⁵⁹	Household Survey, quasi-experimental impact assessment design with matching; FGDs
1.1.2 How do these outcomes contribute to absorptive, anticipatory, adaptive and transformative capacities as defined in the literature?	Survey, FGDS, KIIS
1.1.3 How do outcomes vary depending on the gender of the household head and the wealth status of the household?	Household Survey
1.1.4 How do outcomes vary across frequently occurring combinations?	Household Survey
1.1.5 What are the most important factors affecting the extent to which a household benefits from the programme interventions? Which contextual factors are particularly important?	Survey, FGDs, contextual analysis
1.1.6 To what extent has the programme influenced the way in which benefits are distributed amongst household members? Have gender relationships within beneficiary households been affected?	An intra-household module or FGDs only.
1.1.7 Are there any unexpected outcomes of the programme at household level?	FGDs

⁵⁹ This assumes we can access enough beneficiaries involved only in ECRP and not similar interventions as well as non-beneficiaries not involved in any similar activities during the lifetime of the programme.

<p>1.2 <i>What outcomes in terms of increased capacity for disaster risk reduction and climate change adaptation at <u>community and district government level</u> can be attributed to the programme activities?</i></p> <p>1.2.1 What has changed in the capability of VCPCs and DCPCs since the programme's inception?</p> <p>1.2.2 What are the factors that enable or constrain improvements in capacity at VCPC and DCPC level? Which contextual factors are particularly important?</p> <p>1.2.3 Are there any unexpected outcomes of the programme at community level?</p>	<p>Survey of VCPCs and District Government Staff</p>
<p>1.3 <i>How has ECRP contributed to policy change at <u>national level</u>?</i></p> <p>1.3.1 What factors enable or constrain policy influence?</p> <p>1.3.2 What can be learned from the ECRP and other programmes to inform future efforts to support capacity for policy development and implementation?</p>	<p>Use National DRM and Climate Change policies as case studies. Consider process tracing/ outcome mapping approaches to identify ECRP impacts and factors inhibiting their influence (textual analysis and KII are main data collection approaches)</p>
<p><i>Question 2: Was the programme theory of change relevant given its objectives and target groups?</i></p>	
<p>2.1 Was the project design relevant given its objectives and target groups?</p> <p>2.2 What can be learned from the ECRP and elsewhere to inform the programme targeting approach?⁶⁰</p> <p>2.3 To what extent was the programme able to target and effectively meet the needs of vulnerable households, including disabled people, people living with HIV/AIDS and female headed households?</p>	<p>Literature review, IP monitoring data (MIS), FGDs, KIIs.</p>
<p><i>Question 3: Was the programme efficient and effective in the way it delivered its results?</i></p>	
<p>3.1 Did the programme deliver outputs at the quantity, quality and cost expected?</p>	<p>HH survey and IP monitoring data (MIS) to generate logframe reporting.</p>

⁶⁰ To include information on the varied exposure/vulnerability of different areas to the extent possible.

<p>3.2 To what extent does additional field supervision improve the quality of the results? How much does it cost?</p> <p>3.3 To what extent could the programme have enhanced effectiveness through closer work with Government extension agencies? What costs might have been involved?</p> <p>3.4 What are the overall costs and benefits associated with adoption of an ECRP package consisting of VSL, agricultural interventions, livestock and early warning activities in combination?</p> <p>3.5 To what extent would the additional investment required to enable very poor households to access some of these benefits have a positive return?</p>	<p>Survey of field staff; consortium cost data; FGDs.</p> <p>Stakeholder perceptions.</p> <p>CBA, drawing on previous findings, reporting data from programme MIS, IP financial reports, survey data and FGDs.</p>
<p><i>Question 4: Sustainability: To what extent are these impacts likely to be sustained without further intervention?</i></p>	
<p>4.1 To what extent are improvements at household level likely to be sustained? Which factors enable / constrain sustainability?</p> <p>4.2 To what extent are improvements within district and community level CPCs likely to be sustained? Which factors enable / constrain sustainability?</p>	<p>Survey; FGDs, economic analysis of activities; stakeholder perceptions</p>

6. Data sources

The evaluation should draw on a number of data sources and should make a clear assessment of data quality and potential limitations in both the approach paper and evaluation report.

The IP monitoring data available in the programme management information system has been regularly reviewed by the M&E Agency. Both IPs and the M&E Agency are aware of its potential limitations and steps necessary to improve its quality and reliability. An assessment of this data should be made prior to its use (e.g. to remove duplicates or to query rapid and unexplained increases in numbers of beneficiaries) and steps taken to improve the quality of data used in the report.

A household survey of both beneficiaries and non-beneficiaries will be undertaken in all 11 districts. This survey will oversample female headed households (and possibly also very poor households) to ensure we have sufficient representation of these groups in our sample to

appropriately disaggregate findings. The feasibility of including questions in the survey on intra-household distribution of benefits or exploring these issues through focus group discussions will be considered and proposals included in the evaluation approach paper.

Civil protection committees and implementation staff in all 11 districts will be surveyed.

Focus Group Discussions will be held in all districts. We will hold separate discussions for beneficiaries and non-beneficiaries, and men and women. Focus group participants will be selected based on the topics for discussion in a given group. For example, specific focus groups for some interventions not yet covered by cost-benefit analysis may be held as well as those looking more generally at programme outcomes.

Key Informant Interviews will include all relevant evaluation stakeholders including Government and IP staff at all levels (national and district), CPC members, lead farmers or village extension multipliers, and VSL village agents. Interviews with programme donors and with other relevant development partners will also be conducted to ensure all relevant perspectives on the evaluation questions can be captured.

7. Cross-cutting issues

As indicated above, evaluation questions will focus on the extent to which the programme was able to influence intra-household and gender dynamics. It will also look at the extent to which the programme was able to target and meet the needs of vulnerable groups such as people living with HIV/AIDs, people with disabilities, and female or child-headed households.

The evaluation will also explore whether a greater focus on capacity building or government partnership would have enhanced sustainability and investigate contextual factors, such as power relations, that may inhibit sustainability and impact.

8. Work streams and personnel

The overall delivery of the evaluation will be overseen by the Team Leader, who will act as Lead Author of the approach paper and the report. Each of the four work streams will be led by one member of the team as per the table overleaf.

Work stream	Data Sources	Key Personnel
<i>Background research:</i> Defining the evaluation object and reviewing resilience literature	IPs reports and SOPs, previous evaluative research. Consultation with IPs, scoping work to test tools – March	Team Leader Literature review and consultation (Dr Mariam Kadzamira)
Work stream 1: Household level	Household Survey	Deputy Team Leader

impact assessment / sustainability	FGDs	Impact Assessment Specialist (Dr Matthew McConnachie) Quantitative Methods Lead (Prof John MacInnes) Survey and FGD teams Gender Specialist (TBC)
Work stream 2: Community and district level impact and sustainability	Review of PVCA outputs CPC Survey FGDs KIIs	Team Leader Deputy Team Leader Data Collection Team
Work stream 3: National level impact (including stakeholder feedback)	Document review KIIs	Policy/advocacy Assessment Methods Specialist (TBC, LTS) Malawian Policy Expert (TBC, CDM)
Work stream 4: VfM/Effectiveness	IP Financial Reports IP staff survey (supervision) Interviews with District Government Staff FGDs (supervision section)	Value for Money Lead (Tillem Burlace) Economist (Dr Mariam Kadzamira) Quantitative Methods Lead (Prof John MacInnes – logframe reporting) Gender Specialist (TBC) Data Collection Support

9. Communications and evaluation uptake

The full evaluation report is written with the primary audience of the donors funding the ECRP and its implementing partners. As the programme manager and contract holder for the M&E Agency, DFID will be responsible for all contractual decisions and sign-off.

Reference to the Paris Declaration principles can be included in the evaluation if required by DFID and other donors.

The evaluation has a dual accountability and learning purpose, since it will contribute to the programme completion review and make an assessment of impacts attributable to DFID. It will be designed with its utilisation in mind. We will therefore engage in sufficient

consultation with all the proposed users of the evaluation in relation to design, implementation and validation of the findings and formulation of recommendations. We will have a specific focus on ensuring relevance to the new DFID business case and programme design efforts.

An evaluation communications plan will be included in the approach paper, but we currently envisage the following dissemination activities:

Publication	Audience
Full report	DFID, Norwegian Embassy, Irish Aid, ECRP implementing partners from both consortia
Glossy executive summary designed in an attractive way (could build on existing <i>ECRP Story</i> publication or be standalone).	As above, plus the wider development community in Malawi
Lesson learning and validation workshop for ECRP stakeholders (prior to report finalization)	DFID, Norwegian Embassy, Irish Aid, ECRP implementing partners from both consortia
Dissemination workshop in Malawi	Wider development community in Malawi – e.g. UN Agencies, other donors and NGOs.
Blog or case study aimed at international audience	BRACED Knowledge Manager, wider international resilience research and practitioner communities.

Whilst we do not currently have resources available for publication in peer reviewed journals, we will explore the possibility to do this pro bono. If DFID has any scope to support us with this (in kind or financially) we can consider altering the distribution of resources across the evaluation to make this more likely.

DFID will have unlimited access to the material produced by the supplier, as indicated in the general conditions of its contract with the M&E Agency. All original datasets, with personal information removed, will be made available to DFID and the implementing partners on their request.

10. Indicative timeline

The timing of the evaluation ensures that household survey data collection occurs at the same time as previous surveys and during the post-harvest period when respondents have more time to engage in data collection activities. It is also structured to ensure that we will

produce and disseminate evaluation findings prior to the end of the ECRP programme in September 2017. The timing of the PCR inputs will depend on availability of implementing partner final reports and will be agreed with DFID and IPs.

Key Task	Due Date
Draft approach paper and team composition shared with DFID and IPs	6 March
Preparatory mission: Discussions with implementing partners, LTS-CDM, research on targeting/potential confounders, test for intra-household, CPC and staff surveys	w/c 13 March
2 nd draft approach paper, including all data collection instruments shared	24 March
Final feedback from implementing partners / DFID	31 March
Approach and instruments finalised	14 April
Household & CPC survey implementation	Late April / early May
Survey data available	End May
FGDs	June
VFM Data Collection	June
National Level Policy Data Collection	June
IP final MIS data available	30 June
IP Financial Reports available	25 July
Analysis and drafting	July
First draft ready for internal LTS QA	4 August
First draft of the report shared with DFID and implementing Partners	18 August
Draft PCR submitted	30 August
Written comments provided by DFID and implementing partners (final report)	1 September

Workshop in Lilongwe with DFID and Implementing Partners to discuss report	6 September
Dissemination workshop for external audiences (if appropriate)	TBC (either 7 Sept or 29 th)
Comments included in the report	15 September
Final Review by DFID completed by	22 September
Report and communications product (if appropriate) finalised	26 September
Final IP final financial and narrative reports	25 October
PCR Completed	<i>By DFID within 3 months of programme end.</i>

11. Indicative timetable for March planning mission

The table below provides an overview of the activities proposed for the evaluation planning mission.

Day 1	Planning meeting with IP stakeholders - reviewing theory of change; reviewing definitions of absorptive, anticipatory, adaptive, and transformative capacities in the context of ECRP; collecting available documents for literature review, discussing targeting considerations.
Day 2	Field work – testing instruments and discussing targeting: HH survey & recall (Salima/Dedza)
Day 3	Field work – testing instruments and processes: CPC survey, FGD organisation process (Salima/Dedza)
Day 4	M&E Team Internal work-planning
Day 5	AM only: Debrief with IPs, filling any gaps and agreeing next steps

All logistical arrangements for the evaluation will be made by the M&E Agency. We will clearly communicate support requirements to implementing partners to timelines agreed in the approach paper.

Annex B: Programme Logframe

Zoom in to view or download the Excel file. Output 5 data will be completed by DFID based on implementing partner reporting in October and therefore Output 5 is not included here.

PROJECT TITLE								
Enhancing Community Resilience and Adaptation to Climate Change in Malawi								
IMPACT	Impact Indicator 1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
Reduction in extreme poverty and hunger in Malawi (MDG 1)	Percentage of population living below the national poverty line	86.0%	85%	84%	82%	77%	75%	
			n/a	86.0%	77.5%	86.0%	94.6%	
		85.0%	84%	83.0%	81.0%	77%	75%	
			n/a	84.2%	78.0%	84.0%	95.9%	
		87.0%	86%	85.0%	83.0%	77%	75%	
			n/a	87.9%	76.5%	88.0%	93.6%	
	Source							
	ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.							
		Impact Indicator 2	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
		Average food insecure population in targeted districts (indiv)	1,097,868	1,042,975	988,081	988,081	988,081	988,081
				895,611	895,611	1,265,024	3,039,495	573,906
			383,861	364,687	345,493	345,493	345,493	345,493
				347,858	347,858	459,882	675,638	116,895
			713,987	678,288	642,588	642,588	642,588	642,588
				547753	547753	805142	2363857	457,011
Source								
Source: Annual MVAC Assessments								
	Impact Indicator 3	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
	% of targeted households that passed through at least 9 months with food from their own production / % that achieved 12 months of food security	9 months: 51% of HHs 12 months: 28% of HHs	9 months: 52% of HHs	9 months: 56% of HHs	9 months: 60% 12 months: 45%	9 months: 63% 12 months: 47%	9 months: 70% 12 months: 47%	
			n/a	9 months: 56% of HHs 12 months: 34% of HHs	9 months: 69% 12 months: 48%	9 months: 54% 12 months: 27%	9 months: 44% 12 months: 25%	
			9 months: 59% of HHs 12 months: 37% of HHs	9 months: 52% of HHs	9 months: 65% of HHs	9 months: 72% 12 months: 50%	9 months: 70% 12 months: 50%	9 months: 70% 12 months: 50%
				25%	9 months: 52% of HHs 12 months: 32% of HHs	9 months: 70% 12 months: 50%	9 months: 55% 12 months: 30%	9 months: 41% 12 months: 26%
			9 months: 43% of HHs 12 months: 23% of HHs	9 months: 45% of HHs	9 months: 48% of HHs	9 months: 52% 12 months: 38%	9 months: 63% 12 months: 45%	9 months: 69% 12 months: 45%
				n/a	9 months: 61% of HHs 12 months: 37% of HHs	9 months: 69% 12 months: 45%	9 months: 53% 12 months: 24%	9 months: 46% 12 months: 24%
Source								
ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.								

OUTCOME	Outcome Indicator 1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Increased resilience of vulnerable communities to climate variability and change	Number of beneficiaries (disaggregated by gender of HH head and by direct/indirect) benefiting from the programme (measured in individuals)	- Direct: 200,000 (of which 66,000 from FHH) Direct + Indirect: 600,000	Direct: 200,000 (of which 66,000 from FHH) Direct + Indirect: 600,000	Direct: 428,563 (of which 142,000 from FHH) Direct + Indirect: 950,000	560,835 people (of which 33% are from FHH) Direct + Indirect: 1,233,400	820,000 individuals (of which 33% are from FHH) Direct + Indirect: 1,396,200	840,000 individuals (of which 33% are from FHH) Direct + indirect: 1,407,100
		n/a	n/a	Direct: 388,253 (of which 139,996 are from FHH) Direct+indirect: 926,217	Direct: 780,897 Direct+indirect: 1,357,287	970,070 individuals (~413,267 in FHHs / 42%) Direct+indirect: ~ 1,417,890	999,316 individuals (~ 41% in FHH) Direct+indirect: ~ 1,519,575
		- Direct: 150,000 (of which 49,500 from FHH) Direct + Indirect: 300,000	Direct: 150,000 (of which 49,500 from FHH) Direct + Indirect: 300,000	Direct: 298,500 (of which 99,500 from FHH) Direct + Indirect: 450,000	298,500 people (of which 33% are from FHH) Direct + Indirect: 603,400	446,000 individuals (of which 33% are from FHH) Direct + Indirect: 757,100	450,000 people (of which 33% are from FHH) Direct + Indirect: 757,100
		Direct: 89,578 (of which 29,237 are women) Direct + Indirect: 272,426	Direct: 89,578 (of which 29,237 are women) Direct + Indirect: 272,426	Direct: 168,583 (of which 57,095 are from FHH) Direct+indirect: 586,727	Direct: 411,423 (of which 137,127 are from FHH) Direct + Indirect: 717,976	449,320 people (~188,000 from FHH) Direct + Indirect: 753,890	467,648 individuals (~ 41%) Direct+indirect: ~754,575
		- Direct: 50,000 (of which 16,500 are from FHH) Direct + Indirect: 300,000	Direct: 50,000 (of which 16,500 are from FHH) Direct + Indirect: 300,000	Direct: 130,000 (of which 42,900 from FHH) Direct + Indirect: 500,000	Direct: 262,335 (of which 33% from FHH) Direct + Indirect: 630,000	374,000 individuals (of which 33% are from FHH) Direct + Indirect: 639,100	390,000 individuals (of which 33% are from FHH) Direct plus indirect: 650,000
		n/a	n/a	Direct: 219,670 (of which 82,901 are from FHH) Direct+indirect: 339,490	Direct: 369,474 Direct + Indirect: 639,311	520,149 individuals (~225,000 in FHHs) Direct+indirect: 664,000	531,668 individuals (~ 43% in FHHs) Direct+indirect: ~ 765,000
Source Implementing Partners' Management Information Systems (MIS)							
	Outcome Indicator 2.1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Proxy Indicator 1 for Number of households that are resilient to climatic variability and change: Change in the level of real household income for targeted direct beneficiaries (disaggregated by household headship) [all measured in baseline MK values]	ALL: MK 28,000 MHH: MK 34,000 FHH: MK 16,000	5% increase ALL: MK 29,400 MHH: MK 35,700 FHH: MK 16,800	10% increase ALL: MK 30,800 MHH: MK 37,400 FHH: MK 17,600	15% ALL: MK 32,200 MHH: MK 39,100 FHH: MK 18,400	2% increase on 2015 actuals ALL: MK 60,894 MHH: 75,072 FHH: 31,824	5% increase on 2015 actuals ALL: MK 62,885 MHH: 77,280 FHH: 32,780	
	n/a	n/a	ALL: MK 41,180 (47% increase from baseline) MHH: MK 50,492 (49%) FHH: MK 22,295 (39%)	ALL: MK 59,700 (113%) MHH: MK 73,600 (116%) FHH: MK 31,200 (95%)	ALL MK 51,800 MHH MK 61,500 FHH: MK 32,500	ALL: MK 29,900 MHH: MK 31,500 FHH: MK 25,000	
	ALL: MK 26,000 MHH: MK 35,000 FHH: MK 16,000	5% increase ALL: MK 28,600 MHH: MK 36,750 FHH: MK 17,600	10% increase ALL: MK 28,600 MHH: MK 38,500 FHH: MK 17,600	15% ALL: MK 29,900 MHH: MK 40,250 FHH: MK 18,400	2% increase on 2015 actuals ALL: MK 59,466 MHH: 70,890 FHH: 33,048	5% increase on 2015 actuals ALL: MK 61,215 MHH: 72,975 FHH: 34,020	
	n/a	n/a	ALL: MK 40,459 (56%) MHH: MK 49,639 (42%) FHH: MK 22,295 (39%)	ALL: MK 58,300 (124%) MHH: MK 69,500 (99%) FHH: MK 32,400 (103%)	ALL MK 51,800 MHH: MK 56,000 FHH: MK 32,500	ALL: MK 29,500 MHH: MK 31,100 FHH: MK 25,200	
	ALL: MK 29,000 MHH: MK 33,600 FHH: MK 16,600	5% increase ALL: MK 30,450 MHH: MK 35,280 FHH: MK 17,430	10% increase ALL: MK 31,900 MHH: MK 36,960 FHH: MK 18,260	15% ALL: MK 33,350 MHH: MK 38,640 FHH: MK 19,090	2% increase on 2015 actuals ALL: MK 69,054 MHH: 84,150 FHH: 29,223	5% increase on 2015 actuals ALL: MK 71,085 MHH: 86,625 FHH: 30,083	
	n/a	n/a	ALL: 42,754 (47%) MHH: MK 55,803 (66%) FHH: MK 22,754 (37%)	ALL: 67,700 (133%) MHH: MK 82,500 (146%) FHH: MK 28,650 (72%)	ALL MK 54,500 MHH: MK 65,900 FHH: MK 35,800	ALL: MK 30,200 MHH: MK 31,800 FHH: MK 24,600	
Source ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.							

Outcome Indicator 2.2	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Proxy indicator 2 for Number of households that are resilient to climatic variability and change: Change in the median capital asset value per targeted household (MK'v) (iron sheets, livestock, oxcart, bed, table, mobile phone, radio, television, bicycle, hoe, axe, sickle, panga, cash) disaggregated by household headship [all measured in baseline MK'v values]	ALL HH: MK 18,750 MHH: MK 25,900 FHH: MK 9,950	5% increase ALL: MK 19,688 MHH: MK 27,195 FHH: MK 10,448	10% increase ALL: MK 20,625 MHH: MK 28,490 FHH: MK 10,945	15% increase on baseline ALL: MK 21,563 MHH: MK 29,785 FHH: MK 11,443	2% on 2015 actuals ALL: 39,372 MHH: 48,807 FHH: 12,178	5% on 2015 actuals ALL: 40,530 MHH: 50,243 FHH: 12,537
		n/a	ALL: MK 39,541 (111% increase on baseline) MHH: MK 47,302 (88%) FHH: MK 17,041 (71%)	ALL: MK 38,600 (106% increase on baseline) MHH: MK 47,850 (95%) FHH: MK 11,940 (56%)	AI: MK 21,600 MHH: MK 27,000 FHH: MK 8,600	AI: MK 34,400 MHH: MK 39,300 FHH: MK 19,100
	ALL HH: MK 25,100 MHH: MK 33,000 FHH: MK 13,050	5% increase ALL: MK 26,355 MHH: MK 34,650 FHH: MK 13,703	10% increase ALL: MK 27,610 MHH: MK 36,300 FHH: MK 14,355	15% increase on baseline ALL: MK 28,865 MHH: MK 37,950 FHH: MK 15,008	2% on 2015 actuals ALL: 40,392 MHH: 54,162 FHH: 17,138	5% on 2015 actuals ALL: 41,580 MHH: 55,755 FHH: 17,640
		n/a	ALL: MK 37,579 (50%) MHH: MK 45,550 (38%) FHH: MK 13,551 (4%)	ALL: MK 39,600 (58%) MHH: MK 53,100 (61%) FHH: MK 16,800 (29%)	AI: MK 22,100 MHH: MK 28,300 FHH: MK 8,100	AI: MK 30,700 MHH: MK 37,700 FHH: MK 17,900
	ALL HH: MK 16,000 MHH: MK 21,250 FHH: MK 8,100	5% increase ALL: MK 26,355 MHH: MK 22,313 FHH: MK 8,505	10% increase ALL: MK 27,610 MHH: MK 23,375 FHH: MK 8,910	15% increase on baseline ALL: MK 28,865 MHH: MK 24,438 FHH: MK 9,315	2% on 2015 actuals ALL: 38,352 MHH: 43,452 FHH: 15,708	5% on 2015 actuals ALL: 39,480 MHH: 44,730 FHH: 16,170
	n/a	ALL: MK 42,689 (167%) MHH: MK 49,016 (131%) FHH: MK 20,936 (158%)	ALL: MK 37,600 (135%) MHH: MK 42,600 (100%) FHH: MK 15,400 (90%)	AI: MK 20,900 MHH: MK 26,400 FHH: MK 8,800	AI: MK 37,900 MHH: MK 41,300 FHH: MK 27,100	
Source						
ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.						
Outcome Indicator 2.3	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Proxy indicator 3 for Number of households that are resilient to climatic variability and change: Percentage of direct beneficiaries using a combination of at least three types of climate change and DRR transformative strategies-Conservation agriculture, irrigation, livestock, agro-forestry, drought/flood tolerant crops, solar, energy efficient stoves, afforestation, VSL	Individuals: 275,417 45.6% of HHs	65% of HHs	Individuals: 252,552 80% of HHs	Individuals: 390,542 76% of HHs	80%	90%
		n/a	Individuals: 237,934 61% of HHs	Individuals: 581,559 74% of HHs	99%	96%
	Individuals: 125,967 42.2% of HHs	65% of HHs	Individuals: 118,352 80% of HHs	Individuals: 180,905 75% of HHs	80%	90%
		n/a	Individuals: 93,159 55% of HHs	Individuals: 304,453 74% of HHs	99%	93%
	Individuals: 149,450 49% of HHs	65% of HHs	Individuals: 134,200 80% of HHs	Individuals: 211,242 79% of HHs	80%	90%
	n/a	Individuals: 147,984 67% of HHs	Individuals: 277,106 75% of HHs	99%	98%	
Source						
ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.						
Outcome Indicator 3	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Number and type of policies and programmes positively influenced by ECRP at national, district and local levels	-	2	5	6	14	14
		4: Draft National DRM Bill; National DRM Communication Strategy; Draft National CC Policy; Draft National Agricultural Policy	3: As 2013, with National Budgetary Allocations; National Energy Policy; EU CC Programme; Malawi MDGs reporting; Cost of Hunger Project.	14: Meteorology Policy, Agriculture Policy, Climate Change Policy, DRM Policy, DRM Devolution Plan, National Resilience Strategy/Programme, Energy Policy, Participatory Scenario Planning Process at National Level, Budget decisions on radar purchase, formulation of the National Adaptation Programme, DRM Communication Strategy, EU CC Programme, Malawi MDGs reporting.	18 (as previously with also reports of World Bank's Pilot Programme on Climate Resilience, the Sustainable Energy for All initiative, the national Climate Smart Agriculture programme and VFP MASDAF)	20. As previously, plus National Gender Policy and Government projects in irrigation and land resources.
Source						
INPUTS (£)	DFID (£)	Govt (£)	Other (£)	Total (£)	DFID SHARE (%)	
	27,169,203		2,799,547	29,968,750		
INPUTS (HR)	DFID (FTEs)					91
	1.0					
Advisor 70%, SRO 10%, PM 10% and Senior Manager 10%.						

OUTPUT 1	Output Indicator 1.1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
Increased capacity of local authorities, communities and individuals to address the impacts of climate change	Percentage of targeted households that have knowledge of at least 3 interventions likely to enhance individual and community resilience to climate related disasters and variability	HHs: 24,382 21% of HHs	30% of HHs	30	50%	29%	32%	
			n/a	26% of HHs	25.05% of HHs	48%	55%	
		HHs: 9,868 17% of HHs	30% of HHs	45% of HHs	50%	28%	28%	
			n/a	25% of HHs	23.9% of HHs	51%	52%	
		HHs: 14,091 23% of HHs	30% of HHs	45% of HHs	50%	30%	35%	
		n/a	26% of HHs	26.2% of HHs	45%	58%		
	Source ECRP HH Survey. NE survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.							
	Output Indicator 1.2	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
	Number of targeted districts and GVH with functional EWS	0 district and 10 GVHs fully functional; 4 GVHs partially functional	68 GVHs in 6 districts	133 GVHs in 10 districts	119 GVHs in 9 districts	230 GVHs in 11 districts	240 GVHs in 11 districts	
			155 GVHs in 9 districts	57 GVHs in 4 districts	228 GVHs in 10 districts	236 GVHs in 11 districts	Full Functional: 202 GVHs Partially Functional: 70 GVHs Districts: 11	
		0 district and 10 GVHs fully functional; 4 GVHs partially functional	40 GVHs in 3 districts	75 GVHs in 5 districts	94 GVHs in 5 districts	109 GVHs in 5 districts	114 GVHs in 5 Districts	
			33 GVHs in 3 Districts	37 GVHs in 4 districts	107 GVHs in 5 districts	110 GVHs in 5 districts	Full Functional: 95 GVHs Partially Functional: 24 GVHs Districts: 5	
		0 district and 0 GVH functional	28 GVHs in 3 districts	58 GVHs in 6 districts	86 GVHs in 4 districts	121 GVHs in 7 districts	126 GVH in 7 districts	
		n/a	20 GVHs in 0 districts	121 GVHs in 7 districts	126 GVHs in 7 districts	Full Functional: 107 GVHs Partially Functional: 46 GVHs Districts: 7		
	Source IP Monitoring Data							
Output Indicator 1.3	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017		
Number of districts and targeted GVH with functional Community Protection Committee	0 districts; 14 GVHs	4 districts; 80 GVHs	9 districts; 130 GVHs	133 GVHs in 9 districts	230 GVHs in 11 districts	240 GVHs in 11 districts		
		11 districts; 142 GVHs	8 districts; 95 GVHs	230 GVHs in 10 districts	245 GVHs in 11 districts	Full Functional: 226 GVHs Partially Functional: 46 GVHs Districts: 5		
	0 districts; 14 GVHs	1 district; 52 GVHs	3 districts; 80 GVHs	69 GVHs in 4 districts	109 GVHs in 5 districts	114 GVHs in 5 Districts		
		5 districts; 40 GVHs	5 districts; 44 GVHs	109 GVHs in 5 districts	119 GVHs in 5 districts	Full Functional: 107 GVHs Partially Functional: 12 GVHs Districts: 5		
	0 districts; 0 GVHs	3 districts; 28 GVHs	6 districts; 50 GVHs	64 GVH in 5 districts	121 GVHs in 7 districts	126 GVH in 7 districts		
	n/a	3 districts; 51 GVH	121 GVHs in 7 districts	126 YCPS in 7 districts	Full Functional: 119 GVHs Partially Functional: 34 GVHs Districts: 7			
Source IP Monitoring Data								
IMPACT WEIGHTING	15%							
INPUTS (£)	DFID (£)	Govt (£)	Other (£)	Total (£)			DFID SHARE (%)	
	4,075,380	-	419,932	4,495,313			91	
INPUTS (HR)	DFID (FTEs)							
	0.15							

OUTPUT 2	Output Indicator 2.1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
Community and household livelihood practices are better adapted to the impacts of climate variability and change	Number of households directly benefiting from the programme that use a combination of at least 2 climate smart agriculture techniques per growing season (out of the following: Conservation agriculture, Irrigation, drought tolerant crop variety, post-harvest management, agroforestry)	61,810	95,502	125,852		90,678	146,234	
				58,832	126,316	174,900 (99% of HHs)	172,944 (~97% of HHs)	
		25,708	35,000	42,000		46,319	93% of target households 71,514 households	98% of target households 76,034
				24,477	63,842	79,539 (98% of HHs)	78,210 (96% of HHs)	
		36,102	60,502	83,852		44,358	95% of target households 64,600	95% of target households 64,600
			34,355	62,475	95,360 (99% of households)	94,734 (98% of HHs)		
	Source							
	ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.							
		Output Indicator 2.1.1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
	Number of additional households practicing irrigation	-	5,395	8,695		-	20,437	23,400
				8,559		18,807	43,719	51,509
		-	1,500	4,800		3,392	8,000	10,200
					3,103	7,557	18,824	28,509
		-	3,895	3,895		6,623	12,437	13,200
				5,456	11,250	24,895	23,000	
Source								
Project monitoring data. Management Information System.								
	Output Indicator 2.1.2	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
Number of additional households practicing conservation agriculture	-	5,395	18,390		27,634	56,550	62,000	
			n/a	25,418	50,992	77,273	90,111	
	-	1,500	3,150		8,736	18,455	23,000	
			n/a	7,942	17,710	31,029	47,524	
	-	3,895	15,240		18,898	38,095	39,000	
			17,476	33,282	46,244	42,587		
Source								
Project monitoring data. Management Information System.								
	Output Indicator 2.1.3	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
Percentage of households that grow drought tolerant crops	5.8%	10%	15%		80%	83%	87%	
			n/a	72.6%	92% average of all HHs	94.0%	90%	
	4.2%	10%	15%		81%	88%	93%	
			n/a	74.2%	95% of MHH 90% of FHH	93.0%	90%	
	60%	85%	70%		77%	77%	80%	
		n/a	70.8%	87% of MHH in CA-ECRP 98% of FHH in CA-ECRP	95.0%	91%		
Source								
ECRP HH Survey. NB survey was not conducted in 2013. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with approx. 1,000HH will be conducted in 2015 and 2016.								

Output Indicator 2.2	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Number of households directly benefiting from the programme that are adopting low carbon energy techniques (including solar, cook stoves, afforestation)	Stoves: 1294 HH Solar: 3,072 Woodlot: 12,864	Stoves: 7034 HH Solar: 15,147 Woodlot: 24,939	Stoves: 24,394 HH Solar: 35,334 HH Woodlot: 52,364 HH	Stoves: 29,545 HH Solar: 12,974 HH Woodlot: 49,984 HH	Stoves: 45,706 HH Solar: 13,083 HH Woodlot/catchment conservation: 37,282 HH	Stoves: 62,500 hh Solar: 20,600 hh Woodlot/catchment conservation: 77,690 HH
		Stoves: 15,871 HH Solar: 3,050 HH Woodlot: 17,439 HH	Stoves: 7,000 HH Solar: 4,174 HH Woodlot: 18,672 HH	Stoves: 38,205 Solar: 10,766 Woodlot: 34,702	Stoves: 110,014 Solar: 46,171 Woodlots: 52,837	Stoves: 53,033 Solar: 34,813 Woodlots: 40,938
	Stoves: 670 HH Solar: 1,827 HH Woodlot: 4,934 HH	Stoves: 5,670 HH Solar: 9,327 HH Woodlot: 12,434 HH	Stoves: 20,670 HH Solar: 21,827 HH Woodlot: 24,934 HH	Stoves: 20,277 HH Solar: 8,472 HH Woodlot: 28,202 HH	Stoves: 24,118 HH Solar: 7,803 HH Woodlot: 17,282 HH	Stoves: 28,925 hh Solar: 9,380 hh Woodlot/catchment conservation: 38,690 hh
		Stoves: 13,483 HH Solar: 3050 HH Woodlot: No data	Stoves: 4,883 HH Solar: 2,616 HH Woodlot: 8,970 HH	Stoves: 21,706 Solar: 7,023 Woodlot: 15,960	Stoves: 49,330 Solar: 16,309 Woodlots: 22,014	Stoves: 29,833 Solar: 14,513 Woodlots: 17,738
	Stoves: 124 HH Solar: 1,245 HH Woodlot: 7,930 HH	Stoves: 1,364 HH Solar: 5,820 HH Woodlot: 12,505 HH	Stoves: 3,224 HH Solar: 12,745 HH Woodlot: 27,430 HH	Stoves: 8,746 HH Solar: 4,502 HH Woodlot: 21,782 HH	Stoves: 21,588 HH Solar: 5,280 HH Woodlot/catchment conservation: 20,000 HH	Stoves: 22,500 hh Solar: 5,600 hh Woodlot/catchment conservation: 39,000 HH
		Stoves: 2,388 HH additional Solar: 0 additional Woodlot: 4,575 additional	Stoves: 2,117 HH Solar: 1,558 HH Woodlot: 9,702 HH	Stoves: 16,499 Solar: 3,743 Woodlot: 18,742	Stoves: 60,684 Solar: 29,680 Woodlots: 30,823	Stoves: 23,200 Solar: 20,300 Woodlots: 23,200
ECRP HH Survey. NB survey was not conducted in 2013 and data from that year is drawn from programme monitoring. Baseline, 2014 and 2017 surveys will have approx. 2000 HH sample size. It is proposed that small surveys with						
Output Indicator 2.3	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Number of direct beneficiaries participating in Village Savings and Loans Schemes supported by the project (disaggregated by gender)	-	29,700	52,205 80% women	52,205 80% women	83,000 75% women	92,000 74.5% women
		n/a	39,926 72% women	69,508 67% women	101,849 (69% women)	109,752 (68% women)
	-	8,000	16,000 80% women	16,000 80% women	26,000 80% women	32,000 80% women
		8,613 86% women	13,259 85% women	21,245 65% women	33,940 (62% women)	42,259 (61% women)
	-	21,700	36,205 80% women	36,205 80% women	57,000 participating 70% women	60,000 68% women
		n/a (data provided not accurate)	26,667 65% women	48,263 68% women	67,909 (69% women)	67,493 (70% women)
Source Project monitoring data. Management Information System.						
Output Indicator 2.4	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Number of direct beneficiary households receiving livestock (small ruminants or poultry)	-				24,000	29,100
					33,867	46,610
	-				16,000	19,000
					22,220	31,811
	-				8,000	10,100
					11,647	14,799
Source Project monitoring data. Management Information System.						
IMPACT WEIGHTING	60%					
INPUTS (£)	DFID (£)	Govt (£)	Other (£)	Total (£)	DFID SHARE (%)	
	16,301,522	-	1,679,728	17,981,250		
INPUTS (HR)	DFID (FTEs)	0.6				

OUTPUT 3	Output Indicator 3.1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017	
Strengthened information sharing by different stakeholders on DRM and climate change adaptation. (including district and national level governments, research institutions and CSOs)	Number (cumulative) and level of satisfaction with respect to information shared by CEPA (including policy briefs, papers, and lesson learning papers) that builds on evidence and practical experiences and feedback from research and ECRP implementation	0	2 produced 20% of survey respondents received 1+ 94% of responses in relation to CEPA publications "satisfied or very satisfied"	5 produced 30% of survey respondents received 1+ 94% of responses in relation to CEPA publications "satisfied or very satisfied"	8 produced 30% of survey respondents received 2+ 90% of responses in relation to CEPA publications "satisfied or very satisfied"	15 produced 45% of survey respondents received 2+ 90% of responses in relation to CEPA publications "satisfied or very satisfied"	20 produced 50% of survey respondents received 3+ 90% of responses in relation to CEPA publications "satisfied" or "very satisfied"	
			25% reported receiving one or more publications 85% satisfied or very satisfied	27% reported receiving one or more publications No responses about satisfaction	13 produced. 28% of survey respondents received 2+ 89% responded that they were "satisfied" or "very satisfied"	27 produced (14 new); 55% had received 2+, 98% of response "satisfied" or "very satisfied."	41 produced (14 new); 70% of survey respondents had received 2+, 83% of responses in relation to CEPA publications are "satisfied" or "very satisfied"	
	Source							
	CEPA reporting on number of publications produced; online survey on respondent satisfaction to these publications.							
		Output Indicator 3.2	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
		Number of multi-stakeholder (MS) platforms at national, district and community level that ECRP IPs participate in	3	68	68	68	76	76
				85	153	137	135	113
			2	30	30	30	30	30
				70	135	117	109	73
			1	38	38	38	48	48
			15	18	20	26	58	
Source								
IP reporting on number of platforms attended. Some platforms are attended by both CA-ECRP/CEPA and DISCOVER. These are subtracted from the total.								
IMPACT WEIGHTING								
10%								
INPUTS (£)	DFID (£)	Govt (£)	Other (£)	Total (£)			DFID SHARE (%)	
	2,716,920		279,955	2,996,875				
INPUTS (HR)	DFID (FTEs)							
	0.1							

OUTPUT 4	Output Indicator 4.1	Baseline 2012	Milestone 2013	Milestone 2014	Milestone 2015	Milestone 2016	Project Target 2017
Strengthened disaster risk reduction and climate change programmes and delivery structures of key Government Ministries and Departments	Number of National and district level climate change adaptation related policies, strategic plans and programmes that have been targeted and provided information by the programme and its innovations	-	4	7	10	14	14
				4	9	14	18
Source							
CEPA and IP reporting; annual review interviews.							
IMPACT WEIGHTING							
10%							
INPUTS (£)	DFID (£)	Govt (£)	Other (£)	Total (£)			DFID SHARE (%)
	2,716,920	-	279,955	2,996,875			91
INPUTS (HR)	DFID (FTEs)						
	0.1						

Annex C: Evaluation Matrix

Criteria: Impact

1. What impacts can be attributed to ECRP at household level? What is its contribution to change at community, district and national levels?

Sub-questions	Proposed indicators / areas of enquiry	Proposed data sources
<i>1.1 To what extent can outcomes at household level be attributed to the programme activities?</i>		
1.1.1 To what extent do households involved in ECRP experience improvements in income, assets, food security, and ability to use early warning or weather information (in comparison to similar households not involved in the programme)?	Impact estimates of assets; incomes, food security derived from comparing beneficiaries with matched non-beneficiaries.	Household survey; focus group discussions and interviews, previous studies.
1.1.2 How do these outcomes contribute to absorptive, anticipatory, adaptive and transformative capacities as defined in the literature?	Analysis of intermediary outcomes related to programme mechanisms in relation to these definitions and criteria, for example: <ul style="list-style-type: none"> - Volume of HH savings (absorptive) - Adoption of diverse crop types / new agricultural practices (adaptive) - Use of early warning/forecasts (anticipatory) - Actual investments / plan to invest in less weather dependent livelihoods (transformative) 	Literature review, household survey, focus group discussions, previous studies.
1.1.3 How do outcomes vary depending on the gender of the household head and the wealth status of the household?	Sub-group analysis in relation to above indicators for female headed households and very poor households	Household survey; focus group discussions and key informant interviews. Additional survey data / FGDs focused on beneficiaries of humanitarian response.
1.1.4 How do outcomes vary across frequently occurring combinations?	Sub-group analysis in relation to assets, incomes, food security to compare between households adopting different combinations.	Household survey; focus group discussions, previous study.
1.1.5 To what extent has the programme influenced the way in which benefits are distributed amongst household members? Have gender relationships within beneficiary households been affected? If so how?	Level of effort invested in different interventions by men, women and children within a household. Decision-making authority in relation to those interventions and any of their products.	In-depth household interviews; focus group discussions; possible additional questions to household survey.

1.1.6	Are there any unexpected outcomes of the programme at household level?	Open questions about changes in intra-household dynamics, environmental management, household health.	Focus group discussion, in-depth interviews.
1.2 What is the programme's contribution to increased capacity for disaster risk reduction and climate change adaptation at <u>community and district government level</u>?			
1.2.1	What has changed in the capability of VCPCs and DCPCs since the programme's inception? What is the evidence to link this to programme interventions?	Level of clarity & understanding of roles and responsibilities Level of confidence in completing PVCA & DRR plan Level of inclusion of vulnerable groups in risk management plans Functionality of EWS (drought and flood) Level of implementation of plans Capacity for community-led response/social support Level of involvement in Govt-led assessment, targeting & implementation of response Linkage between PCVA and programme NRM activities or other development plans and investments Improved relationship of mutual accountability between village and district Government	District Stakeholder and Staff interviews; CPC Survey; Focus Group Discussions
1.2.2	What other factors enable or constrain improvements in capacity at VCPC and DCPC level? Which contextual factors are particularly important?	How frequently has the village experienced a hazard Level of resources the district Govt allocated to DRM Capacity of district to respond to VCPC reports Functionality and support from ACPCs	District Stakeholder and Staff interviews; CPC Survey; Focus Group Discussions
1.2.3	Are there any unexpected outcomes of the programme at community level?	Open questions, with some exploration of the following themes: Diversion of resources from other priorities; changes in gender dynamics; level of support received from extension workers or other government agents.	District Stakeholder and Staff interviews; CPC Survey; Focus Group Discussions
What is the contribution of the ECRP to improved policy at <u>national level</u>?			
1.2.4	In relation to one policy case study, what evidence is there to link ECRP advocacy work to Government of Malawi action?	Level of evidence to support programme theory of change / absence of evidence to support alternative theories Generation of evidence/ implementation of lobbying activities by the programme Extent to which this is a unique contribution not provided by others or a critical voice in convincing key decision-makers Extent to which these are recognised as important by key stakeholders/decision-makers	Policy and advocacy document review, interviews with programme implementers and key informants
1.2.5	What other factors enabled or constrained ECRP's influence on the desired outcomes in this case?	Exploration of actions by other actors; links to external events/international policy dialogues; internal political economy factors.	Policy and advocacy document review, interviews with programme implementers and key informants

1.2.6	What can be learned from ECRP advocacy work to inform future DFID investments aimed at developing Government of Malawi capacity for policy and implementation?	Findings generalised from above analysis and from literature review	Literature review
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Criteria: Relevance

2. Was the programme theory of change relevant given its objectives and target groups?

Sub-questions	Proposed indicators	Proposed data collection methods
2.1 What can be learned from the ECRP and elsewhere to inform the programme targeting approach, including in relation to the way the programme targeted vulnerable households?	Level of participation of these groups in the programme as captured by programme MIS and the HH survey Relevance to MGDS objectives / Govt. policy goals on resilience Extent to which MVAC targeting reflects 'very poor' households by progress out of poverty index Level of time and resource invested in targeting for those programmes and potential for replication/usage Perceptions of people meeting poor/vulnerable criteria on the most important factors enabling/constraining their involvement	MIS data, Household survey / analysis of progress out of poverty index data; focus group discussions and staff and lead farmer interviews; literature review; stakeholder interviews.
2.2 Did ECRP have a comparative advantage in relation to other programmes working on resilience and was this maintained during the ECRP lifetime?	Coverage of ECRP versus other resilience programmes Complementarity between ECRP activities and those of other programmes Stakeholder perceptions of opportunities for synergies	Literature review, focus group discussions, stakeholder interviews

Criteria: Efficiency and effectiveness

3. Was the programme efficient and effective in the way it delivered its results?

Sub-questions	Proposed indicators	Proposed data collection methods
3.1 Did the programme deliver outputs at the quantity, quality and cost expected?	Level of achievement of programme logframe targets £ spend per beneficiary and per output % of total spend used on implementation cost drivers	Programme MIS, household survey, review of financial reports.
3.2 To what extent does additional field supervision improve the quality of the results? How much does it cost?	% of field staff & lead farmer time used on supporting different interventions in different districts Level of adoption compared across districts Staff/beneficiary perceptions about the value of this supervision and optimal level	Interviews, MIS and household survey data per district

3.3 To what extent could the programme have enhanced effectiveness through closer work with Government agencies? What costs might have been involved?	% of field staff time spent liaising with district officials Level of involvement of Government officials in different interventions Estimated costs of engaging District Officials and Extension Workers in these interventions Project Staff/Government Staff/Beneficiary perception of the benefits of this cooperation	Staff survey; district government interviews; focus group discussions
3.4 What are the overall costs and benefits associated with adoption of different ECRP packages?	Cost-benefit ratios using impact estimates and programme and beneficiary costs	Household survey; costs derived from financial reports; beneficiary costs derived from lead farmer interviews
3.5 To what extent would the additional investment required to enable very poor households to access some of these benefits have a positive return?	Analysis of costs involved in targeting MVAC beneficiaries under CA-ECRP pilot Analysis of necessary complementary interventions currently being provided by others Sub-group analysis of benefits for very poor households Perception of increased level of effort required for this group by project staff	Household survey; literature review; focus group discussions, CPC, staff and lead farmer interviews, stakeholder interviews
3.6 Did ECRP management learn from experience and adjust its level of investment to focus on the most successful activities?	Reports on actions taken following each annual review Stakeholder perception	Literature review, stakeholder interviews.

Criteria: Sustainability

4. To what extent are programme outcomes likely to be sustained without further intervention?

Sub-questions	Proposed indicators	Proposed data collection methods
4.1 To what extent are improvements at household level likely to be sustained? Which factors enable / constrain sustainability?	Assessment of farm-level costs and benefits Analysis of trade-offs between different activities Perception by beneficiaries about the feasibility of continuing new practices Level of support from National policy and District Investment decisions to the interventions	Document review, household survey, focus group discussions, staff interviews; district interviews; national stakeholder interviews.
4.2 To what extent are improvements within district and community level CPCs likely to be sustained? Which factors enable / constrain sustainability?	Level of resources available to VCPCs and DCPCs without programme resources Level of capacity in District Governments to support VCPCs	CPC survey, focus group discussions, district government and staff interviews

Annex D: Sampled areas and areas from which data was collected

“Qualitative” Team (includes CPC Survey)

	Sampled beneficiary GVH1	Visited beneficiary GVH1	Sampled beneficiary GVH2	Visited beneficiary GVH2	Sampled Comparison GVH	Visited Comparison GVH
Balaka	Phalula	Phalula	Nyanyala	Nyanyala	Mdela	Mdela
Dedza	Huwa	Huwa	Kafulama	Kafulama	Chitsatsa	Chitsatsa
Karonga	Mchekacheka	Mchekacheka	Kapiyira	Kapiyira	Musopole	Musopole
Salima	Mtende	Mtende	Chilenga	Chilenga	Nthondo	Nthondo
Nsanje DISCOVER	M'nembe	M'nembe	Nyanga	Nyanga	Mangani	Mangani
Kasungu	Chiwinga	Chiwinga	Kaweta	Kaweta	Kadiso	Kadiso
Machinga	Mlaluwere	Mlaluwere	Nyama	Nyama	Msonthi	Msonthi
Mwanza	Ngadziwe	Ngadziwe	Chimweta	Chimweta	Nchotseni	Nchotseni
Thyolo	Khuguwe	Khuguwe	Mbawera	Mbawera	Makhalira	Makhalira
Mulanje	Ng'omba	Ng'omba	Nande	Nande	Mfumuyayikazi	Mulunguzi
Chikwawa	Nantusi	Nantusi	Biliati	Biliati	Kadzumba	Ndombo
Nsanje ECRP	Fachi 2	Fachi 1	Nsitu	Nsitu	Mangani	Mangani

Mfumuyayikazi was replaced with Mulunguzi due to a vehicle breakdown. Kadzumba in Chikwawa could not be located by the data collection team so was replaced by Ndombo which was a known village in the same enumeration area. Fachi 2 was inaccessible by vehicle during the study period due to a damaged bridge and was therefore replaced with Fachi 1.

Household Survey Team

District	EE CODE	Status	Villages	Actual Villages Visited
Salima	20505002	Non beneficiary	Justen, majola, Kandeu, Mtika, Kalowa	As sampled
Salima	20501045	Beneficiary	Esau, maganga, Chongole, Chambata, Nanyungu	As sampled
Salima	20505038	Non beneficiary	Saidi, Ngwena, Mikuju	As sampled
Salima	20509011	Non beneficiary	Chinombo, Bandawe, Lundu, Mzalule, Mangwere, Sumani, Imedi, Kambodya	As sampled
Salima	20501003	Non beneficiary	Nguwo	As sampled
Salima	20501023	Non beneficiary	Chinyamunyamu, Chikuni Jimu, Kuthenje	As sampled
Salima	20501044	Beneficiary	Mgawi, Nanyungu, Chizuwi, Kabumbu, Mpondezi, Ngwapa, Naunje	As sampled
Salima	20502033	Non beneficiary	Fikila, Simaiwa, Chioko, Nkonkha, Samson, Kalakazombe	As sampled
Salima	20504017	Beneficiary	Gomani, Chitekwere, Mitondo, Mgoza, Kachisa, Chumbu, Maiza, Ngolomi	As sampled
Salima	20504028	Non beneficiary	Sitiki, Kaponda, Nthondo, Kaliinde, Chilemba, Nkhambadza	As sampled
Salima	20503019	Beneficiary	Chankwa, Binali, Tambala, Mchenga, Njolo	As sampled

Salima	20503021	Non beneficiary	Kamchacha, Mwafuli	As sampled
Salima	20508034	Non beneficiary	Chapuma, Kafulatira, Mwansambo, Mtayamanja, Kuthambo, Chilamba, Chikuse, Chilekwa	As sampled
Salima	20510004	Beneficiary	Juliasi, Monjowa, Chimtumbuka, Kasache, Chikwasa	As sampled
Karonga	10203005	Non beneficiary	Musopole. Ng'ambi	As sampled
Karonga	10201076	Non beneficiary	Mwipimeghe	As sampled
Karonga	10203023	Non beneficiary	Mwenekeabe	As sampled
Karonga	10203053	Non beneficiary	Peter Mwangwalaba, Mwakatundu	As sampled
Karonga	10203073	Beneficiary	Mwakenja, Marko Mwakenja I	As sampled
Karonga	10203103	Beneficiary	Potipher Mwangolera	As sampled
Karonga	10203107	Beneficiary	Ngosi, Mwalughali	As sampled
Karonga	10201058	Non beneficiary	Mwapagatwa, Mwamusako, Mwakighonja, Mwakabighili	As sampled
Karonga	10201062	Non beneficiary	Mungete, Mwangasa, Muliinda, Kasiba, Mwakaboko, Kafwala	As sampled
Karonga	10201074	Non beneficiary	Chisi	As sampled
Karonga	10205013	Beneficiary	Mwakasenjere, Pulubwe, Mchekacheka	As sampled
Karonga	10205009	Beneficiary	Yakumutu, Mphangwayanjiri	As sampled
Kasungu	20113002	Beneficiary	Mzingo, Jalamalonda, Chimdima, Chinyanga, Masasa, Nkhokwe, Chiwilila, Sadza, Kaunda	As sampled
Kasungu	20101004	Beneficiary	Nkhanyenkhu, Mnyamadzi, Thom Kapopo, Chilembwe, Mphandukila	As sampled
Kasungu	20101005	Beneficiary	Chisoso, Mphandukila, Kamunthuvibi, Nkhanyenkhu, Boni kumwenda	As sampled
Kasungu	20101014	Non beneficiary	Chingala, Mkukula	As sampled
Kasungu	20101022	Beneficiary	Kanjosi, Mwalimo Chirwa, Kelula, Zanda, Chimbilanjala	As sampled
Kasungu	20101027	Beneficiary	Chikonda, Yosefe Tomoka, Mzima, Jona Maziuko	As sampled
Kasungu	20112016	Beneficiary	Jembe, Thunga, Kanyama, Chimbaleme, Chimbaye	As sampled
Kasungu	20101042	Beneficiary	Phiri, Lukhere, Tembo, Mbuzi, Zakaliya, Mkango	As sampled
Kasungu	20112046	Beneficiary	Wimbe, Masitela, Manyenje, Vindevu, Kachala, Chipoka, Hussen	As sampled
Kasungu	20111029	Non beneficiary	Kadiso	As sampled
Kasungu	20111031	Non beneficiary	Bowa, Nyamula, James, Mwachilira	As sampled
Kasungu	20111010	Non beneficiary	Katema, majomeka, Kantambo, Katema, Nyanga, Chipatuka, Mlangali, Khalaumba, Jaji	As sampled
Kasungu	20107004	Non beneficiary	Bema, Ng'ombe, Kadzuwa, Kangulu, Samalani, Mlauli, Sandilesi, Kayedzeka, Mwendon Jozeke	As sampled
Kasungu	20102021	Beneficiary	Ngwata, Zinkambani, Banda, Gideon	As sampled
Kasungu	20109031	Non beneficiary	Chinkwenje, Mchenga, Kalengo, Nkhondwela, Madika	As sampled
Kasungu	20103009	Non beneficiary	Chipeta, Wanthewa, Mnyanja, Ngweda Muhone, Belezuke, Yesaya, Moyo	As sampled
Nsanje	31102002	Beneficiary	Gumbwa, Mpombwa, Mangani, Chazuka	Gumbwa, Mpombwa, Chazuka
Nsanje	31102006	Non beneficiary	Chabote, Muyang'anila, Alufasi, Mwanagalu, Nyamizinga II, Nyamizinga I, Mkumba, Sikuzakwenda	Chabote, Muyang'anila, Mwanagalu
Nsanje	31105008	Beneficiary	Chilembwe, Mpasu	Chilembwe, Mpasu
Nsanje	31105012	Beneficiary	Malemia, Mwasalapa, Mwendonthengo	Malemia, Mwasalapa, Mwendonthengo
Nsanje	31105028	Beneficiary	Navaya, Nyangadi	Navaya, Nyangadi
Nsanje	311040474	Beneficiary	Gundani, Nsitu, Chabe	Nsitu, Gundani, Chabe
Nsanje	31104051	Beneficiary	Mchacha, Manthenga	Mchacha, Manthenga
Nsanje	31106008	Beneficiary	Kuyeri, Sorgin	Kuyeri, Sorgin
Nsanje	31106024	Beneficiary	Chinsomba, Sandram	Chinsomba, Sandram
Nsanje	31108005	Beneficiary	Mpanje, Nyamphota, Mbesa	Mpanje, Nyamphota, Mbesa

Nsanje	31101004	Beneficiary	Bilitinyu II	Bilitinyu II
Nsanje	31107002	Beneficiary	Mkotamu	Mkotamu
Thyolo	3071090	Non beneficiary	Chitengu, Nkaombe	As sampled
Thyolo	3071091	Non beneficiary	Chitengu	As sampled
Thyolo	30702010	Non beneficiary	Liwanda, Mnong'ona	As sampled
Thyolo	30702011	Non beneficiary	Mnong'ona	As sampled
Thyolo	30702012	Non beneficiary	Mnong'ona	As sampled
Thyolo	30702013	Non beneficiary	Moneya, Simpasi	As sampled
Thyolo	30702018	Non beneficiary	Gombe I	As sampled
Thyolo	30709080	Non beneficiary	Chikopa, Makhalira	As sampled
Thyolo	30709082	Non beneficiary	Kachala, Kachingwe, Namagonya	As sampled
Thyolo	30709003	Non beneficiary	Matontho, Mphera	As sampled
Thyolo	30703040	Beneficiary	Khunguwe	As sampled
Thyolo	30703049	Beneficiary	Phodogoma, Katoma	As sampled
Thyolo	30701019	Beneficiary	Jarson	As sampled
Mwanza	30604029	Beneficiary	Pfupa, Chiwambo, Ndilire, Chikoleka	As sampled
Mwanza	30604033	Beneficiary	Kawiliza, Kalanga, Kalima I	As sampled
Mwanza	30603024	Beneficiary	Moffat, Mlongolola	As sampled
Mwanza	30603029	Beneficiary	Lupiya, Thambala	As sampled
Dedza	20807002	Beneficiary	Saiti, Mganga, Kafuka	As sampled
Dedza	20807021	Beneficiary	Kafulama, Tembetembe	As sampled
Dedza	20807024	Beneficiary	Lunguzi, Kanyela	As sampled
Dedza	20807042	Beneficiary	Chikoteza, Kabulika, Leza	As sampled
Mangochi	30103017	Non beneficiary	Yesaya, Mpango, Mwalala, M'bwana	As sampled
Mangochi	30103019	Non beneficiary	Domwe, Kholowela	As sampled
Dedza	20807057	Beneficiary	Liwengo, Kanjobvu	As sampled
Dedza	20807059	Beneficiary	Chagontha, John Kadewere	As sampled
Dedza	20807039	Beneficiary	Ndindi, Dyera	As sampled
Dedza	20807054	Beneficiary	Abraham, Asani	As sampled
Mangochi	30103031	Non beneficiary	Matekwe, Chilimba, Mbinda	As sampled
Mangochi	30103048	Non beneficiary	Simoni, Chantulo	As sampled
Mangochi	30103049	Non beneficiary	Nakhokoloko, Chantulo, Mteleleka, Mbapi	As sampled
Mangochi	30103060	Non beneficiary	Nankumba, Chamba, Sosola	As sampled
Machinga	30207005	Beneficiary	Machina, Mwila, Makhaliha, Makuteya, Mahatele	As sampled
Machinga	30207016	Beneficiary	Chimwaza, Nantuma, Muhimela, Mataka, Kasimba	As sampled
Machinga	30207018	Non beneficiary	Msonthi, M'bang'ombe, M'bwana, Maonga	As sampled
Machinga	30207037	Non beneficiary	Makwinja, Mkumba, Mlungu, Kamphwatiwa	As sampled
Machinga	30207804	Beneficiary	Chikweo, Balala, Njinga, Mchigama, Msonthe, Kambwiri, Sapera	As sampled
Machinga	30201009	Non beneficiary	Ntewe, Ngomano	As sampled
Machinga	30201048	Non beneficiary	Malama, Chabwera	As sampled
Machinga	30208010	Beneficiary	Ahamadu, Makuku, Nsangula, Gidioni, Kapoloma, Lisimba, M'rwala	As sampled
Chikwawa	31007044	Beneficiary	Machokola	As sampled
Chikwawa	31001006	Beneficiary	Chiphuphu, M'beza, Mwanawanjovu	As sampled
Chikwawa	31001039	Non beneficiary	Sauti, Moses, Therere	As sampled
Chikwawa	31001044	Beneficiary	Jeke Blantyre, Jackson I	As sampled
Chikwawa	31001005	Beneficiary	Jasi I, Jasi II, Ntayananja	As sampled
Chikwawa	31001111	Beneficiary	Khembo, Zyuga, Ng'oma	As sampled
Chikwawa	31001123	Non beneficiary	Alindiamo, Ntayananja, Nyamitambo, Kabu	As sampled
Chikwawa	31004016	Beneficiary	Misili, Kaphiri, Nyamphota, Nyamatchuwa, Maseya	As sampled

Chikwawa	31003066	Beneficiary	Moses, Chimphepo, Nkhongono	As sampled
Chikwawa	31007033	Beneficiary	Kamoto, Sing'ando, Makwiza	As sampled
Chikwawa	31005012	Beneficiary	Nedi, Vhinangwa	As sampled
Chikwawa	31001109	Non beneficiary	John II, Black, Gogo	As sampled
Chikwawa	31001126	Non beneficiary	Mandele, Lombe	As sampled
Chikwawa	31006027	Beneficiary	Chikhambi, Fombe	As sampled
Balaka	31201031	Non beneficiary	Zammimba, Buleya	As sampled
Balaka	31201065	Beneficiary	Namputu, Mwandama, Thamangiw	As sampled
Balaka	31201076	Beneficiary	Kasonya, Chikamana, Chilembwe	As sampled
Balaka	31201135	Non beneficiary	Zidyana, Magoni	As sampled
Balaka	31201141	Beneficiary	Kuthambo, Mazenga, Ayanjaawo, Phombeya, Govati	As sampled
Balaka	31201151	Beneficiary	Msukwa, Ntaja, Nsambuza, Janken	As sampled
Balaka	31201154	Non beneficiary	Matipani, Naweta	As sampled
Balaka	31201160	Beneficiary	S. Magombo, Singano, Chambuluka, Njobvuyalema	As sampled
Balaka	31201163	Non beneficiary	Kanono, Chikapa	As sampled
Balaka	31204030	Non beneficiary	Mdela, Pongolani, Mthumbwe	As sampled
Mulanje	30806017	Non beneficiary	Masauli, Dzanyama	As sampled
Mulanje	30806026	Non beneficiary	Ndanga	As sampled
Mulanje	30806037	Non beneficiary	Juma, Nalipa, Khwalala	As sampled
Mulanje	30806040	Non beneficiary	Mfumuyayikazi, Muliva	As sampled
Mulanje	30806041	Non beneficiary	Mfumuyayikazi, Wendewende	As sampled
Mulanje	30806044	Non beneficiary	Wendewende, Sabola	As sampled
Mulanje	30805068	Non beneficiary	Manjomo, Mkwera, Harneck, Muriya	As sampled
Mulanje	30804050	Beneficiary	Wasi	As sampled
Mulanje	30803071	Beneficiary	Mapsere, Nyezerela	As sampled
Mulanje	30801021	Beneficiary	Gawanya, Mikhuti, Nande	As sampled
Thyolo	30703042	Beneficiary	Mbawera	As sampled
Thyolo	30709001	Non beneficiary	Mathotho	As sampled
Thyolo	30709014	Non beneficiary	Wizalamu	As sampled
Machinga	30207803	Beneficiary	Nyama, Welawela, Mchigama	As sampled
Machinga	30207003	Beneficiary	Kawe, Chunju, Ugwe, Mbisa, Mapanje, Mbaso	As sampled
Machinga	30201033	Non beneficiary	Mikonga, Mjamba, Mbwese	As sampled
Machinga	30201046	Non beneficiary	Mikonga, Mjamba, Mbwese	As sampled

Annex E: People Consulted During the Evaluation

This does not include community members consulted through focus group discussions, CPC committee interviews, lead farmer interviews, intra-household surveys and case studies.

Name	Position	Organisation
Abdulla Rhaman	Chief	Malunda Village, Machinga
Amos Simwera	Project Coordinator	CADECOM
Arthur Lichenya	Programs Manager	CARD (Blantyre)
Billy Molosoni	Gender Advisor	CARE Malawi
Blessings Kamtema	ADDRMO	District Council
Bruno Kamanga	Environmental District Officer	District Council
Charles Vanya	MET	Blantyre MET offices
Chifunda Macheke	ECRP Project Coordinator	CARD (Thyolo)
Chifundo Macheke	Project Officer	CARD
Chikondi Chabvuta	Action Aid	Action Aid
Chiku Kilembe	Officer	Christian Aid
Chrissy Nyoza		
Clyton Masambakusiyana	Lead Farmer	Khuguwe Village, Thyolo
Daisy Chitete	Assistant Project Manager (responsible for M&E)	Care International
Dan Msewa	Project Officer	MALEZA
Dennis Zingeni	DADO	District Agriculture Office
Dorica Chibota	DISCOVER Programme Coordinator	GOAL (Blantyre)
Dr. David Mkwambisi	Associate Professor/Consultant	LUANAR
Eda Munthali	Project Coordinator	Emmanuel International
Eda Munthali	ECRP Project Coordinator	Emmanuel International (Machinga)
Edward Katunga	DADO	District Agriculture Office
Elias Lipenga	Field Officer	River of life evangelical church (Rolec)
Elias Lipenga	Field Officer	LOREC
Eliza Hammad		
Emmanuel Sohaya	Acting DPD	District Council
Enford Kanyimbo and Ephraim Ndekha	DADO and Irrigation Officer	District Agriculture Office
Ernest Kaphuka	District Planning Development (DPD)	District Council

Esther Mweso	Program Manager	United Purpose
Felix Mwamlima	Project Officer	HEIFER International
Felix Mwamlima	Project Officer	Heifer International
Francis Kadzokoya	ADDRMO	District Council
Geoffrey Kumwenda	CARE	CARE
Gerald Kosamu	Assistant Project Manager (responsible for partner coordination)	Care International
Gerald Kossam	Assistant Project Manager	CARE Malawi
Gift Geremani	COOPI	COOPI
Gift Jeremani	Deputy Program Manager	COOPI
Gift Khakana	Project Officer	RUO CBO (PIAFORD)
Gilbert Jangasiya	CUMO	CUMO
Grant Mzembe	Project Officer	CARD
Harry Mwamlima	Dir. of poverty reduction	Lilongwe, Capital Hill
Henry Hugna	Principal LCRD Officer	Department of Land Resource Conservation
Herbert Mwalukomo	Programme Manager	CEPA
Horace Pyamdziko	Program Officer	Goal Malawi
Humphrey Gondwe	Former DPD for Mulanje, Now DC for Mwanza	District Council
Humphrey Magalasi	ADDRMO	District Council
Isaac Sangweni	Project Manager	Self Help Africa
Jane Swira	Programme Officer	UNDP/EAD
Jarvis Mwenechani	Desk officer for disaster risk management	District Council
Jassen Tembo	M+E Officer	District Council
John Banda	Assistant District Forest Officer	District Council
Joseph Kalowekamo		Department of Energy
Julius Ng'oma	National Coordinator	CISONECC
Kelvin Harawa	DPD	District Council
Khumbo Kamanga	<i>DISCOVER-Dedza Project Manager</i>	United Purpose
Kingsley Namazinga and Linda Lamya	Project Manager and Project Officer	ADRA
Kondwani Nkhoma	Chief	Khuguwe Village, Thyolo
Linda Maso	M+E	GOAL
Linda Masoo	Officer	Goal Malawi
Lusungu Chinombo	Gender Focal Point	Christian Aid
Mark Nyoza		

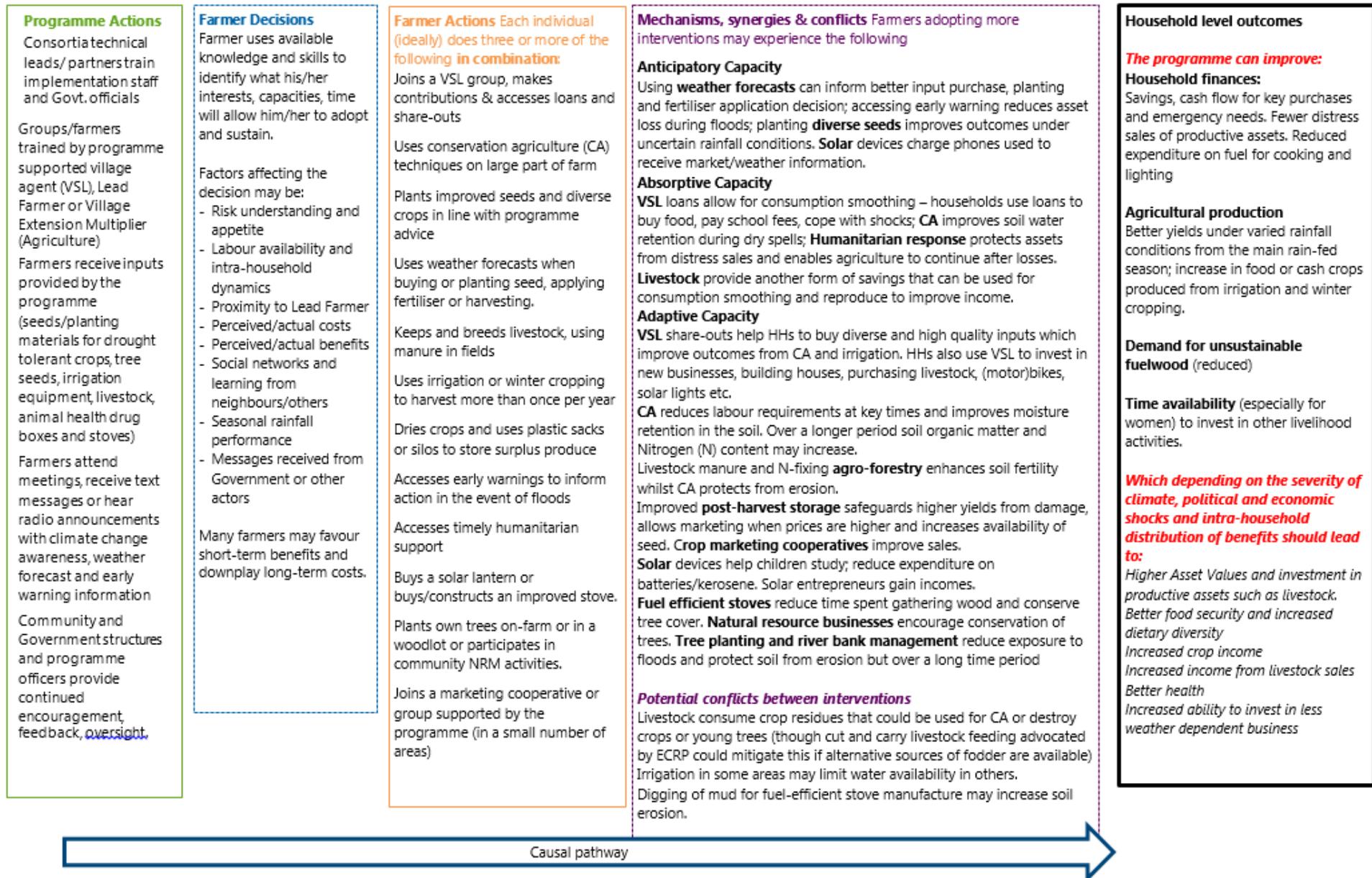
Martino Mazinga	National Coordinator	CADECOM
Matias Mahuta	Lead Farmer	Malunda Village, Machinga
Mbawaka Mwakhwawa	DPD	District Council
McPherson Kapalamula	Project Manager	United Purpose
Mr F.J. Banda	Crops Officer	District Agriculture Office
Mr Mbendera	DADO	District Agriculture Office
MR MDK LOWOLE	CROPS OFFICER	District Agriculture Office
Mr San John	Emergency Operations Officer	District Council
Mrs Uledi	Assistant Land Resource Officer	District Council
Philippa Sackett	Assistant Country Director	GOAL (Blantyre)
Professor Sosten Chiotha	Executive Director	LEAD SEA
Revie Manda	DoDMa	Lilongwe, Capital Hill (Dept of EPD, last floor)
Rose Maxson		
Shamiso Najira	Assistant Director	Environmental Affairs Department
Steve Sakhama	Principle Environmental Officer	District Council
Stevie Kuliyaizi	Former ECRP M&E and Advocacy Manager	FHI (Former ECRP M & E and Advocacy)
Sugzo Gondwe	Desk Officer Disaster	District Council
Taonga Kamanga	ADDRMO	District Council
Tawachi Kaseghe	Project Officer	Eagles
Trywell Khonje	Programs Manager	Eagles
Victor Phiri	Officer in Charge	Meteorological Services, Member DCPC
Vincent Tholo	Program Coordinator	EAM
William Chadza	Executive Director	CEPA
William Nyirenda	Project Coordinator	ActionAid
Zione Viyazyi	ADDRMO	District Council

Annex F: Documents Reviewed

CEPA (2012) ECRP Advocacy Strategy
DISCOVER (2012) Participatory Vulnerability and Capacity Analysis Report
CA-ECRP (2012) Participatory Vulnerability Assessment (PVA) Consolidated Report
DISCOVER 2011-2016 Annual Reports
CA-ECRP 2011-2016 Annual Reports
ECRP M&E Agency (2012) Inception Report, including Theory of Change
ECRP M&E Agency (2012) Baseline Report
DISCOVER (2013) Revised Proposal and Budget
CA-ECRP (2013) Revised Proposal and Budget
DISCOVER (2013) DISCOVER Standards Manual and Targeting Criteria
CEPA (2013) Internal Review: Climate Change Advocacy Strategy
CA-ECRP (2014) Standard Operating Procedures
ECRP M&E Agency (2014) Mid-term review
ECRP M&E Agency (2014) Value for Money study, including cost benefit analysis of VSL and ECRP's agricultural package
ECRP M&E Agency (2014) Assessment of ECRP contribution to the national DRR system
CA-ECRP (2015) Final Report to WFP for the MVAC-Overlap Project – Support to Disaster Risk Reduction and Resilience Building
ECRP M&E Agency (2015) Consolidation of lessons on low carbon technologies
ECRP M&E Agency (2015) Study of ECRP Interventions in Combination
ECRP M&E Agency (2015) Study of ECRP's Contribution to Flood Resilience
ECRP M&E Agency (2015) Cost Benefit Analysis – Livestock and Irrigation
ECRP M&E Agency (2015) Lessons Learned from ECRP
ECRP M&E Agency (2015) Review of Social Protection Programmes in Malawi
ECRP M&E Agency (2015) Political Analysis of Climate Resilience in Malawi
ECRP M&E Agency (2015) The Economics of Climate Change in Malawi
ECRP M&E Agency (2016) Annual Review
ECRP M&E Agency (2016) Qualitative assessment of natural resource management and climate change awareness interventions
C12 (2016) ECRP VSL Gender Analysis
CA-ECRP (2016) Gender Integration in the ECRP
ECRP M&E Agency (2017) Evaluability Study: potential for statistical impact assessment in ECRP
CEPA (2017) Status of District Advocacy Activities
Full references to external documents are provided in footnotes throughout the text.

Annex G: Detailed Theory of Change

Household Level



Community Level

Programme activities

DRR, CCA and Early Warning

- Training for Village and District Civil Protection Committees (CPCs) and strengthening their links with VDCs and DECs
- Participatory Vulnerability and Capacity Assessment (PCVA)
- Development of local level contingency or DRM plans
- Link CPC members to weather information via the ESOKO SMS service
- Village based awareness meetings & Participatory Scenario Planning (PSP)
- Provide equipment –i.e. river gauges, rain gauges, life jackets.
- Improve links to DCPCs, District DRR planning, coordination of District investments and allocation of District resources to DRR.
- Advocacy for district resource allocation to DRR and NRM objectives
- Self-sufficiency grants for CPCs
- Linkage of upstream and downstream CPCs in a riverine alliance.

Natural Resource Management

- Formation/training of natural resource committees or catchment management committees (VNRMC/CMCs)
- Planning and implementation support to:
 - o By-law development
 - o Establishment and planting of village forest areas either through nursery establishment or year-round planting using truncheons
 - o Distribution of fruit, tea and indigenous tree seedlings for private planting;
 - o Construction of water harvesting structures (swales), check dams, pits, fish ponds
 - o Planting of grass, trees, cacti along swales and river banks;
 - o River de-siltation and sand bag placement
- Development of natural resource businesses (beekeeping, stove production, briquettes)

Areas of Change in Community Resilience (ECRP Mechanisms at community level)

Area 1: Governance

Knowledge and attitudes: CPCs understand their role, the role of VDCs and the process to communicate village requirements and plans in order to attract resources.

Skills and capacity: VCPC and DCPC members have an appropriate mandate and human resources. They include the views/needs of vulnerable groups and women in their work.

Decision-Making: There is clear accountability between community, VCPCs, VDCs, DCPCs, DECs. CPCs are able to assess and communicate longer-term risk reduction and short-term humanitarian needs effectively to District officials and NGOs.

Area 2: Risk Assessment

Knowledge and attitudes: CPC members understand both short-term (weather) and long-term (climate) risks. CPCs have conducted & shared findings of a PVCA and understand its relevance to local planning.

Skills and capacity: The PVCA is usable & can inform decision making. CPC members have the capacity to use the assessment & replicate it on an appropriate time period.

Area 3: Knowledge and Education

Knowledge and attitudes: Cultural and economic barriers to DRR/CCA are understood and challenged. (E.g. non-compliance with early warning messages; unsustainable natural resource use)

Skills and capacity: With the programme's support, the VCPC has been able to create open debate in the community and increase farmers' access and use of climate, weather & early warning information (e.g. participatory scenario planning)

Area 4: Risk Management and Vulnerability Reduction (focus on NRM)

Knowledge and attitudes: Community members understand the links between natural resource degradation and current/future vulnerabilities, they know which actions can help reduce exposure to flood or vulnerability to drought or flood.

Capacities and Skills: Programme Staff, District Officials and Community Committee Members have skills and resources to develop and deliver plans which: identify and prioritise natural resource management actions; may include afforestation, water harvesting, and soil conservation; take a landscape/catchment approach to managing resources; provide quality assurance to ensure the design and implementation of NRM activities are likely to be sustained.

Decision-making: Community institutions (by-laws, committees, social norms) shift to incentivise more sustainable natural resource management; where feasible the programme creates additional incentives for behaviour which protects or enhances tree cover, water availability and soil conservation.

Area 5: Disaster Preparedness and Response

All hazards: The DCPC has a clear process for triggering a response and targeting resources. Local accountability mechanisms improve the quality of response.

Flood/pest Capacities and Skills: CPCs in flood affected areas have used and maintained early warning equipment, communicate warnings successfully and conduct evacuation simulations. District has resources to respond to reported warnings.

Drought Capacities and Skills: CPCs can disseminate seasonal forecasts and monitor risks to support local social protection responses; All CPCs participate in annual assessments and use risk assessments to support targeting of the response.

Intermediate outcomes

Flood - Preparedness & Response

VCPCs and community members use early warnings to save lives and assets. Communities follow evacuation and first aid procedures to minimise loss of life. VCPC engagement in assessments and targeting make response and recovery support faster, more accurate and transparent

Crop pests – Preparedness & Response

VCPCs report early signs of pest outbreaks and access support in minimising their impact on crop and livestock losses.

Drought - Preparedness & Response

VCPCs organise local response or social protection in line with community capacities VCPC engagement in humanitarian assessments and targeting making response faster, more accurate and transparent Response activities are better suited to local needs (e.g. more appropriate planting materials; cash vs. food etc.)

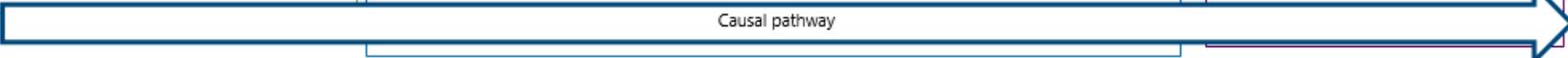
Long-term vulnerability reduction

Farmers decide to adopt and benefit from programme interventions (see the HH-level ToC)
ECRP NRM activities reduce priority risks
Government investments reduce risks

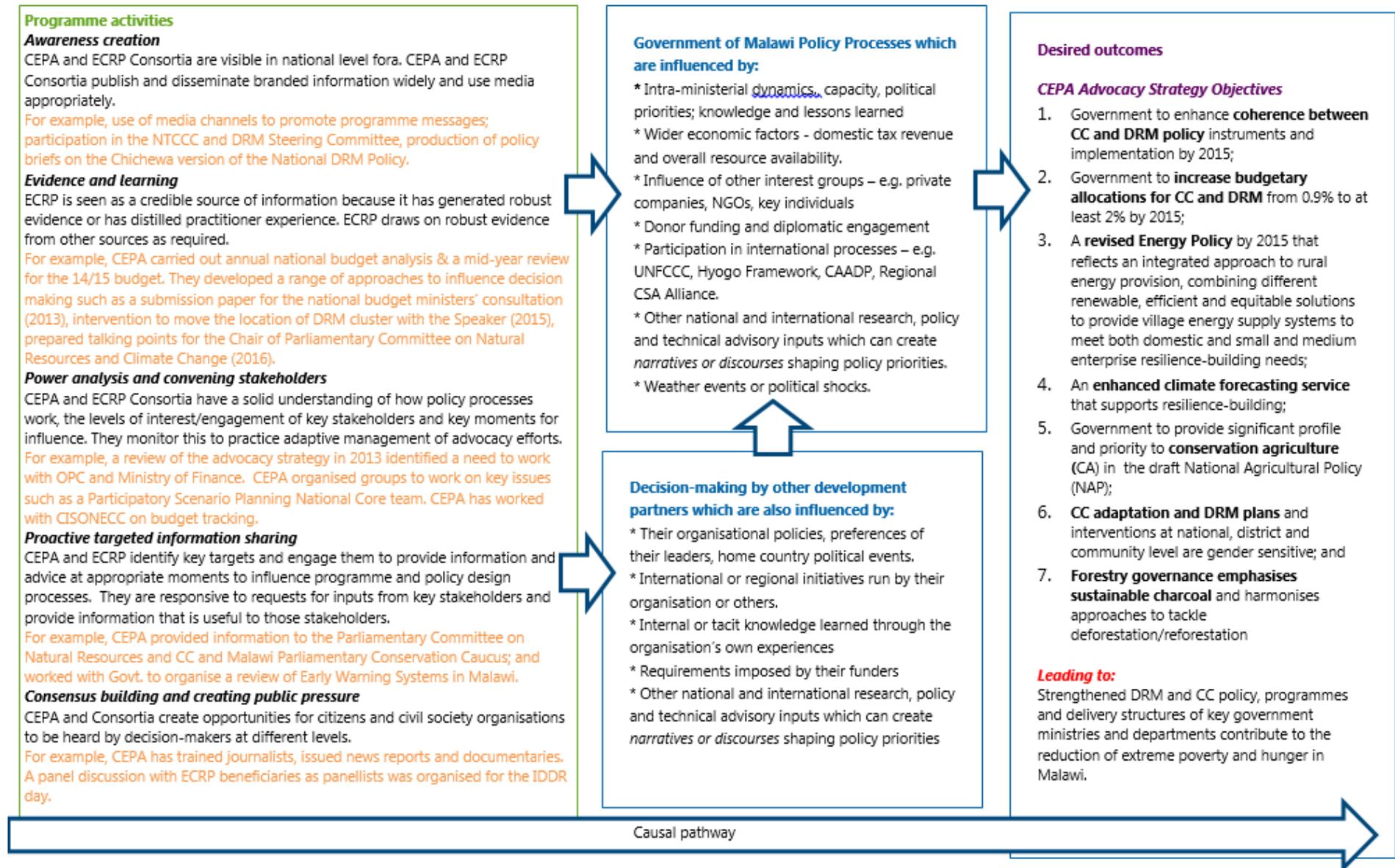
Leading to long-term outcomes at household and community level:

- More equitable distribution of risk
- Reduced flood losses
- Reduced exposure to floods (long-term)
- Reduced soil erosion; increased water conservation and tree cover.
- Better yields despite droughts

Causal pathway



National Level



Annex H: Baseline recall assessment

The purpose of this annex is to assess the relative accuracy of the baseline recall estimates used for the household level impact assessment.

As part of the endline survey, households were asked to recall their baseline situation in 2012 before the programme began. As described in the main report, we used the baseline recall to match households with similar baseline characteristics from the beneficiary and non-beneficiary groups. Ideally, we would have surveyed the same households at baseline and endline (called a “panel” survey) but instead we needed to rely on recall to reconstruct the baseline.

In the two sections below we compare the recall estimates made in 2017 for the 2012 baseline with comparable estimates made during the baseline survey. Although the same households were not sampled we would expect that if the recall were accurate then on average it would be approximately equivalent to the baseline survey results.

One of the caveats with comparing the endline recall and equivalent baseline estimates is that the baseline survey sampled households before the programme began, thus both beneficiary and non-beneficiary households were sampled within programme areas. On the other hand, the endline survey sampled either signed-up beneficiaries or non-beneficiaries who were not exposed to any similar programme interventions. The non-beneficiaries were sampled outside of the programme villages but within the programme districts.

We would therefore expect that the endline beneficiary sample would have had better-off baseline conditions than the baseline survey sampled households and the endline non-beneficiary households would potentially be slightly worse-off at baseline.

In summary, the key findings were that the recall estimates were broadly accurate strengthening our confidence in using them as a baseline estimate for the impact assessment. Details are listed in the remainder of the annex.

Outcome level recall checking: food security and assets values

Food security

The food security recall estimates for the agricultural year of 2011/2012 aligned closely with the baseline survey estimates (Table 1), however the recall estimates for the year 2012/2013 were all higher than the baseline survey estimates (Table 2). One explanation could be that the baseline survey estimates were based on a projection, households were asked how food secure they would be for the rest of the year, not what their food security had been the previous year. To account for this issue, we used both the 2011/2012 and 2012/2013 recall estimates for the statistical matching.

A surprising result was that the food security estimates for 9 months and 12 months appeared to be equally accurate, we would have expected households to be less accurate in recalling food security levels at 9 months. A greater proportion of households however did report not being able to recall their baseline food security at 9 months compared to 12 months. For this reason, we used the 12-month recall estimates as a baseline indicator for the statistical matching.

Table 1. A comparison between food security estimates for the 2011/2012 season made during the baseline survey in 2012 and recall estimates made during the endline survey in 2017. Household were asked to estimate number of food secure months from April 2011.

	Baseline survey estimate made in May 2012	Recall at endline: all households	Recall at endline: Beneficiary households at endline	Recall at endline: non-Beneficiary households
Food secure 12 months	28.3 % (2.7)	30.5 % (1.4)	31.3 % (1.7)	29.7 % (2.2)
Food secure 9 months	49.6 % (3.4)	50.3 % (1.6)	51.6 % (2.3)	49.0 % (2.2)

Table 2. A comparison between food security estimates for the 2012/2013 season made during the baseline survey in 2012 and equivalent recall estimates made during the endline survey in 2017. Household were asked to estimate number of food secure months from April 2012.

	Baseline survey projected estimate made in May 2012	Recall at endline: all households	Recall at endline: Beneficiary households	Recall at endline: non-Beneficiary households
Food secure 12 months	12.5 % (1.8)	33.9 % (1.4)	35.0 % (1.9)	32.8 % (2.0)
Food secure 9 months	24.6 % (3.3)	52.0 % (1.5)	54.5 % (2.2)	49.5 % (2.1)

Asset values

The average recall estimates for both livestock and household assets aligned very closely with the baseline survey estimates (columns 1 and 2, in Table 3 and 4 respectively). As expected, the beneficiary/non-beneficiary recall estimates were slightly higher/lower than the baseline survey estimates. All values in Table 3 and 4 are inflation adjusted and shown in 2012 Malawian Kwachas.

To improve the accuracy of the recall estimates for baseline assets values, we asked households to recall the quantity of each type of asset owned and not its actual value in 2012. To calculate the values, we used the average value per asset type listed at endline (e.g. goat or bed) and multiplied these values by the quantity of each type of asset owned.

Table 3. A comparison between estimated total livestock values in 2012 (Kwachas) made during the baseline survey in 2012 and recall estimates made during the endline survey five years later in 2017.

	Baseline survey projected estimate made in May 2012	Recall at endline: all households	Recall at endline: Beneficiary households	Recall at endline: Non-beneficiary households
Median	3,230 (784)	4,306 (824)	9,952 (1,036)	0 (206)
Mean	31,618 (4,407)	32,110 (2,987)	39,138 (3,421)	25,347 (4,129)

Table 4. A comparison between estimated total household asset values in 2012 (Kwachas) made during the baseline survey in 2012 and recall estimates made during the endline survey five years later in 2017.

	Baseline survey projected estimate made in May 2012	Recall at endline: all households	Recall at endline: Beneficiary households	Recall at endline: Non-beneficiary households
Median	14,861 (770)	13,400 (581)	16,985 (856)	9,584 (1,030)
Mean	26,515 (1,660)	22,537 (1,246)	27,140 (1,423)	18,107 (1,778)

Output level recall checking: adoption of interventions

The table below shows the baseline survey estimates for adoption of various programme interventions compared to the equivalent recall estimates made during the endline survey (columns 3 and 4 respectively). The recall estimates for non-beneficiaries aligned closely with the baseline survey estimates, whilst the beneficiary recall estimates tended to be higher but not for all. If anything, these adoption level recall estimates might downwardly bias our impact estimate, which we would prefer to positive as it makes our impact estimates more conservative.

	Intervention	Definition for household survey	2012 Baseline survey estimate of % of targeted beneficiaries adopting this intervention	Recall at endline of 2012 baseline adoption rates
1	Village Savings and Lending	Any member of the household is a member of a VSL group AND has made any number of contributions.	3.4%	Beneficiary: 7.9% Non-beneficiary: 1.8%
2	Minimum tillage	A household which used minimum tillage	16%	Beneficiary: 37% Non-beneficiary: 9%
3	Crop diversification	Households where maize was planted on less than 50% of the total farm area cultivated.	34%	Beneficiary: 38% Non-beneficiary: 37%
4	Improved seeds	Households reporting the use of 'improved' seed or planting materials for any crop grown in the previous year. This relates to any seed purchased from an ADMARC, or agricultural input supplier or new varieties provided by the programme or as part of the 'pass-on' programme.	79%	Beneficiary: 76% Non-beneficiary: 63%
5	Post-harvest Management	Households who reported that they either stored any fruits or vegetables OR a) Dried and tested the moisture content of their maize or other grains before storing it AND b) applied chemicals to store any maize or grain harvested in the previous season.	47%	Beneficiary: 71% Non-beneficiary: 47%
6	Agroforestry	Any household reporting that they had trees on their farm to produce fruit, animal fodder or to improve soil fertility at the time of the survey.	16%	Beneficiary: 32% Non-beneficiary: 18%
7	Livestock – small stock	Households with any livestock promoted by the programme (goat, sheep, pigs)	27%	
	Livestock - poultry	Households with poultry only	54%	Beneficiary: 53% Non-beneficiary: 34%
8	Irrigation	Any household which practiced irrigation in the last growing season on at least 0.10 hectares of land. (Can include watering can, channel/river diversion, treadle pump, solar or diesel pumps) Does NOT include cultivation in residual moisture on dambo land.	23.4	Beneficiary: 49% Non-beneficiary 26%
9	Fuel efficient stove	Any household which uses the Chitetezo Mbaula or Fixed Mud Stove as their main stove for cooking.	3%	Beneficiary: 7% Non-beneficiary: 1%
10	Solar lighting	Any household which owns at least one working solar lantern.	3%	Beneficiary: 3% Non-beneficiary 3%

Annex I: Impact estimate definitions

This annex provides detailed definitions for the impact assessment definitions for the adoption and core package related interventions, listed in Table 1 and 2 respectively.

Table 1. Definitions for the adoption related impact estimates

Impact statement	Outcome definition	Intervention group definition	Comparison group definition
1. Mean difference in Village Savings Lending (VSL) adoption between the intervention and comparison groups in 2017.	VSL adoption: % of households where any member of the household is a member of a VSL AND has made any number of contributions.	Any household exposed and receiving support from the ECRP programme (i.e. a beneficiary)	Any household not exposed to the ECRP programme but with similar baseline characteristics to the intervention group.
2. Mean difference in conservation agriculture (CA) adoption between the intervention and comparison groups in 2017.	CA adoption: % of households which used any two of the following CA techniques in the last planting season in combination on part or all the farm: minimum tillage; planting basins; retaining crop residues for mulching, inter-cropping or cover-cropping with legumes.	Same groups as 1 above	Same groups as 1 above
3. Mean difference in non-maize crop adoption between the intervention and comparison groups in 2017.	Non-maize adoption: % households where maize was planted on less than 50% of the total farm area cultivated.	Same groups as 1 above	Same groups as 1 above
4. Mean difference in number of crop types harvested between the intervention and comparison groups in 2017.	Number crops harvested: the number of different crops harvested in the 2016/17 season.	Same groups as 1 above	Same groups as 1 above
5. Mean difference in adoption of improved seeds between the intervention and comparison groups in 2017.	Improved seeds adoption: Households reporting the use of 'improved' seed or planting materials for any crop grown in the previous year. This relates to any seed purchased from an ADMARC, or agricultural input supplier or new varieties provided by the programme or as part of the 'pass-on' programme.	Same groups as 1 above	Same groups as 1 above
6. Mean difference in adoption of post-harvest management (PHM) between	Post-harvest management: Households who reported that they either stored any fruits or vegetables OR a) Dried and tested the moisture	Same groups as 1 above	Same groups as 1 above

the intervention and comparison groups in 2017.	content of their maize or other grains before storing it AND b) applied chemicals to store any maize or grain harvested in the previous season.		
7. Mean difference in % of stored sacks lost between the intervention and comparison groups in 2017.	% stored sacks lost: stored sacks lost due to pests or rotting in the 2016/17 season.	Programme beneficiary households adopting PHM in 2016/17.	Non-beneficiary households not adopting PHM between 2010 and 2017.
8. Mean difference in adoption of agroforestry between the intervention and comparison groups in 2017.	Agroforestry adoption: Any household reporting that they had trees on their farm to produce fruit, animal fodder or to improve soil fertility at the time of the survey.	Same groups as 1 above	Same groups as 1 above
9. Mean difference in average number of small livestock owned between the intervention and comparison groups in 2017.	Small livestock: goats, pigs and sheep.	Same groups as 1 above	Same groups as 1 above
10. Mean difference in average number of poultry owned between the intervention and comparison groups in 2017.	Poultry: chickens and guinea fowls.	Same groups as 1 above	Same groups as 1 above
11. Mean difference in adoption of irrigation between the intervention and comparison groups in 2017.	Irrigation adoption: Any household which practiced irrigation in the last growing season on at least 0.10 hectares of land. (Can include watering can, channel/river diversion, treadle pump, solar or diesel pumps) Does NOT include cultivation in residual moisture on dambo land.	Same groups as 1 above	Same groups as 1 above
12. Mean difference exposure to early warning systems between the intervention and comparison groups in 2017.	Early warning: Receipt of weather forecast info by SMS, radio or from a Lead Farmer/VEM) in the past 2 years AND participation in / awareness of village level planning or PVCA or participation in / awareness of a PSP activity.	Same groups as 1 above AND households exposed to disaster in 2016/17	Same groups as 1 above AND households exposed to disaster in 2016/17
13. Mean difference exposure to weather forecasts between the intervention and comparison groups in 2017.	Weather forecast: Receipt of weather forecast info by SMS, radio or from a Lead Farmer/VEM) in the past 2 years.	Same groups as 1 above	Same groups as 1 above
14. Mean difference in adoption of fuel efficient stoves between the intervention and comparison groups in 2017.	Fuel efficient stove adoption: Any household which uses the Chitetezo Mbaula or Fixed Mud Stove as their main stove for cooking.	Same groups as 1 above	Same groups as 1 above

15. Mean difference in adoption of solar lighting between the intervention and comparison groups in 2017.	Solar lighting adoption: Any household which owns at least one working solar lantern.	Same groups as 1 above	Same groups as 1 above
16. Mean difference in adoption of food supplies between the intervention and comparison groups in 2017.	Food supplies: received humanitarian food assistance in 2016/17	Same groups as 1 above AND households exposed to disaster in 2016/17	Same groups as 1 above AND households exposed to disaster in 2016/17
17. Mean difference in adoption of seeds between the intervention and comparison groups in 2017.	Seeds: received seeds as part of humanitarian assistance in 2016/17	Same groups as 1 above AND households exposed to disaster in 2016/17	Same groups as 1 above AND households exposed to disaster in 2016/17

Annexes available as separate documents:

Annex J: Impact Assessment Results Detail

Annex K: Cost Benefit Analysis Report

Annex L: National Climate Change Management Policy Case Study

Annex M: Draft Programme Completion Review

Annex J: Impact assessment result supporting information

Press control then click on the table below to go to the impact estimate:

<i>Adoption impact estimates</i>	2
Village Savings Lending.....	2
Conservation agriculture	5
Crop diversification	9
Improved seeds	11
Post-Harvest Management.....	14
Agroforestry	17
Livestock.....	20
Irrigation.....	23
Early Warning / DRR	27
Weather forecasts	30
Fuel efficient stove	33
Solar lighting.....	37
Humanitarian assistance	41
<i>Core packackage outcomes</i>	44
Core package	44
Core package plus irrigation	50
Core package plus received goats or pigs	64
Core package plus DRR/EWS	72

Adoption impact estimates

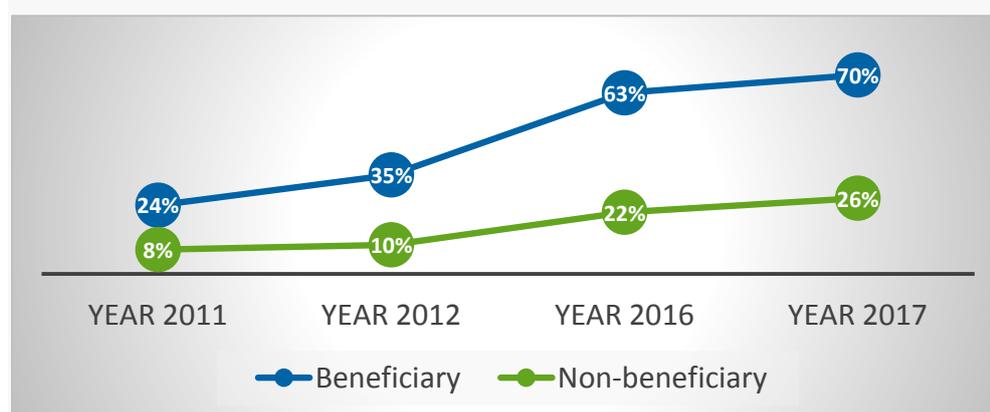
Village Savings Lending

Variable code lookup	Description
VSL.2011.12	Adopted Village Saving Loan in 2011/12.
VSL.2010.11	Adopted Village Saving Loan in 2010/11.
Assets.2012	Value of assets owned in 2012
Food.2012	Food secure for 12 months in 2012
PPI_score2011	Poverty score in 2011

Box 1: Impact estimate all households: 27.93% (3.6 SE), p-value <0.001

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## VSL.2011.12	0.3458	0.1014	0.3020	0.2444
## VSL.2010.11	0.2407	0.0848	0.2787	0.1559
## Assets.2012	63042.9340	43453.3853	131858.1773	19589.5487
## Food.2012	0.3388	0.3281	0.4697	0.0107
## PPI_score2011	41.8349	43.7300	18.3920	-1.8950



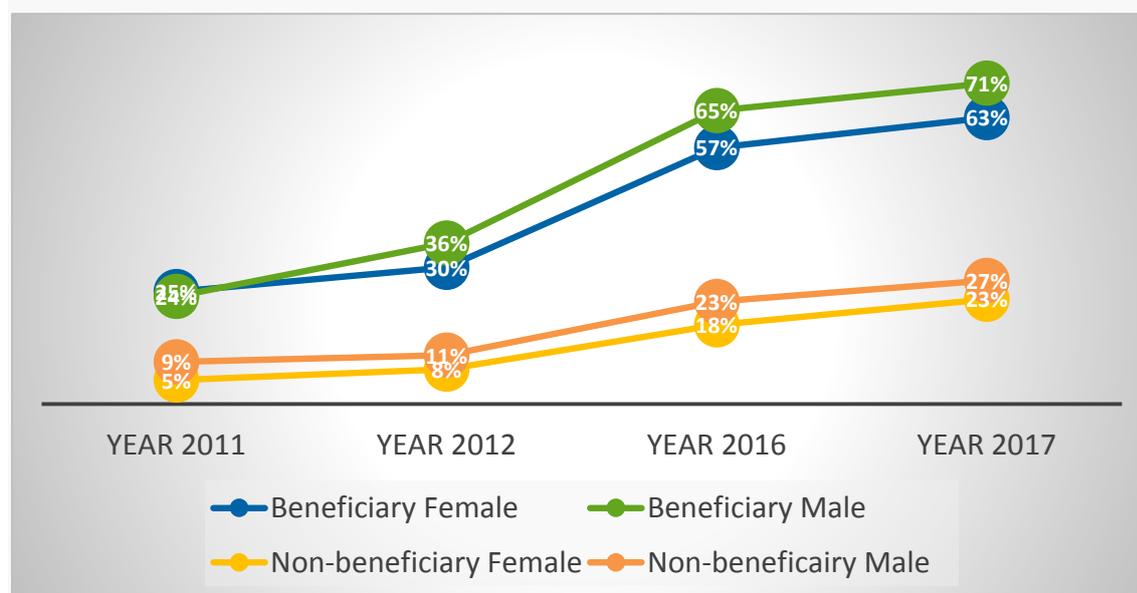
Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## VSL.2011.12	0.3458	0.3406	0.4743	0.0052
## VSL.2010.11	0.2407	0.2433	0.4295	-0.0026
## Assets.2012	63042.9340	61114.8688	176515.1820	1928.0652
## Food.2012	0.3388	0.3414	0.4746	-0.0026
## PPI_score2011	41.8349	40.2780	17.0659	1.5569

```
## Sample sizes:
##           Control Treated
## All       1085    1151
## Matched   536    1151
## Unmatched 549     0
## Discarded 0      0
```

Box 2: Impact estimate female households: 25.63% (5.9 SE), p-value < 0.01

```
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## VSL.2011.12      0.3029      0.0776      0.2680      0.2254
## VSL.2010.11      0.2490      0.0531      0.2246      0.1959
## Assets.2012      37775.3071    22809.8776 50609.7868 14965.4295
## Food.2012        0.2531      0.2857      0.4527     -0.0326
## PPI_score2011    41.5228      42.7020     17.4221    -1.1792
```



```
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## VSL.2011.12      0.3029      0.2946      0.4578      0.0083
## VSL.2010.11      0.2490      0.2407      0.4293      0.0083
## Assets.2012      37775.3071    33796.2365 88868.9313 3979.0705
## Food.2012        0.2531      0.2116      0.4102      0.0415
## PPI_score2011    41.5228      38.2905     17.4365      3.2324
```

```
## Sample sizes:
##           Control Treated
## All       245    241
## Matched   119    241
## Unmatched 126     0
## Discarded 0      0
```

Box 3: Impact estimate poor households: 16.9% (9.1 SE), p-value < 0.1

```
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## VSL.2011.12      0.3023      0.1220      0.3292      0.1804
## VSL.2010.11      0.2093      0.1098      0.3145      0.0995
## Assets.2012     31297.5000     16441.3902 28592.7647 14856.1098
## Food.2012        0.2558        0.2805      0.4520     -0.0247
## PPI_score2011    14.6163     13.6341     15.6335      0.9821
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## VSL.2011.12      0.3023      0.2326      0.4285      0.0698
## VSL.2010.11      0.2093      0.1512      0.3633      0.0581
## Assets.2012     31297.5000     31379.9535 37238.7248 -82.4535
## Food.2012        0.2558        0.1395      0.3514      0.1163
## PPI_score2011    14.6163     15.7674     11.1224     -1.1512
##
## Sample sizes:
##           Control Treated
## All           82      86
## Matched       36      86
## Unmatched     46       0
## Discarded     0       0
```

Box 4: Impact estimate households exposed to disaster: 33.9% (5.4 SE), p-value < 0.001

```
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## VSL.2011.12      0.3134      0.1089      0.3121      0.2045
## VSL.2010.11      0.1972      0.0968      0.2962      0.1004
## Assets.2012     64807.7113     49467.7621 139907.4416 15339.9492
## Food.2012        0.3099        0.2823      0.4510      0.0276
## PPI_score2011    41.1056     42.8468     17.2772     -1.7411
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## VSL.2011.12      0.3134      0.3063      0.4623      0.0070
## VSL.2010.11      0.1972      0.1954      0.3977      0.0018
## Assets.2012     64807.7113     56638.3856 146882.4019 8169.3257
## Food.2012        0.3099        0.3644      0.4827     -0.0546
## PPI_score2011    41.1056     40.8345     15.5784      0.2711
##
## Sample sizes:
##           Control Treated
## All           248     568
## Matched       175     568
## Unmatched     73       0
## Discarded     0       0
```

Conservation agriculture

Variable code lookup	Description
CA_2011.2012_2	Adopted two conservation agricultural practices in 2011/12
CA_2010.2011_2	Adopted two conservation agricultural practices 2010/11
Assets.2012	Value of assets owned in 2012
Food.2012	Food secure for 12 months in 2012
PPI_score2011	Poverty score in 2011

Box 5: Impact estimate all households: 23.17% (2.1 SE), p-value < 0.001

```
## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5751           0.4507           0.1266           0.1245
## CA_2011.2012_2      0.4023           0.1023           0.3032           0.3000
## CA_2010.2011_2      0.3380           0.0949           0.2933           0.2430
## Assets.2012        63042.9340        43453.3853  131858.1773  19589.5487
## Food.2012           0.3388           0.3281           0.4697           0.0107
## PPI_score2011       41.8349           43.7300           18.3920          -1.8950
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5751           0.5749           0.1936           0.0002
## CA_2011.2012_2      0.4023           0.3997           0.4903           0.0026
## CA_2010.2011_2      0.3380           0.3805           0.4860          -0.0426
## Assets.2012        63042.9340        55823.2181  155803.8826  7219.7159
## Food.2012           0.3388           0.2911           0.4547           0.0478
## PPI_score2011       41.8349           39.5543           17.7403           2.2806
##
## Sample sizes:
##           Control Treated
## All           1085     1151
## Matched        541     1151
## Unmatched       544         0
## Discarded         0         0
```

Box 6: Impact estimate female headed households: 30.21% (4.2 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5688           0.4242    0.1153    0.1446
## CA_2011.2012_2      0.3361           0.0531    0.2246    0.2830
## CA_2010.2011_2      0.2739           0.0449    0.2075    0.2290
## Assets.2012        37775.3071      22809.8776 50609.7868 14965.4295
## Food.2012           0.2531           0.2857    0.4527   -0.0326
## PPI_score2011       41.5228          42.7020   17.4221  -1.1792
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5688           0.5683    0.2167    0.0004
## CA_2011.2012_2      0.3361           0.3402    0.4759   -0.0041
## CA_2010.2011_2      0.2739           0.3154    0.4667   -0.0415
## Assets.2012        37775.3071      28714.8880 68548.4958 9060.4191
## Food.2012           0.2531           0.2116    0.4102    0.0415
## PPI_score2011       41.5228          39.4813   16.2830    2.0415
##
## Sample sizes:
##           Control Treated
## All           245     241
## Matched       115     241
## Unmatched     130      0
## Discarded      0      0

```

Box 7: Impact estimate poor households: 23.2% (5.8 SE), p-value < 0.001

```
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5577           0.4639    0.1264    0.0939
## CA_2011.2012_2     0.2791           0.0976    0.2985    0.1815
## CA_2010.2011_2     0.2442           0.0976    0.2985    0.1466
## Assets.2012        31297.5000       16441.3902 28592.7647 14856.1098
## Food.2012          0.2558           0.2805    0.4520   -0.0247
## PPI_score2011      14.6163           13.6341   15.6335    0.9821
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5577           0.5542    0.1573    0.0035
## CA_2011.2012_2     0.2791           0.1860    0.3940    0.0930
## CA_2010.2011_2     0.2442           0.1860    0.3940    0.0581
## Assets.2012        31297.5000       33875.0233 46068.7298 -2577.5233
## Food.2012          0.2558           0.1977    0.4032    0.0581
## PPI_score2011      14.6163           20.0233   20.8081   -5.4070
##
## Sample sizes:
##           Control Treated
## All           82      86
## Matched       41      86
## Unmatched     41       0
## Discarded     0       0
```

Box 8: Impact estimate households exposed to disaster: 28.5% (3.3 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.7216           0.6377           0.1040           0.0839
## CA_2011.2012_2     0.4384           0.1492           0.3570           0.2892
## CA_2010.2011_2     0.3644           0.1411           0.3489           0.2233
## Assets.2012        64807.7113       49467.7621  139907.4416  15339.9492
## Food.2012           0.3099           0.2823           0.4510           0.0276
## PPI_score2011      41.1056           42.8468           17.2772          -1.7411

## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.7216           0.7216           0.1358           0.0000
## CA_2011.2012_2     0.4384           0.4384           0.4977           0.0000
## CA_2010.2011_2     0.3644           0.4014           0.4917          -0.0370
## Assets.2012        64807.7113       67344.3803  139182.7162 -2536.6690
## Food.2012           0.3099           0.2799           0.4503           0.0299
## PPI_score2011      41.1056           39.3468           15.5865           1.7588

## Sample sizes:
##           Control Treated
## All           248     568
## Matched       166     568
## Unmatched      82       0
## Discarded      0       0

```

Crop diversification

Variable code lookup	Description
CA_2011.2012_2	Adopted two conservation agricultural practices in 2011/12
CA_2010.2011_2	Adopted two conservation agricultural practices 2010/11
Assets.2012	Value of assets owned in 2012
Food.2012	Food secure for 12 months in 2012
PPI_score2011	Poverty score in 2011

Box 9: Impact estimate all households: 0.78% (3.2 SE), p-value < 1

```
## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5217           0.5073      0.0549      0.0144
## Non.maize.2010.11    0.3666           0.3843      0.4867     -0.0177
## Non.maize.2011.12    0.3432           0.3677      0.4824     -0.0246
## Assets.2012        63042.9340      43453.3853 131858.1773 19589.5487
## Food.2012           0.3388           0.3281      0.4697      0.0107
## PPI_score2011       41.8349           43.7300      18.3920     -1.8950
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5217           0.5217      0.0529      0.0000
## Non.maize.2010.11    0.3666           0.3536      0.4785      0.0130
## Non.maize.2011.12    0.3432           0.3119      0.4637      0.0313
## Assets.2012        63042.9340      54228.9731 123019.5961 8813.9609
## Food.2012           0.3388           0.3501      0.4774     -0.0113
## PPI_score2011       41.8349           40.2667      18.2699      1.5682
##
## Sample sizes:
##           Control Treated
## All           1085     1151
## Matched        586     1151
## Unmatched      499         0
## Discarded         0         0
```

Box 10: Impact estimate female headed households: -1.06 % (4.2 SE), p-value < 1

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5124           0.4797           0.0704           0.0327
## Non.maize.2010.11     0.3071           0.3184           0.4668          -0.0113
## Non.maize.2011.12     0.2697           0.3020           0.4601          -0.0323
## Assets.2012          37775.3071          22809.8776 50609.7868 14965.4295
## Food.2012            0.2531           0.2857           0.4527          -0.0326
## PPI_score2011        41.5228           42.7020           17.4221          -1.1792

## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5124           0.5126           0.0919          -0.0003
## Non.maize.2010.11     0.3071           0.3029           0.4614           0.0041
## Non.maize.2011.12     0.2697           0.2324           0.4240           0.0373
## Assets.2012          37775.3071          35840.0249 79802.1401 1935.2822
## Food.2012            0.2531           0.2407           0.4292           0.0124
## PPI_score2011        41.5228           38.7884           16.8145           2.7344
##
## Sample sizes:
##           Control Treated
## All           245      241
## Matched       125      241
## Unmatched     120       0
## Discarded      0       0

```

Box 11: Impact estimate poor households: 4.6% (7.7 SE), p-value < 1

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5482           0.4738           0.1196           0.0744
## Non.maize.2010.11     0.4070           0.4634           0.5017          -0.0564
## Non.maize.2011.12     0.3488           0.4878           0.5029          -0.1390
## Assets.2012          31297.5000          16441.3902 28592.7647 14856.1098
## Food.2012            0.2558           0.2805           0.4520          -0.0247
## PPI_score2011        14.6163           13.6341           15.6335           0.9821

## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5482           0.5484           0.1399          -0.0002
## Non.maize.2010.11     0.4070           0.5349           0.5045          -0.1279
## Non.maize.2011.12     0.3488           0.4186           0.4990          -0.0698
## Assets.2012          31297.5000          31468.5930 38247.1512 -171.0930
## Food.2012            0.2558           0.3023           0.4646          -0.0465
## PPI_score2011        14.6163           19.1395           18.9033          -4.5233

## Sample sizes:
##           Control Treated
## All           82       86
## Matched       44       86

```

```
## Unmatched      38      0
## Discarded      0      0
```

Box 12: Impact estimate households exposed to disaster: -4.3% (4.0 SE), p-value < 1

```
# Summary of balance for all data:
##                Means Treated Means Control  SD Control  Mean Diff
## distance                0.7000      0.6872      0.0525      0.0128
## Non.maize.2010.11      0.3768      0.3387      0.4742      0.0381
## Non.maize.2011.12      0.3380      0.3387      0.4742     -0.0007
## Assets.2012           64807.7113    49467.7621  139907.4416  15339.9492
## Food.2012              0.3099      0.2823      0.4510      0.0276
## PPI_score2011         41.1056      42.8468      17.2772     -1.7411
##
## Summary of balance for matched data:
##                Means Treated Means Control  SD Control  Mean Diff
## distance                0.7000      0.6999      0.0445      0.0001
## Non.maize.2010.11      0.3768      0.3926      0.4897     -0.0158
## Non.maize.2011.12      0.3380      0.3187      0.4673      0.0194
## Assets.2012           64807.7113    41838.5845  91018.7297  22969.1268
## Food.2012              0.3099      0.3187      0.4673     -0.0088
## PPI_score2011         41.1056      38.5264      16.1181      2.5792
##
## Sample sizes:
##                Control Treated
## All                248      568
## Matched            179      568
## Unmatched          69       0
## Discarded          0       0
```

Improved seeds

Box X: Impact estimate all households: 10.0% (1.9 SE), p-value < 0.001

```
# Summary of balance for all data:
##                Means Treated Means Control  SD Control
## distance                0.5310      0.4976      0.0901
## Improved.seed_2011.12  0.7411      0.6304      0.4829
## Improved.seed_2010.11  0.6820      0.6313      0.4827
## Assets.2012           63042.9340    43453.3853  131858.1773
## Food.2012              0.3388      0.3281      0.4697
## PPI_score2011         41.8349      43.7300      18.3920
##
## Summary of balance for matched data:
```

```

##                Means Treated Means Control  SD Control
## distance                0.5310      0.5309      0.0844
## Improved.seed_2011.12    0.7411      0.7776      0.4162
## Improved.seed_2010.11    0.6820      0.7124      0.4530
## Assets.2012              63042.9340    46513.1069 113848.9169
## Food.2012                0.3388      0.3015      0.4593
## PPI_score2011           41.8349      41.0738     17.7034
##
## Sample sizes:
##           Control Treated
## All           1085    1151
## Matched       587    1151
## Unmatched     498      0
## Discarded      0      0

```

Box X: Impact estimate female headed households: 14.2% (3.7 SE), p-value < 0.001

Summary of balance for all data:

```

##                Means Treated Means Control  SD Control  Mean Diff
## distance                0.5207      0.4715      0.0962      0.0491
## Improved.seed_2011.12    0.6888      0.5959      0.4917      0.0929
## Improved.seed_2010.11    0.6224      0.6204      0.4863      0.0020
## Assets.2012              37775.3071    22809.8776 50609.7868 14965.4295
## Food.2012                0.2531      0.2857      0.4527     -0.0326
## PPI_score2011           41.5228      42.7020     17.4221     -1.1792
##

```

Summary of balance for matched data:

```

##                Means Treated Means Control  SD Control  Mean Diff
## distance                0.5207      0.5204      0.1095      0.0002
## Improved.seed_2011.12    0.6888      0.7469      0.4365     -0.0581
## Improved.seed_2010.11    0.6224      0.6598      0.4756     -0.0373
## Assets.2012              37775.3071    30532.3444 56474.2263 7242.9627
## Food.2012                0.2531      0.2739      0.4476     -0.0207
## PPI_score2011           41.5228      39.1037     16.5724      2.4191
##

```

Sample sizes:

```

##           Control Treated
## All           245    241
## Matched       131    241
## Unmatched     114      0
## Discarded      0      0

```

Box X: Impact estimate poor households: -1.0% (6.3 SE), p-value < 1

Summary of balance for all data:

```

##                Means Treated Means Control  SD Control  Mean Diff
## distance                0.5402      0.4822      0.1067      0.0581
## Improved.seed_2011.12    0.5698      0.5488      0.5007      0.0210

```

```

## Improved.seed_2010.11      0.4651      0.5122      0.5029      -0.0471
## Assets.2012                31297.5000    16441.3902  28592.7647  14856.1098
## Food.2012                  0.2558      0.2805      0.4520      -0.0247
## PPI_score2011             14.6163     13.6341     15.6335     0.9821
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance      0.5402      0.5394      0.1181     0.0008
## Improved.seed_2011.12    0.5698      0.6744      0.4746    -0.1047
## Improved.seed_2010.11    0.4651      0.5814      0.4996    -0.1163
## Assets.2012        31297.5000    30909.2558  36404.5536  388.2442
## Food.2012         0.2558      0.2209      0.4202     0.0349
## PPI_score2011      14.6163     17.1163     19.6544    -2.5000
##
## Sample sizes:
##           Control Treated
## All           82      86
## Matched       40      86
## Unmatched     42      0
## Discarded     0      0

```

Box X: Impact estimate households exposed to disaster: 10.8% (3.7 SE), p-value < 0.01

```

# Summary of balance for all data:
##           Means Treated Means Control SD Control
## distance      0.7055      0.6744      0.0860
## Improved.seed_2011.12    0.7412      0.6855      0.4653
## Improved.seed_2010.11    0.6796      0.7097      0.4548
## Assets.2012        64807.7113    49467.7621  139907.4416
## Food.2012         0.3099      0.2823      0.4510
## PPI_score2011      41.1056     42.8468     17.2772
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control
## distance      0.7055      0.7057      0.0745
## Improved.seed_2011.12    0.7412      0.7623      0.4268
## Improved.seed_2010.11    0.6796      0.7324      0.4439
## Assets.2012        64807.7113    79059.8204  189251.7900
## Food.2012         0.3099      0.3292      0.4712
## PPI_score2011      41.1056     38.4982     16.3614
##
## Sample sizes:
##           Control Treated
## All           248     568
## Matched       190     568
## Unmatched     58      0
## Discarded     0      0

```

Post-Harvest Management

Box X: Impact estimate all households: 3.33% (1.2 SE), p-value < 0.05

```
## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5442           0.4836           0.1227           0.0606
## PHM_Int_11.12       0.6907           0.4700           0.4993           0.2207
## PHM_Int_10.11       0.6725           0.4728           0.4995           0.1996
## Assets.2012        63042.9340        43453.3853 131858.1773 19589.5487
## Food.2012           0.3388           0.3281           0.4697           0.0107
## PPI_score2011       41.8349           43.7300           18.3920          -1.8950
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5442           0.5441           0.1123           0.0001
## PHM_Int_11.12       0.6907           0.6924           0.4619          -0.0017
## PHM_Int_10.11       0.6725           0.6768           0.4681          -0.0043
## Assets.2012        63042.9340        51243.3727 121054.5489 11799.5613
## Food.2012           0.3388           0.3310           0.4710           0.0078
## PPI_score2011       41.8349           39.6377           17.9527           2.1972
##
## Sample sizes:
##           Control Treated
## All           1085    1151
## Matched        582    1151
## Unmatched       503         0
## Discarded         0         0
```

Box X: Impact estimate female headed households: 8.6% (2.5 SE), p-value < 0.01

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5430           0.4496    0.1445    0.0934
## PHM_Int_11.12      0.6598           0.4000    0.4909    0.2598
## PHM_Int_10.11      0.6722           0.4082    0.4925    0.2640
## Assets.2012      37775.3071      22809.8776 50609.7868 14965.4295
## Food.2012          0.2531           0.2857    0.4527   -0.0326
## PPI_score2011      41.5228           42.7020   17.4221   -1.1792
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5430           0.5428    0.1447    0.0002
## PHM_Int_11.12      0.6598           0.6266    0.4857    0.0332
## PHM_Int_10.11      0.6722           0.6390    0.4823    0.0332
## Assets.2012      37775.3071      41621.3651 91827.7221 -3846.0581
## Food.2012          0.2531           0.2531    0.4366    0.0000
## PPI_score2011      41.5228           39.3817   16.7603    2.1411
##
## Sample sizes:
##           Control Treated
## All           245     241
## Matched       121     241
## Unmatched     124      0
## Discarded      0      0

```

Box X: Impact estimate poor households: 2.9% (4.8 SE), p-value < 1

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5516           0.4703    0.1316    0.0813
## PHM_Int_11.12      0.5814           0.3902    0.4908    0.1912
## PHM_Int_10.11      0.5116           0.3659    0.4846    0.1458
## Assets.2012      31297.5000      16441.3902 28592.7647 14856.1098
## Food.2012          0.2558           0.2805    0.4520   -0.0247
## PPI_score2011      14.6163           13.6341   15.6335    0.9821
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5516           0.5504    0.1330    0.0012
## PHM_Int_11.12      0.5814           0.5116    0.5064    0.0698
## PHM_Int_10.11      0.5116           0.4302    0.5016    0.0814
## Assets.2012      31297.5000      32005.4884 30784.5579 -707.9884
## Food.2012          0.2558           0.1163    0.3247    0.1395
## PPI_score2011      14.6163           17.1512   13.8540   -2.5349
##
## Sample sizes:
##           Control Treated
## All           82      86

```

```
## Matched      39      86
## Unmatched    43       0
## Discarded     0       0
```

**Box X: Impact estimate households exposed to disaster: 6.8% (2.4 SE)
, p-value < .01**

```
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7225           0.6355           0.1405           0.0870
## PHM_Int_11.12       0.7306           0.4395           0.4973           0.2911
## PHM_Int_10.11       0.7130           0.4597           0.4994           0.2534
## Assets.2012        64807.7113       49467.7621 139907.4416 15339.9492
## Food.2012           0.3099           0.2823           0.4510           0.0276
## PPI_score2011       41.1056           42.8468           17.2772          -1.7411
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7225           0.7225           0.1226           0.0001
## PHM_Int_11.12       0.7306           0.7342           0.4430          -0.0035
## PHM_Int_10.11       0.7130           0.7201           0.4502          -0.0070
## Assets.2012        64807.7113       38432.9208 76671.2419 26374.7905
## Food.2012           0.3099           0.3415           0.4756          -0.0317
## PPI_score2011       41.1056           37.8504           15.9899           3.2553
##
## Sample sizes:
##           Control Treated
## All           248       568
## Matched       178       568
## Unmatched      70        0
## Discarded      0        0
```

Agroforestry

Box X: Impact estimate all households: 11.1% (2.0 SE), p-value < 0.001

```
## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5474           0.4802      0.1062      0.0672
## agro.2011.12       0.3719           0.1631      0.3697      0.2087
## agro.2010.11       0.3414           0.1696      0.3754      0.1719
## Assets.2012       63042.9340      43453.3853 131858.1773 19589.5487
## Food.2012          0.3388           0.3281      0.4697      0.0107
## PPI_score2011     41.8349           43.7300     18.3920     -1.8950
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5474           0.5474      0.1388      0.0000
## agro.2011.12       0.3719           0.3371      0.4731      0.0348
## agro.2010.11       0.3414           0.3458      0.4761     -0.0043
## Assets.2012       63042.9340      86789.8280 214637.3885 -23746.8940
## Food.2012          0.3388           0.2876      0.4530      0.0513
## PPI_score2011     41.8349           39.7124     17.0497      2.1225
##
## Sample sizes:
##           Control Treated
## All           1085     1151
## Matched        557     1151
## Unmatched       528         0
## Discarded         0         0
```

Box X: Impact estimate female headed households: 13.13% (2.8 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5464           0.4462           0.1256           0.1003
## agro.2011.12       0.3859           0.1388           0.3464           0.2471
## agro.2010.11       0.3693           0.1510           0.3588           0.2183
## Assets.2012       37775.3071       22809.8776 50609.7868 14965.4295
## Food.2012          0.2531           0.2857           0.4527           -0.0326
## PPI_score2011      41.5228           42.7020           17.4221           -1.1792
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5464           0.5457           0.1670           0.0007
## agro.2011.12       0.3859           0.4025           0.4924          -0.0166
## agro.2010.11       0.3693           0.4108           0.4940          -0.0415
## Assets.2012       37775.3071       31226.0539 53818.7852 6549.2531
## Food.2012          0.2531           0.2241           0.4187           0.0290
## PPI_score2011      41.5228           40.8797           16.2134           0.6432
##
##
## Sample sizes:
##           Control Treated
## All           245       241
## Matched       121       241
## Unmatched     124         0
## Discarded         0         0

```

Box X: Impact estimate poor households: 12.1% (4.5 SE), p-value < 0.05

```

# Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5931           0.4268           0.1388           0.1663
## agro.2011.12       0.3372           0.0732           0.2620           0.2640
## agro.2010.11       0.2558           0.0732           0.2620           0.1826
## Assets.2012        31297.5000        16441.3902  28592.7647  14856.1098
## Food.2012          0.2558           0.2805           0.4520           -0.0247
## PPI_score2011      14.6163           13.6341           15.6335           0.9821
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5931           0.5827           0.2069           0.0104
## agro.2011.12       0.3372           0.1860           0.3947           0.1512
## agro.2010.11       0.2558           0.1860           0.3947           0.0698
## Assets.2012        31297.5000        50636.3488  50183.8191 -19338.8488
## Food.2012          0.2558           0.1163           0.3251           0.1395
## PPI_score2011      14.6163           19.2907           18.6115           -4.6744
##
## Sample sizes:
##           Control Treated
## All           82         86
## Matched       36         86
## Unmatched     46         0
## Discarded     0         0

```

Box X: Impact estimate households exposed to disaster: 12.4% (3.2 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7021           0.6823           0.0595           0.0198
## agro.2011.12       0.3433           0.2621           0.4407           0.0812
## agro.2010.11       0.3204           0.2823           0.4510           0.0382
## Assets.2012        64807.7113        49467.7621  139907.4416  15339.9492
## Food.2012          0.3099           0.2823           0.4510           0.0276
## PPI_score2011      41.1056           42.8468           17.2772           -1.7411
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7021           0.7015           0.0635           0.0006
## agro.2011.12       0.3433           0.3275           0.4705           0.0158
## agro.2010.11       0.3204           0.3504           0.4784           -0.0299
## Assets.2012        64807.7113        69717.7835  140618.4730 -4910.0722
## Food.2012          0.3099           0.3891           0.4888           -0.0792
## PPI_score2011      41.1056           39.5511           16.2957           1.5546
##
## Sample sizes:
##           Control Treated
## All           248        568
## Matched       188        568
## Unmatched     60         0
## Discarded     0         0

```

Livestock

Box X: Impact estimate all households livestock number: 0.76 (0.20 SE), p-value < 0.001; poultry number: 1.75 (0.39 SE), p-value 0.001, receiving pass on 22.84% (3.8 SE), p-value 0.001; given from pass on 43.2% (7.3 SE), p-value 0.001.

```
## Summary of balance for all data:
##               Means Treated Means Control  SD Control  Mean Diff
## distance                0.5383          0.4898      0.0915      0.0485
## livestock.poultry.2012    6.3675          3.9180      7.9033      2.4495
## livestock.small.2012     2.4787          1.0590      2.8920      1.4197
## Assets.2012              63042.9340      43453.3853 131858.1773 19589.5487
## Food.2012                0.3388          0.3281      0.4697      0.0107
## PPI_score2011           41.8349          43.7300      18.3920     -1.8950
##
## Summary of balance for matched data:
##               Means Treated Means Control  SD Control  Mean Diff
## distance                0.5383          0.5379      0.1168      0.0004
## livestock.poultry.2012    6.3675          6.9835     10.9797     -0.6160
## livestock.small.2012     2.4787          2.1216      4.0772      0.3571
## Assets.2012              63042.9340      65410.0417 136160.8641 -2367.1077
## Food.2012                0.3388          0.3527      0.4782     -0.0139
## PPI_score2011           41.8349          40.3467     17.7508      1.4883
##
## Sample sizes:
##           Control Treated
## All           1085    1151
## Matched         579    1151
## Unmatched       506      0
## Discarded        0      0
```

Box X: Impact estimate female headed households livestock number: 0.99 (0.33 SE), p-value < 0.01; poultry number: 1.35 (0.57 SE), p-value 0.05, receiving pass on 14.2% (3.8 SE), p-value 0.001; given from pass on 33.34% (7.2 SE), p-value 0.001.

```
## Summary of balance for all data:
##               Means Treated Means Control  SD Control  Mean Diff
## distance                0.5222          0.4700      0.0920      0.0522
## livestock.poultry.2012    5.5934          3.3633      8.1835      2.2301
## livestock.small.2012     1.6929          0.6163      1.8106      1.0766
## Assets.2012              37775.3071      22809.8776 50609.7868 14965.4295
## Food.2012                0.2531          0.2857      0.4527     -0.0326
## PPI_score2011           41.5228          42.7020     17.4221     -1.1792
##
##
## Summary of balance for matched data:
```

```

##                Means Treated Means Control SD Control Mean Diff
## distance                0.5222      0.5205      0.1238      0.0017
## livestock.poultry.2012    5.5934      8.4108     16.5638     -2.8174
## livestock.small.2012      1.6929      0.9253      2.1119      0.7676
## Assets.2012              37775.3071   33659.1411 56998.3247 4116.1660
## Food.2012                 0.2531      0.2324      0.4240      0.0207
## PPI_score2011            41.5228      40.1452     15.9081      1.3776
##
## Sample sizes:
##                Control Treated
## All                245      241
## Matched           130      241
## Unmatched         115       0
## Discarded         0        0

```

Box X: Impact estimate poor household's livestock number: -0.07 (0.58 SE), p-value > 0.1; poultry number: 1.69 (0.74 SE), p-value 0.05, receiving pass on 23.0% (14.5 SE), p-value > 0.1; given from pass on 29.24% (11.4 SE), p-value 0.05

```

## Summary of balance for all data:
##                Means Treated Means Control SD Control Mean Diff
## distance                0.5424      0.4800      0.1125      0.0624
## livestock.poultry.2012    5.0814      2.7561      7.2326      2.3253
## livestock.small.2011      0.8721      0.4512      1.5804      0.4209
## Assets.2012              31297.5000   16441.3902 28592.7647 14856.1098
## Food.2012                 0.2558      0.2805      0.4520     -0.0247
## PPI_score2011            14.6163     13.6341     15.6335      0.9821
##                eQQ Med    eQQ Mean    eQQ Max
## distance                0.0487      0.0591      0.1276
## livestock.poultry.2012    0.0000      2.7683     10.0000
## livestock.small.2011      0.0000      0.4268     20.0000
## Assets.2012              12223.5000 13935.8902 60727.0000
## Food.2012                 0.0000      0.0244      1.0000
## PPI_score2011            1.0000      4.9146     80.0000
##
##
## Summary of balance for matched data:
##                Means Treated Means Control SD Control Mean Diff
## distance                0.5424      0.5425      0.1243     -0.0002
## livestock.poultry.2012    5.0814      5.3023      9.6023     -0.2209
## livestock.small.2011      0.8721      0.7209      1.9931      0.1512
## Assets.2012              31297.5000   28084.0116 35251.3999 3213.4884
## Food.2012                 0.2558      0.2558      0.4417      0.0000
## PPI_score2011            14.6163     21.2791     24.3093     -6.6628
##                eQQ Med    eQQ Mean    eQQ Max
## distance                0.0119      0.0132      0.0364
## livestock.poultry.2012    0.0000      1.5854     11.0000
## livestock.small.2011      0.0000      0.6585     20.0000
## Assets.2012              5417.0000   6188.1707 60727.0000

```

```

## Food.2012          0.0000    0.0000    0.0000
## PPI_score2011     0.0000    4.5366    80.0000
##
## Percent Balance Improvement:
##                Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance         99.7233   75.5811  77.7039   71.4679
## livestock.poultry.2012  90.4988    0.0000  42.7313  -10.0000
## livestock.small.2011   64.0836    0.0000 -54.2857    0.0000
## Assets.2012         78.3692   55.6837  55.5954    0.0000
## Food.2012          100.0000    0.0000 100.0000 100.0000
## PPI_score2011      -578.4002 100.0000    7.6923    0.0000
##
## Sample sizes:
##                Control Treated
## All                82      86
## Matched            41      86
## Unmatched          41       0
## Discarded           0       0

```

Box X: Impact estimate for households exposed to disaster livestock number: 0.80 (0.25 SE), p-value > 0.01; poultry number: 1.61 (0.67 SE), p-value < 0.05, receiving pass on 18.54% (3.5 SE), p-value < 0.001; given from pass on 41.8% (7.2 SE), p-value < 0.001

```

## Summary of balance for all data:
##                Means Treated Means Control  SD Control  Mean Diff
## distance         0.7054          0.6747    0.0722    0.0308
## livestock.poultry.2012  7.1496          4.8508    9.7161    2.2988
## livestock.small.2012   2.5123          1.3024    3.2145    1.2099
## Assets.2012        64807.7113      49467.7621 139907.4416 15339.9492
## Food.2012          0.3099          0.2823    0.4510    0.0276
## PPI_score2011       41.1056          42.8468   17.2772   -1.7411
##                eQQ Med    eQQ Mean    eQQ Max
## distance         0.0259    0.0306    0.0507
## livestock.poultry.2012  2.0000    2.5927   22.0000
## livestock.small.2012   0.0000    1.2177   15.0000
## Assets.2012       16860.0000 27959.5040 544495.0000
## Food.2012         0.0000    0.0282    1.0000
## PPI_score2011     2.0000    2.2097    9.0000
##
## Summary of balance for matched data:
##                Means Treated Means Control  SD Control  Mean Diff
## distance         0.7054          0.7051    0.0769    0.0003
## livestock.poultry.2012  7.1496          7.3116   11.8520   -0.1620
## livestock.small.2012   2.5123          2.0229    3.6934    0.4894
## Assets.2012        64807.7113      57510.1620 122948.9869 7297.5493
## Food.2012          0.3099          0.3451    0.4767   -0.0352
## PPI_score2011       41.1056          38.4912   16.5357    2.6144
##                eQQ Med    eQQ Mean    eQQ Max
## distance         0.0196    0.0205    0.0394
## livestock.poultry.2012  2.0000    1.9840   22.0000
## livestock.small.2012   0.0000    1.0642   20.0000
## Assets.2012       14377.0000 23089.9091 215173.0000
## Food.2012         0.0000    0.0160    1.0000

```

```

## PPI_score2011          1.0000      1.2406      10.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean  eQQ Max
## distance          99.0367 24.5800 33.0465 22.2156
## livestock.poultry.2012 92.9542 0.0000 23.4803 0.0000
## livestock.small.2012  59.5475 0.0000 12.6111 -33.3333
## Assets.2012          52.4278 14.7272 17.4166 60.4821
## Food.2012           -27.5720 0.0000 43.1627 0.0000
## PPI_score2011       -50.1566 50.0000 43.8542 -11.1111
##
## Sample sizes:
##           Control Treated
## All           248      568
## Matched       187      568
## Unmatched      61       0
## Discarded      0       0

```

Irrigation

Box X: Impact estimate all households: 15.41% (2.9 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance          0.5252          0.5037      0.0652      0.0215
## irrigated.2011.12  0.2233          0.1696      0.3754      0.0537
## irrigated.2010.11  0.1720          0.1558      0.3628      0.0163
## Assets.2012       63042.9340      43453.3853 131858.1773 19589.5487
## Food.2012         0.3388          0.3281      0.4697      0.0107
## PPI_score2011     41.8349          43.7300      18.3920     -1.8950
##           eQQ Med   eQQ Mean   eQQ Max
## distance          0.018     0.0223     0.1277
## irrigated.2011.12  0.000     0.0535     1.0000
## irrigated.2010.11  0.000     0.0157     1.0000
## Assets.2012       15483.000 24573.1456 1096223.0000
## Food.2012         0.000     0.0101     1.0000
## PPI_score2011     3.000     2.5041     12.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance          0.5252          0.5251      0.0716      0.0001
## irrigated.2011.12  0.2233          0.2693      0.4440     -0.0460
## irrigated.2010.11  0.1720          0.2137      0.4103     -0.0417
## Assets.2012       63042.9340      50905.3797 120555.0664 12137.5543
## Food.2012         0.3388          0.3449      0.4757     -0.0061
## PPI_score2011     41.8349          40.9044      18.3815      0.9305
##           eQQ Med   eQQ Mean   eQQ Max
## distance          0.0089     0.0128     0.0614
## irrigated.2011.12  0.0000     0.0051     1.0000
## irrigated.2010.11  0.0000     0.0219     1.0000
## Assets.2012       14908.5000 18314.4747 117334.0000

```

```

## Food.2012          0.0000    0.0067    1.0000
## PPI_score2011     1.0000    1.1094    8.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance          99.4940 50.8269 42.7015 51.9565
## irrigated.2011.12  14.2497 0.0000 90.5521 0.0000
## irrigated.2010.11 -156.4128 0.0000 -39.6811 0.0000
## Assets.2012        38.0407 3.7105 25.4696 89.2965
## Food.2012          43.2955 0.0000 33.5782 0.0000
## PPI_score2011     50.8981 66.6667 55.6964 33.3333
##
## Sample sizes:
##           Control Treated
## All           1085    1151
## Matched       594    1151
## Unmatched     491      0
## Discarded      0      0

```

Box X: Impact estimate female headed households: 19.98% (4.5 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance          0.5149          0.4772 0.0779 0.0377
## irrigated.2011.12 0.1909          0.1347 0.3421 0.0562
## irrigated.2010.11 0.1452          0.1265 0.3331 0.0187
## Assets.2012      37775.3071 22809.8776 50609.7868 14965.4295
## Food.2012         0.2531          0.2857 0.4527 -0.0326
## PPI_score2011    41.5228          42.7020 17.4221 -1.1792
##           eQQ Med   eQQ Mean   eQQ Max
## distance          0.0253    0.0388    0.1577
## irrigated.2011.12 0.0000    0.0581    1.0000
## irrigated.2010.11 0.0000    0.0207    1.0000
## Assets.2012      9272.0000 15501.2241 156997.0000
## Food.2012         0.0000    0.0290    1.0000
## PPI_score2011    2.0000    2.2905    10.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance          0.5149          0.5146 0.0995 0.0003
## irrigated.2011.12 0.1909          0.1743 0.3808 0.0166
## irrigated.2010.11 0.1452          0.1452 0.3537 0.0000
## Assets.2012      37775.3071 40866.8091 75535.6656 -3091.5021
## Food.2012         0.2531          0.3071 0.4631 -0.0539
## PPI_score2011    41.5228          40.1203 17.2108 1.4025
##           eQQ Med   eQQ Mean   eQQ Max
## distance          0.0184    0.0284    0.1041
## irrigated.2011.12 0.0000    0.0538    1.0000

```

```

## irrigated.2010.11    0.0000    0.0231    1.0000
## Assets.2012        7161.5000 11320.2308 111337.0000
## Food.2012         0.0000    0.0231    1.0000
## PPI_score2011     2.0000    1.9538    8.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.2794 27.3067 26.6548 33.9588
## irrigated.2011.12  70.4552 0.0000  7.3077  0.0000
## irrigated.2010.11 100.0000 0.0000 -11.2308  0.0000
## Assets.2012       79.3424 22.7621 26.9720 29.0834
## Food.2012        -65.4545 0.0000 20.5495  0.0000
## PPI_score2011    -18.9337 0.0000 14.6962 20.0000
##
## Sample sizes:
##           Control Treated
## All             245     241
## Matched         130     241
## Unmatched       115      0
## Discarded        0      0

```

Box X: Impact estimate poor households: 20.24% (7.1 SE), p-value < 0.01

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5448           0.4774  0.1155  0.0674
## irrigated.2011.12  0.1047           0.0610  0.2408  0.0437
## irrigated.2010.11  0.0814           0.0366  0.1889  0.0448
## Assets.2012       31297.5000      16441.3902 28592.7647 14856.1098
## Food.2012         0.2558           0.2805  0.4520 -0.0247
## PPI_score2011     14.6163           13.6341  15.6335  0.9821
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0531     0.0645   0.1315
## irrigated.2011.12  0.0000     0.0366   1.0000
## irrigated.2010.11  0.0000     0.0366   1.0000
## Assets.2012       12223.5000 13935.8902 60727.0000
## Food.2012         0.0000     0.0244   1.0000
## PPI_score2011     1.0000     4.9146  80.0000
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5448           0.5446  0.1256  0.0002
## irrigated.2011.12  0.1047           0.1628  0.3738 -0.0581
## irrigated.2010.11  0.0814           0.1512  0.3627 -0.0698
## Assets.2012       31297.5000      23996.1279 29313.2472 7301.3721
## Food.2012         0.2558           0.1628  0.3738  0.0930
## PPI_score2011     14.6163           21.7093  24.1579 -7.0930
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0252     0.0258   0.0862
## irrigated.2011.12  0.0000     0.0000   0.0000

```

```

## irrigated.2010.11    0.0000    0.0000    0.0000
## Assets.2012        5747.0000 6431.7561 60727.0000
## Food.2012          0.0000    0.0244    1.0000
## PPI_score2011      1.0000    4.8049    80.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.7646 52.5527 59.9862 34.4539
## irrigated.2011.12  -33.1169 0.0000 100.0000 100.0000
## irrigated.2010.11  -55.6962 0.0000 100.0000 100.0000
## Assets.2012         50.8527 52.9840 53.8475  0.0000
## Food.2012          -277.0115 0.0000  0.0000  0.0000
## PPI_score2011      -622.2062 0.0000  2.2333  0.0000
##
## Sample sizes:
##           Control Treated
## All                82     86
## Matched            41     86
## Unmatched          41     0
## Discarded          0     0

```

Box X: Impact estimate households exposed to disaster: 16.17% (3.8 SE), p-value < 0.001

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7031    0.6801    0.0693    0.0230
## irrigated.2011.12  0.2465    0.2177    0.4135    0.0287
## irrigated.2010.11  0.1743    0.2097    0.4079   -0.0354
## Assets.2012       64807.7113 49467.7621 139907.4416 15339.9492
## Food.2012         0.3099    0.2823    0.4510    0.0276
## PPI_score2011     41.1056    42.8468    17.2772   -1.7411
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0164    0.0231    0.1744
## irrigated.2011.12  0.0000    0.0282    1.0000
## irrigated.2010.11  0.0000    0.0363    1.0000
## Assets.2012       16860.0000 27959.5040 544495.0000
## Food.2012         0.0000    0.0282    1.0000
## PPI_score2011     2.0000    2.2097    9.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7031    0.7029    0.0635    0.0001
## irrigated.2011.12  0.2465    0.2201    0.4154    0.0264
## irrigated.2010.11  0.1743    0.1391    0.3470    0.0352
## Assets.2012       64807.7113 41850.5792 84881.5754 22957.1320
## Food.2012         0.3099    0.2923    0.4560    0.0176
## PPI_score2011     41.1056    38.3556    16.3336    2.7500
##           eQQ Med   eQQ Mean   eQQ Max

```

```

## distance          0.0118    0.0178    0.1659
## irrigated.2011.12  0.0000    0.0319    1.0000
## irrigated.2010.11  0.0000    0.0160    1.0000
## Assets.2012       16603.0000 22720.4202 120132.0000
## Food.2012         0.0000    0.0160    1.0000
## PPI_score2011     1.0000    1.3511    7.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance      99.4631 27.9690 23.0597 4.8888
## irrigated.2011.12  8.1028 0.0000 -13.0699 0.0000
## irrigated.2010.11  0.4815 0.0000 56.0284 0.0000
## Assets.2012     -49.6559 1.5243 18.7381 77.9370
## Food.2012       36.2140 0.0000 43.4650 0.0000
## PPI_score2011   -57.9425 50.0000 38.8570 22.2222
##
## Sample sizes:
##           Control Treated
## All           248     568
## Matched       188     568
## Unmatched      60      0
## Discarded      0      0

```

Early Warning / DRR

Box X: Impact estimate all households: 16.48 (6.5 SE), p-value < 0.05

```

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance      0.6626      0.6544      0.0407      0.0082
## Assets.2012   62941.5581   46428.6868 138149.7794 16512.8713
## Food.2012     0.2720      0.2473      0.4326      0.0247
## PPI_score2011  41.3654      42.5275      17.2523     -1.1620
##           eQQ Med   eQQ Mean   eQQ Max
## distance      0.0093      0.0096      0.074
## Assets.2012   14518.0000 24676.6923 544495.000
## Food.2012     0.0000      0.0220      1.000
## PPI_score2011  2.0000      2.2198      8.000
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff  eQQ Med
## distance      0.6626      0.6624      0.0364      0.0002 3.800e-03
## Assets.2012   62941.5581   50576.9207 113694.2839 12364.6374 1.598e+04
## Food.2012     0.2720      0.2975      0.4590     -0.0255 0.000e+00
## PPI_score2011  41.3654      38.6884      16.3966      2.6771 3.000e+00
##           eQQ Mean   eQQ Max
## distance      0.0052      0.039
## Assets.2012   24272.6960 190085.000

```

```

## Food.2012          0.0080      1.000
## PPI_score2011     2.5440      13.000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          98.1404  59.5397  46.3004  47.2457
## Assets.2012       25.1212 -10.0703   1.6372  65.0897
## Food.2012         -3.2136   0.0000  63.6000   0.0000
## PPI_score2011    -130.3767 -50.0000 -14.6059 -62.5000
##
## Sample sizes:
##           Control Treated
## All           182      353
## Matched       125      353
## Unmatched      57       0
## Discarded      0       0

```

Box X: Impact estimate female headed households: -25.44% (11.6 SE), p-value < 0.05

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control  Mean Diff  eQQ Med
## distance          0.6652          0.5803   0.1195   0.0849   0.0787
## Assets.2012       27725.0897    15776.6222 29760.4758 11948.4675 9062.0000
## Food.2012         0.2308          0.0889   0.2878   0.1419   0.0000
## PPI_score2011     38.0897          40.9111   14.9055   -2.8214   3.0000
##           eQQ Mean      eQQ Max
## distance          0.0844      0.1605
## Assets.2012     12693.4222 37819.0000
## Food.2012         0.1333      1.0000
## PPI_score2011     3.3111     15.0000
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control  Mean Diff  eQQ Med
## distance          0.6652          0.6611   0.118   0.0041   0.0539
## Assets.2012       27725.0897    15969.2308 27563.427 11755.8590 9062.0000
## Food.2012         0.2308          0.2949   0.465   -0.0641   0.0000
## PPI_score2011     38.0897          32.0641   13.851   6.0256   1.0000
##           eQQ Mean      eQQ Max
## distance          0.0473      0.1016
## Assets.2012     10589.3846 24701.0000
## Food.2012         0.0769      1.0000
## PPI_score2011     2.0385      7.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          95.1144  31.4693  43.9573  36.6982
## Assets.2012       1.6120   0.0000  16.5758  34.6863

```

```
## Food.2012      54.8193  0.0000  42.3077  0.0000
## PPI_score2011 -113.5716 66.6667  38.4357 53.3333
##
## Sample sizes:
##           Control Treated
## All           45      78
## Matched       26      78
## Unmatched     19       0
## Discarded     0       0
```

Box X: Impact estimate poor households: X% (X SE), p-value < X

```
## ECRP.beneficiary -0.337179351  0.099936884  -3.374 0.003867 **
```

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff	eQQ Med
## distance	0.6491	0.5264	0.1805	0.1227	0.1204
## Assets.2012	34988.7143	17251.1429	19550.6567	17737.5714	8819.5000
## Food.2012	0.2857	0.2857	0.4688	0.0000	0.0000
## PPI_score2011	15.2857	12.8571	6.0999	2.4286	1.5000

##	eQQ Mean	eQQ Max
## distance	0.1031	0.1684
## Assets.2012	15388.2857	77985.0000
## Food.2012	0.0000	0.0000
## PPI_score2011	1.9286	10.0000

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff	eQQ Med
## distance	0.6491	0.6332	0.1465	0.0159	0.0527
## Assets.2012	34988.7143	26045.5238	22606.3108	8943.1905	7690.0000
## Food.2012	0.2857	0.2381	0.4553	0.0476	0.0000
## PPI_score2011	15.2857	16.0000	4.4508	-0.7143	0.5000

##	eQQ Mean	eQQ Max
## distance	0.0697	0.127
## Assets.2012	15181.6250	77985.000
## Food.2012	0.0000	0.000
## PPI_score2011	0.6250	2.000

Percent Balance Improvement:

##	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	87.0717	56.2542	32.4047	24.5938
## Assets.2012	49.5805	12.8068	1.3430	0.0000
## Food.2012	-Inf	0.0000	0.0000	0.0000
## PPI_score2011	70.5882	66.6667	67.5926	80.0000

Sample sizes:

```
##           Control Treated
```

```
## All          14      21
## Matched      8       21
## Unmatched    6       0
## Discarded    0       0
```

Weather forecasts

Box X: Impact estimate all households: X% (X SE), p-value < X

```
## ECRP.beneficiary 0.08424575333 0.01924479502 4.378

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5249           0.5040           0.0679           0.0208
## Assets.2012       63042.9340       43453.3853 131858.1773 19589.5487
## Forecast.2010.11  0.4492           0.3871           0.4873           0.0621
## Forecast.2011.12  0.4857           0.4046           0.4910           0.0811
## Food.2012         0.3388           0.3281           0.4697           0.0107
## PPI_score2011     41.8349           43.7300           18.3920          -1.8950
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0208           0.0218           0.1601
## Assets.2012       15483.0000       24573.1456 1096223.0000
## Forecast.2010.11  0.0000           0.0618           1.0000
## Forecast.2011.12  0.0000           0.0802           1.0000
## Food.2012         0.0000           0.0101           1.0000
## PPI_score2011     3.0000           2.5041           12.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5249           0.5249           0.0683           0.0000
## Assets.2012       63042.9340       52108.1616 126016.3788 10934.7724
## Forecast.2010.11  0.4492           0.4761           0.4998          -0.0269
## Forecast.2011.12  0.4857           0.5065           0.5004          -0.0209
## Food.2012         0.3388           0.3467           0.4763          -0.0078
## PPI_score2011     41.8349           40.1520           17.6817           1.6829
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0106           0.0107           0.0386
## Assets.2012       14943.0000       20956.0066 123151.0000
## Forecast.2010.11  0.0000           0.0149           1.0000
## Forecast.2011.12  0.0000           0.0281           1.0000
## Food.2012         0.0000           0.0017           1.0000
## PPI_score2011     1.0000           0.8416           9.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.8025 48.9672 50.9775 75.8674
## Assets.2012         44.1806 3.4877 14.7199 88.7659
## Forecast.2010.11  56.6140 0.0000 75.9495 0.0000
## Forecast.2011.12  74.2754 0.0000 65.0146 0.0000
## Food.2012          27.0942 0.0000 83.7234 0.0000
## PPI_score2011     11.1947 66.6667 66.3924 25.0000
##
## Sample sizes:
##           Control Treated
```

```
## All          1085    1151
## Matched      606     1151
## Unmatched    479      0
## Discarded    0        0
```

Box X: Impact estimate female headed households: X% (X SE), p-value < X

```
## ECRP.beneficiary 0.06031529364 0.04611991364 1.308 p>1
```

Summary of balance for all data:

```
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5141           0.4780 0.0764 0.0361
## Assets.2012      37775.3071    22809.8776 50609.7868 14965.4295
## Forecast.2010.11 0.3859           0.3347 0.4728 0.0512
## Forecast.2011.12 0.4232           0.3469 0.4770 0.0763
## Food.2012        0.2531           0.2857 0.4527 -0.0326
## PPI_score2011    41.5228           42.7020 17.4221 -1.1792
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0282    0.0376    0.2424
## Assets.2012      9272.0000 15501.2241 156997.0000
## Forecast.2010.11 0.0000    0.0539    1.0000
## Forecast.2011.12 0.0000    0.0788    1.0000
## Food.2012        0.0000    0.0290    1.0000
## PPI_score2011    2.0000    2.2905    10.0000
```

Summary of balance for matched data:

```
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5141           0.5137 0.0951 0.0004
## Assets.2012      37775.3071    34319.3237 71127.8119 3455.9834
## Forecast.2010.11 0.3859           0.4523 0.4997 -0.0664
## Forecast.2011.12 0.4232           0.4855 0.5018 -0.0622
## Food.2012        0.2531           0.2448 0.4317 0.0083
## PPI_score2011    41.5228           39.4813 17.5942 2.0415
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0192    0.0248    0.106
## Assets.2012      8795.5000 11865.7656 111337.000
## Forecast.2010.11 0.0000    0.0000    0.000
## Forecast.2011.12 0.0000    0.0234    1.000
## Food.2012        0.0000    0.0156    1.000
## PPI_score2011    2.0000    1.8672    6.000
```

Percent Balance Improvement:

```
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           98.8609 31.8962 34.0923 56.2710
## Assets.2012        76.9069 5.1391 23.4527 29.0834
## Forecast.2010.11 -29.6725 0.0000 100.0000 100.0000
## Forecast.2011.12 18.4240 0.0000 70.2714 0.0000
## Food.2012          74.5455 0.0000 46.2054 0.0000
## PPI_score2011     -73.1225 0.0000 18.4797 40.0000
```

Sample sizes:

```
##           Control Treated
## All          245     241
## Matched      128     241
```

```
## Unmatched      117      0
## Discarded      0        0
```

Box X: Impact estimate poor households: X% (X SE), p-value < X

```
## ECRP.beneficiary 0.1656368874 0.0679333186 2.438 0.018432 *
```

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.5391	0.4833	0.1045	0.0558
## Forecast.2011.12	0.2674	0.1951	0.3987	0.0723
## Forecast.2010.11	0.2558	0.1951	0.3987	0.0607
## Assets.2012	31297.5000	16441.3902	28592.7647	14856.1098
## Food.2012	0.2558	0.2805	0.4520	-0.0247
## PPI_score2011	14.6163	13.6341	15.6335	0.9821

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.0482	0.0528	0.1331
## Forecast.2011.12	0.0000	0.0610	1.0000
## Forecast.2010.11	0.0000	0.0610	1.0000
## Assets.2012	12223.5000	13935.8902	60727.0000
## Food.2012	0.0000	0.0244	1.0000
## PPI_score2011	1.0000	4.9146	80.0000

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff	eQQ Med
## distance	0.5391	0.5386	0.1186	0.0006	0.014
## Forecast.2011.12	0.2674	0.2791	0.4533	-0.0116	0.000
## Forecast.2010.11	0.2558	0.2791	0.4533	-0.0233	0.000
## Assets.2012	31297.5000	29009.4535	38080.0303	2288.0465	5086.500
## Food.2012	0.2558	0.1977	0.4025	0.0581	0.000
## PPI_score2011	14.6163	18.8953	18.8371	-4.2791	0.000

##	eQQ Mean	eQQ Max
## distance	0.0158	0.0868
## Forecast.2011.12	0.0208	1.0000
## Forecast.2010.11	0.0000	0.0000
## Assets.2012	6920.9167	60727.0000
## Food.2012	0.0625	1.0000
## PPI_score2011	4.1667	80.0000

Percent Balance Improvement:

##	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	99.0114	71.0497	69.9928	34.768
## Forecast.2011.12	83.9216	0.0000	65.8333	0.000
## Forecast.2010.11	61.6822	0.0000	100.0000	100.000
## Assets.2012	84.5986	58.3875	50.3375	0.000

```

## Food.2012          -135.6322   0.0000 -156.2500   0.000
## PPI_score2011     -335.6916 100.0000   15.2192   0.000
##
## Sample sizes:
##           Control Treated
## All           82      86
## Matched       48      86
## Unmatched     34       0
## Discarded     0       0

```

Fuel efficient stove

Box X: Impact estimate all households: X% (X SE), p-value < X

```

## ECRP.beneficiary      0.09150113053  0.02795879644  3.273 p < 0.01

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5261         0.5027      0.0590      0.0235
## own.fixed.stove.2011  0.0330         0.0046      0.0678      0.0284
## Assets.2012        63042.9340      43453.3853 131858.1773 19589.5487
## Food.2012           0.3388         0.3281      0.4697      0.0107
## PPI_score2011       41.8349         43.7300     18.3920     -1.8950
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.016      0.0233     0.2768
## own.fixed.stove.2011  0.000      0.0276     1.0000
## Assets.2012        15483.000 24573.1456 1096223.0000
## Food.2012           0.000      0.0101     1.0000
## PPI_score2011       3.000      2.5041    12.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5261         0.5261      0.0822      0.0001
## own.fixed.stove.2011  0.0330         0.0243      0.1542      0.0087
## Assets.2012        63042.9340      63620.9661 168353.2537 -578.0321
## Food.2012           0.3388         0.2963      0.4570      0.0426
## PPI_score2011       41.8349         39.6994     17.1125     2.1355
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0065      0.0120 2.12300e-01
## own.fixed.stove.2011  0.0000      0.0261 1.00000e+00
## Assets.2012        13126.0000 22740.7843 1.13408e+06
## Food.2012           0.0000      0.0261 1.00000e+00
## PPI_score2011       1.0000      0.9809 8.00000e+00
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med   eQQ Mean eQQ Max
## distance          99.5976 59.2737  48.4096 23.2736
## own.fixed.stove.2011  69.4151 0.0000   5.6522 0.0000
## Assets.2012         97.0493 15.2231   7.4568 -3.4534
## Food.2012          -296.9315 0.0000 -157.3123 0.0000

```

```
## PPI_score2011          -12.6915 66.6667  60.8302 33.3333
##
## Sample sizes:
##           Control Treated
## All           1085   1151
## Matched       575   1151
## Unmatched     510    0
## Discarded     0     0
```

Box X: Impact estimate female headed households: X% (X SE), p-value < X

```
## ECRP.beneficiary      0.05464120499  0.03313664463  1.649 p >0.1
```

Summary of balance for all data:

```
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5158           0.4763  0.0727  0.0395
## own.fixed.stove.2011 0.0415           0.0082  0.0902  0.0333
## Assets.2012       37775.3071      22809.8776 50609.7868 14965.4295
## Food.2012         0.2531           0.2857  0.4527 -0.0326
## PPI_score2011     41.5228          42.7020  17.4221 -1.1792
```

```
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0226   0.0410   0.2378
## own.fixed.stove.2011 0.0000   0.0373   1.0000
## Assets.2012       9272.0000 15501.2241 156997.0000
## Food.2012         0.0000   0.0290   1.0000
## PPI_score2011     2.0000   2.2905  10.0000
```

Summary of balance for matched data:

```
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5158           0.5159  0.1067 -0.0001
## own.fixed.stove.2011 0.0415           0.0498  0.2184 -0.0083
## Assets.2012       37775.3071      32754.7884 58166.1338 5020.5187
## Food.2012         0.2531           0.2739  0.4478 -0.0207
## PPI_score2011     41.5228          37.5477  19.4296  3.9751
```

```
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0148   0.0270   0.1471
## own.fixed.stove.2011 0.0000   0.0248   1.0000
## Assets.2012       7953.0000 10987.9008 111337.0000
## Food.2012         0.0000   0.0413   1.0000
## PPI_score2011     2.0000   2.1074   9.0000
```

Percent Balance Improvement:

```
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.8720 34.5258 34.3278 38.1225
## own.fixed.stove.2011 75.1016 0.0000 33.6088 0.0000
## Assets.2012       66.4526 14.2256 29.1159 29.0834
## Food.2012        36.3636 0.0000 -42.2668 0.0000
## PPI_score2011    -237.0962 0.0000  7.9905 10.0000
```

Sample sizes:

```
##           Control Treated
## All           245   241
## Matched       121   241
## Unmatched     124    0
```

Box X: Impact estimate poor households: X% (X SE), p-value < X

```

## ECRP.beneficiary 0.057369256 0.045593786 1.258 0.21464

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5413           0.4811 0.1148 0.0602
## own.fixed.stove.2011 0.0000           0.0122 0.1104 -0.0122
## Assets.2012        31297.5000        16441.3902 28592.7647 14856.1098
## Food.2012          0.2558           0.2805 0.4520 -0.0247
## PPI_score2011      14.6163           13.6341 15.6335 0.9821
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0475   0.0571   0.3927
## own.fixed.stove.2011 0.0000   0.0122   1.0000
## Assets.2012        12223.5000 13935.8902 60727.0000
## Food.2012          0.0000   0.0244   1.0000
## PPI_score2011      1.0000   4.9146  80.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5413           0.5396 0.1128 0.0017
## own.fixed.stove.2011 0.0000           0.0000 0.0000 0.0000
## Assets.2012        31297.5000        28850.9070 33568.3046 2446.5930
## Food.2012          0.2558           0.1860 0.3940 0.0698
## PPI_score2011      14.6163           17.4302 13.6326 -2.8140
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0135   0.0130   0.0508
## own.fixed.stove.2011 0.0000   0.0000   0.0000
## Assets.2012        4261.0000 5439.3902 60727.0000
## Food.2012          0.0000   0.0000   0.0000
## PPI_score2011      0.0000   2.4634  80.0000
##
## Percent Balance Improvement:
##           Mean Diff.   eQQ Med   eQQ Mean   eQQ Max
## distance           97.2062  71.4931  77.3052  87.062
## own.fixed.stove.2011 100.0000  0.0000 100.0000 100.000
## Assets.2012        83.5314  65.1409  60.9685  0.000
## Food.2012         -182.7586  0.0000 100.0000 100.000
## PPI_score2011     -186.5146 100.0000  49.8759  0.000
##
## Sample sizes:
##           Control Treated
## All           82      86
## Matched       41      86
## Unmatched     41      0
## Discarded     0       0

```

Box X: Impact estimate households exposed to disaster: X% (X.X SE), p-value < X

```

## ECRP.beneficiary 0.07125583762 0.04966991848 1.435 p >0.1

```

```

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.7009           0.6851           0.0470           0.0157
## own.fixed.stove.2011  0.0317           0.0040           0.0635           0.0277
## Assets.2012         64807.7113         49467.7621 139907.4416 15339.9492
## Food.2012           0.3099           0.2823           0.4510           0.0276
## PPI_score2011       41.1056           42.8468           17.2772          -1.7411
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0121           0.0157           0.1739
## own.fixed.stove.2011  0.0000           0.0282           1.0000
## Assets.2012         16860.0000 27959.5040 544495.0000
## Food.2012           0.0000           0.0282           1.0000
## PPI_score2011       2.0000           2.2097           9.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.7009           0.7004           0.0551           0.0005
## own.fixed.stove.2011  0.0317           0.0000           0.0000           0.0317
## Assets.2012         64807.7113         87078.4894 257292.4249 -22270.7782
## Food.2012           0.3099           0.2782           0.4493           0.0317
## PPI_score2011       41.1056           37.6461           16.8361           3.4595
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0096           0.0143           0.1761
## own.fixed.stove.2011  0.0000           0.0326           1.0000
## Assets.2012         17649.5000 26723.2826 544495.0000
## Food.2012           0.0000           0.0217           1.0000
## PPI_score2011       1.0000           1.5543           9.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           96.8460 20.2481  8.6946 -1.2716
## own.fixed.stove.2011 -14.5791 0.0000 -15.5280 0.0000
## Assets.2012         -45.1816 -4.6827  4.4215 0.0000
## Food.2012           -14.8148 0.0000 22.9814 0.0000
## PPI_score2011       -98.6920 50.0000 29.6573 0.0000
##
## Sample sizes:
##           Control Treated
## All           248     568
## Matched       184     568
## Unmatched     64       0
## Discarded     0       0

```

Solar lighting

Box X: Impact estimate all households: X% (X SE), p-value < X

```

## ECRP.beneficiary  0.07079203602  0.01739796906  4.069  0.00012

## Summary of balance for all data:
##               Means Treated Means Control  SD Control  Mean Diff
## distance      0.5280      0.5007      0.0711      0.0272
## own.solar.2010.11  0.1355      0.0608      0.2391      0.0747
## Assets.2012    63042.9340    43453.3853  131858.1773  19589.5487
## Food.2012      0.3388      0.3281      0.4697      0.0107
## PPI_score2011  41.8349      43.7300      18.3920     -1.8950
##               eQQ Med   eQQ Mean   eQQ Max
## distance      0.0175     0.0277     0.1346
## own.solar.2010.11  0.0000     0.0747     1.0000
## Assets.2012    15483.0000  24573.1456  1096223.0000
## Food.2012      0.0000     0.0101     1.0000
## PPI_score2011  3.0000     2.5041     12.0000
##
##
## Summary of balance for matched data:
##               Means Treated Means Control  SD Control  Mean Diff
## distance      0.5280      0.5279      0.0853      0.0001
## own.solar.2010.11  0.1355      0.1355      0.3426      0.0000
## Assets.2012    63042.9340    50034.9687  122866.9926  13007.9652
## Food.2012      0.3388      0.3527      0.4782     -0.0139
## PPI_score2011  41.8349      39.1060      17.2680      2.7289
##               eQQ Med   eQQ Mean   eQQ Max
## distance      0.0072     0.0151     0.109
## own.solar.2010.11  0.0000     0.0471     1.000
## Assets.2012    14898.0000  20267.6335  179686.000
## Food.2012      0.0000     0.0035     1.000

```

```

## PPI_score2011      1.0000      0.9284      8.000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.7664 59.0054 45.3500 19.0822
## own.solar.2010.11 100.0000  0.0000 36.8819  0.0000
## Assets.2012        33.5974  3.7783 17.5212 83.6086
## Food.2012          -29.6103  0.0000 65.5719  0.0000
## PPI_score2011     -44.0048 66.6667 62.9236 33.3333
##
## Sample sizes:
##           Control Treated
## All           1085     1151
## Matched       573     1151
## Unmatched     512         0
## Discarded      0         0

```

Box X: Impact estimate female headed households: X% (X SE), p-value < X

```
## ECRP.beneficiary  0.04467061392  0.02522448187  1.771 0.081411 .
```

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5182           0.4740  0.0831  0.0442
## own.solar.2010.11  0.1494           0.0612  0.2402  0.0882
## Assets.2012       37775.3071    22809.8776 50609.7868 14965.4295
## Food.2012         0.2531           0.2857  0.4527 -0.0326
## PPI_score2011     41.5228           42.7020  17.4221 -1.1792
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0259   0.0453   0.1968
## own.solar.2010.11  0.0000   0.0913   1.0000
## Assets.2012       9272.0000 15501.2241 156997.0000
## Food.2012         0.0000   0.0290   1.0000
## PPI_score2011     2.0000   2.2905  10.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.5182           0.5186  0.1139 -0.0004
## own.solar.2010.11  0.1494           0.1369  0.3452  0.0124
## Assets.2012       37775.3071    37656.8548 90135.3404 118.4523
## Food.2012         0.2531           0.2033  0.4042  0.0498
## PPI_score2011     41.5228           39.2365  18.6099  2.2863
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0179   0.0259   0.1119
## own.solar.2010.11  0.0000   0.0500   1.0000
## Assets.2012       7343.5000 10527.7167 95591.0000
## Food.2012         0.0000   0.0083   1.0000
## PPI_score2011     1.0000   1.9833   8.0000
##
## Percent Balance Improvement:

```

```

##          Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance          99.1115 30.7907 42.8985 43.1386
## own.solar.2010.11  85.8790 0.0000 45.2273 0.0000
## Assets.2012        99.2085 20.7992 32.0846 39.1128
## Food.2012         -52.7273 0.0000 71.3095 0.0000
## PPI_score2011     -93.8831 50.0000 13.4088 20.0000
##
## Sample sizes:
##          Control Treated
## All           245      241
## Matched       120      241
## Unmatched     125       0
## Discarded      0       0

```

Box X: Impact estimate poor households: X% (X SE), p-value < X

```
## ECRP.beneficiary  0.0381363543 0.0405503059 0.940 0.3521
```

Summary of balance for all data:

```

##          Means Treated Means Control SD Control Mean Diff
## distance          0.5491          0.4729 0.1148 0.0763
## own.solar.2010.11  0.1163          0.0366 0.1889 0.0797
## Assets.2012       31297.5000    16441.3902 28592.7647 14856.1098
## Food.2012         0.2558          0.2805 0.4520 -0.0247
## PPI_score2011     14.6163          13.6341 15.6335 0.9821

```

```

##          eQQ Med   eQQ Mean   eQQ Max
## distance          0.0518   0.0735   0.1572
## own.solar.2010.11  0.0000   0.0732   1.0000
## Assets.2012       12223.5000 13935.8902 60727.0000
## Food.2012         0.0000   0.0244   1.0000
## PPI_score2011     1.0000   4.9146   80.0000

```

```
##
##
```

Summary of balance for matched data:

```

##          Means Treated Means Control SD Control Mean Diff
## distance          0.5491          0.5488 0.1443 0.0003
## own.solar.2010.11  0.1163          0.0465 0.2133 0.0698
## Assets.2012       31297.5000    35098.9884 40850.8326 -3801.4884
## Food.2012         0.2558          0.1047 0.3101 0.1512
## PPI_score2011     14.6163          17.5349 16.7876 -2.9186

```

```

##          eQQ Med   eQQ Mean   eQQ Max
## distance          0.0087   0.0163   0.088
## own.solar.2010.11  0.0000   0.0513   1.000
## Assets.2012       4351.0000 5528.0769 60727.000
## Food.2012         0.0000   0.0769   1.000
## PPI_score2011     0.0000   4.5128   80.000

```

```
##
```

Percent Balance Improvement:

```

##          Mean Diff. eQQ Med   eQQ Mean eQQ Max
## distance          99.6261 83.2600 77.8668 44.0376
## own.solar.2010.11  12.4555 0.0000 29.9145 0.0000
## Assets.2012       74.4113 64.4046 60.3321 0.0000
## Food.2012        -512.6437 0.0000 -215.3846 0.0000
## PPI_score2011    -197.1701 100.0000 8.1759 0.0000

```

```
##
```

```
## Sample sizes:
```

```
##           Control Treated
## All           82      86
## Matched       39      86
## Unmatched     43       0
## Discarded     0       0
```

Box X: Impact estimate households exposed to disaster: X% (X.X SE), p-value < X

```
## ECRP.beneficiary  0.0633560573  0.0327946439  1.932  0.05773 .
```

```
## Summary of balance for all data:
```

```
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.7063           0.6726           0.0587           0.0337
## own.solar.2010.11  0.1268           0.0242           0.1540           0.1026
## Assets.2012       64807.7113       49467.7621  139907.4416  15339.9492
## Food.2012         0.3099           0.2823           0.4510           0.0276
## PPI_score2011     41.1056           42.8468           17.2772          -1.7411
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0157           0.0334           0.1955
## own.solar.2010.11  0.0000           0.1008           1.0000
## Assets.2012       16860.0000  27959.5040  544495.0000
## Food.2012         0.0000           0.0282           1.0000
## PPI_score2011     2.0000           2.2097           9.0000
```

```
##
##
```

```
## Summary of balance for matched data:
```

```
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.7063           0.7062           0.0901           0.0001
## own.solar.2010.11  0.1268           0.1092           0.3127           0.0176
## Assets.2012       64807.7113       81119.3028  203884.9887 -16311.5915
## Food.2012         0.3099           0.3521           0.4789          -0.0423
## PPI_score2011     41.1056           40.5898           16.5404           0.5158
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.0096           0.0271           0.1898
## own.solar.2010.11  0.0000           0.0947           1.0000
## Assets.2012       15616.5000  24475.4211  544495.0000
## Food.2012         0.0000           0.0158           1.0000
## PPI_score2011     1.0000           1.1263           9.0000
```

```
##
```

```
## Percent Balance Improvement:
```

```
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.7571  38.8865  18.8752  2.8992
## own.solar.2010.11  82.8350  0.0000  6.0211  0.0000
## Assets.2012       -6.3341  7.3754  12.4612  0.0000
## Food.2012        -53.0864  0.0000  44.0602  0.0000
## PPI_score2011     70.3731  50.0000  49.0280  0.0000
```

```
##
```

```
## Sample sizes:
```

```
##           Control Treated
## All           248      568
## Matched       190      568
## Unmatched     58       0
## Discarded     0       0
```

Humanitarian assistance

Box X: Impact estimate all households: X% (X SE), p-value < X

```

## food ECRP.beneficiary  0.0410100749  0.0647490205  0.633      0.5287
## seed ECRP.beneficiary  0.2220840764  0.0470410181  4.721 0.0000129 ***

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.6490           0.6416           0.0429           0.0073
## Assets.2012       60390.0794       49531.5914 143846.9124 10858.4880
## Food.2012          0.2941           0.2473           0.4326           0.0468
## PPI_score2011     41.1941           42.6183           17.6470          -1.4242
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0085           0.0091           0.0698
## Assets.2012     14064.5000 25468.1613 582352.0000
## Food.2012          0.0000           0.0484           1.0000
## PPI_score2011   2.0000           2.2903           10.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.6490           0.6490           0.0366           0.0000
## Assets.2012       60390.0794       49491.0912 106387.4714 10898.9882
## Food.2012          0.2941           0.3000           0.4599          -0.0059
## PPI_score2011     41.1941           39.9941           16.5031           1.2000
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.0061           0.0063           0.0203
## Assets.2012     13697.0000 19680.3381 164697.0000
## Food.2012          0.0000           0.0288           1.0000
## PPI_score2011   1.0000           1.5899           10.0000
##

```

```
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance      99.9172 28.2119 31.0500 70.9013
## Assets.2012   -0.3730  2.6130 22.7257 71.7187
## Food.2012     87.4324  0.0000 40.5276  0.0000
## PPI_score2011 15.7399 50.0000 30.5806  0.0000
##
## Sample sizes:
##           Control Treated
## All           186      340
## Matched       139      340
## Unmatched     47       0
## Discarded     0       0
```

Box X: Impact estimate female headed households: X% (X SE), p-value < X

```
## food ECRP.beneficiary 0.161442064 0.109588154 1.473 0.1487
## ECRP.beneficiary 0.315971384 0.077261458 4.090 0.000209 ***
```

```
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff eQQ Med
## distance      0.6245          0.5633  0.1144  0.0612  0.0445
## Assets.2012   25625.2361    30232.9167 97127.5142 -4607.6806 8498.0000
## Food.2012     0.2361          0.0833  0.2793  0.1528  0.0000
## PPI_score2011 38.6667          42.5000  16.1838  -3.8333  4.0000
##           eQQ Mean      eQQ Max
## distance      0.0583      0.1645
## Assets.2012   22996.7917 548378.0000
## Food.2012     0.1458      1.0000
## PPI_score2011 4.3333      15.0000
```

```
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff eQQ Med
## distance      0.6245          0.6235  0.1177  0.0009  0.0307
## Assets.2012   25625.2361    17151.0278 23790.1636 8474.2083 8338.5000
## Food.2012     0.2361          0.2083  0.4126  0.0278  0.0000
## PPI_score2011 38.6667          37.5000  13.0343  1.1667  2.0000
##           eQQ Mean      eQQ Max
## distance      0.0401      0.1466
## Assets.2012   12219.7500 29789.0000
## Food.2012     0.1250      1.0000
## PPI_score2011 1.9375      4.0000
```

```
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance      98.5054 30.8779 31.2610 10.8938
## Assets.2012   -83.9148  1.8769 46.8632 94.5678
## Food.2012     81.8182  0.0000 14.2857  0.0000
## PPI_score2011 69.5652 50.0000 55.2885 73.3333
##
## Sample sizes:
##           Control Treated
## All           48       72
```

```
## Matched      32      72
## Unmatched    16       0
## Discarded     0       0
```

Box X: Impact estimate poor households: X% (X SE), p-value < X

```
## ECRP.beneficiary -0.0440674178  0.2362425490  -0.187  0.854
```

```
## ECRP.beneficiary  0.211173372  0.212253684  0.995  0.334
```

Summary of balance for all data:

```
##           Means Treated Means Control SD Control Mean Diff eQQ Med
## distance           0.6673           0.5228           0.1930           0.1445           0.1219
## Assets.2012      36437.0909      17251.1429  19550.6567  19185.9481  11660.5000
## Food.2012           0.2273           0.2857           0.4688           -0.0584           0.0000
## PPI_score2011     15.7273           12.8571           6.0999           2.8701           2.0000
##           eQQ Mean eQQ Max
## distance           0.1284           0.196
## Assets.2012     17217.2143  77985.000
## Food.2012           0.0714           1.000
## PPI_score2011     2.2857           10.000
```

##

##

Summary of balance for matched data:

```
##           Means Treated Means Control SD Control Mean Diff eQQ Med
## distance           0.6673           0.6542           0.1621           0.0131           0.0711
## Assets.2012      36437.0909      31554.7727  22950.4718  4882.3182  8352.5000
## Food.2012           0.2273           0.2727           0.4761           -0.0455           0.0000
## PPI_score2011     15.7273           15.5909           4.1736           0.1364           2.0000
##           eQQ Mean eQQ Max
## distance           0.0764           0.1184
## Assets.2012     17518.8750  77985.0000
## Food.2012           0.0000           0.0000
## PPI_score2011     1.5000           3.0000
```

##

Percent Balance Improvement:

```
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           90.9047  41.6404  40.5099  39.6038
## Assets.2012        74.5526  28.3693  -1.7521  0.0000
## Food.2012          22.2222  0.0000  100.0000  100.0000
## PPI_score2011      95.2489  0.0000  34.3750  70.0000
```

##

Sample sizes:

```
##           Control Treated
## All           14       22
## Matched        8       22
## Unmatched       6       0
## Discarded       0       0
```

Core packackage impact estimates

Core package

Box X: Impact estimate all households: X% (X SE), p-value < X

Assets.2017

CA.PHM.VSL.16.17 24946.23552 8951.09283 2.787 0.00694 **

Food.2017

CA.PHM.VSL.16.17 0.0160481033 0.0406281071 0.395 0.6941

Food.2017.9mnths

CA.PHM.VSL.16.17 0.03576627777 0.06327352970 0.565 0.573840

Food.2016.9mnths

CA.PHM.VSL.16.17 0.1086059530 0.0611695655 1.775 0.080498

Summary of balance for all data:

	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6049	0.1263	0.1711	0.4786
## Assets.2012	72759.8555	42846.0358	131775.8664	29913.8196
## Food.2012	0.3687	0.3245	0.4684	0.0442
## CA_2011.2012_2	0.6667	0.0849	0.2789	0.5818
## PHM_Int_11.12	0.9351	0.4575	0.4984	0.4776
## VSL.2011.12	0.4366	0.0962	0.2950	0.3404

	eQQ Med	eQQ Mean	eQQ Max
## distance	0.5719	0.4782	0.7897
## Assets.2012	26777.0000	38040.1563	1308507.0000
## Food.2012	0.0000	0.0442	1.0000
## CA_2011.2012_2	1.0000	0.5811	1.0000
## PHM_Int_11.12	0.0000	0.4779	1.0000
## VSL.2011.12	0.0000	0.3392	1.0000

##

##

Summary of balance for matched data:

	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6049	0.6052	0.3115	-0.0003
## Assets.2012	72759.8555	61820.1327	69952.5183	10939.7227
## Food.2012	0.3687	0.5723	0.4966	-0.2035
## CA_2011.2012_2	0.6667	0.6667	0.4732	0.0000
## PHM_Int_11.12	0.9351	0.9351	0.2473	0.0000
## VSL.2011.12	0.4366	0.4366	0.4978	0.0000

	eQQ Med	eQQ Mean	eQQ Max
## distance	0.2238	0.2506	0.5653
## Assets.2012	10774.0000	20279.6567	137881.0000
## Food.2012	0.0000	0.0224	1.0000
## CA_2011.2012_2	0.0000	0.3358	1.0000
## PHM_Int_11.12	0.0000	0.0746	1.0000
## VSL.2011.12	0.0000	0.2164	1.0000

##

##

##

##

##

##

##

Percent Balance Improvement:

	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	99.9423	60.8594	47.5903	28.4181

```

## Assets.2012      63.4292  59.7640  46.6888  89.4627
## Food.2012      -360.4634  0.0000  49.4030  0.0000
## CA_2011.2012_2  100.0000  100.0000  42.2115  0.0000
## PHM_Int_11.12  100.0000  0.0000  84.3836  0.0000
## VSL.2011.12    100.0000  0.0000  36.2038  0.0000
##
## Sample sizes:
##           Control Treated
## All           1060     339
## Matched       134     339
## Unmatched     926      0
## Discarded      0      0

```

Crop.prodn.2012_2016

```
## CA.PHM.VSL.16.17  0.1421503558  0.1246344589  1.141  0.
```

Summary of balance for all data:

```

##           Means Treated Means Control SD Control Mean Diff
## distance           0.6478           0.1811  0.2016  0.4667
## Assets.2012      74866.3288      46834.9718  71537.7052  28031.3569
## Food.2012         0.4795           0.3310  0.4722  0.1485
## CA_2011.2012_2   0.7123           0.1268  0.3339  0.5856
## PHM_Int_11.12   0.9178           0.6056  0.4904  0.3122
## VSL.2011.12     0.4521           0.0845  0.2791  0.3675
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.5133           0.4667  0.7482
## Assets.2012      16718.0000  28522.4795  428041.0000
## Food.2012         0.0000           0.1507  1.0000
## CA_2011.2012_2   1.0000           0.5890  1.0000
## PHM_Int_11.12   0.0000           0.3151  1.0000
## VSL.2011.12     0.0000           0.3699  1.0000

```

Summary of balance for matched data:

```

##           Means Treated Means Control SD Control Mean Diff    eQQ Med
## distance           0.6478           0.6526  0.3019  -0.0048  0.3113
## Assets.2012      74866.3288      64901.4932  67879.3480  9964.8356  4671.0000
## Food.2012         0.4795           0.5890  0.5014  -0.1096  0.0000
## CA_2011.2012_2   0.7123           0.7808  0.4216  -0.0685  0.0000
## PHM_Int_11.12   0.9178           0.8904  0.3183  0.0274  0.0000
## VSL.2011.12     0.4521           0.4110  0.5014  0.0411  0.0000
##           eQQ Mean    eQQ Max
## distance           0.2507           0.4017
## Assets.2012      31739.6296  528135.0000
## Food.2012         0.1852           1.0000
## CA_2011.2012_2   0.2593           1.0000
## PHM_Int_11.12   0.1481           1.0000
## VSL.2011.12     0.2222           1.0000

```

Percent Balance Improvement:

```

##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           98.9680  39.3585  46.2755  46.3146
## Assets.2012        64.4511  72.0601 -11.2793 -23.3842
## Food.2012          26.1858  0.0000 -22.8956  0.0000
## CA_2011.2012_2    88.3031  100.0000  55.9862  0.0000

```

```
## PHM_Int_11.12      91.2237  0.0000  52.9791  0.0000
## VSL.2011.12       88.8189  0.0000  39.9177  0.0000
##
## Sample sizes:
##           Control Treated
## All           142     73
## Matched       27     73
## Unmatched     115     0
## Discarded      0     0
```

Box X: Impact estimate female headed households: X% (X SE), p-value

< X

Assets.2017

```
## CA.PHM.VSL.16.17  22830.3249  9133.2671  2.500  0.0171 *
```

Food.2017

```
## CA.PHM.VSL.16.17  0.0207743071  0.0897879014  0.231 0.818337
```

Food.2017.9mnths

```
## CA.PHM.VSL.16.17 -0.0138729441  0.1134842139  -0.122 0.90338
```

Food.2016.9mnths

```
## CA.PHM.VSL.16.17  0.114650308  0.119185107  0.962 0.3425
```

Summary of balance for all data:

	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6262	0.0881	0.1430	0.5381
## CA_2011.2012_2	0.6491	0.0413	0.1994	0.6078
## PHM_Int_11.12	0.9123	0.3926	0.4893	0.5197
## Assets.2012	46819.7368	22909.6901	50894.7666	23910.0468
## Food.2012	0.2632	0.2810	0.4504	-0.0178
## VSL.2011.12	0.4211	0.0785	0.2695	0.3425

	eQQ Med	eQQ Mean	eQQ Max
## distance	0.7075	0.5347	0.8551
## CA_2011.2012_2	1.0000	0.5965	1.0000
## PHM_Int_11.12	1.0000	0.5263	1.0000
## Assets.2012	24953.0000	28463.2807	326322.0000
## Food.2012	0.0000	0.0175	1.0000
## VSL.2011.12	0.0000	0.3333	1.0000

##

##

Summary of balance for matched data:

	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6262	0.5937	0.3228	0.0324
## CA_2011.2012_2	0.6491	0.6491	0.4885	0.0000
## PHM_Int_11.12	0.9123	0.9123	0.2895	0.0000
## Assets.2012	46819.7368	19380.7368	19915.2015	27439.0000

```

## Food.2012          0.2632          0.0702          0.2615          0.1930
## VSL.2011.12       0.4211          0.1404          0.3555          0.2807
##                   eQQ Med    eQQ Mean    eQQ Max
## distance          0.2812          0.3072          0.7042
## CA_2011.2012_2    0.0000          0.4091          1.0000
## PHM_Int_11.12     0.0000          0.0909          1.0000
## Assets.2012       17221.0000 27683.7727 234489.0000
## Food.2012          0.0000          0.1364          1.0000
## VSL.2011.12       0.0000          0.1364          1.0000
##
## Percent Balance Improvement:
##                   Mean Diff.  eQQ Med    eQQ Mean  eQQ Max
## distance          93.9736  60.2625  42.5406  17.6389
## CA_2011.2012_2    100.0000 100.0000  31.4171  0.0000
## PHM_Int_11.12     100.0000 100.0000  82.7273  0.0000
## Assets.2012       -14.7593  30.9863   2.7386  28.1418
## Food.2012         -982.1138  0.0000 -677.2727  0.0000
## VSL.2011.12       18.0529  0.0000  59.0909  0.0000
##
## Sample sizes:
##                   Control Treated
## All                242         57
## Matched            22         57
## Unmatched          220         0
## Discarded          0         0

```

Crop.prodn.2012_2016

```

## CA.PHM.VSL.16.17  0.451122644  0.163934245  2.752  0.0204 *
##
##                   Means Treated Means Control SD Control  Mean Diff
## distance          0.7816          0.1338          0.2018  0.6478
## Assets.2012       54996.3158  31001.4839 46460.6925 23994.8319
## Food.2012         0.3684          0.2903          0.4614  0.0781
## CA_2011.2012_2    0.6842          0.0645          0.2497  0.6197
## PHM_Int_11.12     0.9474          0.4194          0.5016  0.5280
## VSL.2011.12       0.5263          0.0323          0.1796  0.4941
##                   eQQ Med    eQQ Mean    eQQ Max
## distance          0.7816          0.6505          0.8824
## Assets.2012       28842.0000 30435.5263 55896.0000
## Food.2012         0.0000          0.1053          1.0000
## CA_2011.2012_2    1.0000          0.6316          1.0000
## PHM_Int_11.12     1.0000          0.5263          1.0000
## VSL.2011.12       0.0000          0.4737          1.0000
##
##
## Summary of balance for matched data:
##                   Means Treated Means Control SD Control  Mean Diff
## distance          0.7816          0.7197          0.2916  0.0619
## Assets.2012       54996.3158  24814.1579 21727.5269 30182.1579
## Food.2012         0.3684          0.1579          0.4077  0.2105
## CA_2011.2012_2    0.6842          0.6316          0.5393  0.0526
## PHM_Int_11.12     0.9474          1.0000          0.0000 -0.0526
## VSL.2011.12       0.5263          0.1579          0.4077  0.3684
##                   eQQ Med    eQQ Mean    eQQ Max
## distance          0.2387          0.301          0.5844

```

```

## Assets.2012      26808.0000 31783.400 62633.0000
## Food.2012       0.0000    0.000    0.0000
## CA_2011.2012_2  0.0000    0.400    1.0000
## PHM_Int_11.12   0.0000    0.200    1.0000
## VSL.2011.12    0.0000    0.400    1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance      90.4409  69.4622  53.7295  33.7691
## Assets.2012   -25.7861   7.0522  -4.4286 -12.0527
## Food.2012    -169.5652  0.0000 100.0000 100.0000
## CA_2011.2012_2  91.5068 100.0000  36.6667  0.0000
## PHM_Int_11.12  90.0322 100.0000  62.0000  0.0000
## VSL.2011.12   25.4296  0.0000  15.5556  0.0000
##
## Sample sizes:
##           Control Treated
## All           31      19
## Matched        5      19
## Unmatched      26       0
## Discarded       0       0

```

Box X: Impact estimate households exposed to disaster: X% (X.X SE), p-value < X

```

Assets.2017
## CA.PHM.VSL.16.17  20876.95930  11191.74255  1.865  0.0678

Food.2017
## CA.PHM.VSL.16.17  0.0889395313  0.0630666128  1.410  0.16442.

Food.2017.9mnths
## CA.PHM.VSL.16.17  0.14055625372  0.06530871162  2.152  0.03605 *

Food.2016.9mnths
## CA.PHM.VSL.16.17  0.2038407945  0.0782265188  2.606  0.011928 *

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance      0.7094      0.2353      0.2265      0.4741
## CA_2011.2012_2  0.6837      0.1364      0.3439      0.5473
## PHM_Int_11.12   0.9184      0.4256      0.4955      0.4927
## Assets.2012    70664.8367    50017.1033 141557.4535 20647.7334
## Food.2012      0.3622      0.2769      0.4484      0.0854
## VSL.2011.12    0.4031      0.1116      0.3155      0.2915
##
##           eQQ Med  eQQ Mean  eQQ Max
## distance      0.5606  0.4757  0.7456
## CA_2011.2012_2  1.0000  0.5510  1.0000
## PHM_Int_11.12   0.0000  0.4949  1.0000

```

```

## Assets.2012      26689.0000 33869.9898 544495.0000
## Food.2012        0.0000   0.0867   1.0000
## VSL.2011.12     0.0000   0.2908   1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7094           0.6868   0.2571   0.0226
## CA_2011.2012_2    0.6837           0.6939   0.4651  -0.0102
## PHM_Int_11.12     0.9184           0.9031   0.2986   0.0153
## Assets.2012      70664.8367    34403.9337 38647.1196 36260.9031
## Food.2012         0.3622           0.5408   0.5029  -0.1786
## VSL.2011.12      0.4031           0.1173   0.3248   0.2857
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.2249           0.2567   0.5134
## CA_2011.2012_2    0.0000           0.3636   1.0000
## PHM_Int_11.12     0.0000           0.1636   1.0000
## Assets.2012      20113.0000    37205.7455 658478.0000
## Food.2012         0.0000           0.0364   1.0000
## VSL.2011.12      0.0000           0.2000   1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           95.2328  59.8824  46.0442  31.1427
## CA_2011.2012_2    98.1356 100.0000  34.0067  0.0000
## PHM_Int_11.12     96.8937  0.0000  66.9353  0.0000
## Assets.2012      -75.6169  24.6394  -9.8487 -20.9337
## Food.2012        -109.1358  0.0000  58.0749  0.0000
## VSL.2011.12       1.9818  0.0000  31.2281  0.0000
##
## Sample sizes:
##           Control Treated
## All           242      196
## Matched       55      196
## Unmatched     187       0
## Discarded     0        0

```

Crop.prodn.2012_2016

```
## CA.PHM.VSL.16.17 0.360496170 0.216120317 1.668 0.1136
```

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.8028           0.1918   0.2498   0.6110
## Assets.2012      83763.0571    39228.4722 64837.1456 44534.5849
## Food.2012         0.4571           0.0556   0.2323   0.4016
## CA_2011.2012_2    0.7429           0.1944   0.4014   0.5484
## PHM_Int_11.12     0.9429           0.5000   0.5071   0.4429
## VSL.2011.12      0.4000           0.0833   0.2803   0.3167
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.6182           0.6261   0.897
## Assets.2012      28251.0000    49418.6571 550204.000
## Food.2012         0.0000           0.4286   1.000
## CA_2011.2012_2    1.0000           0.5714   1.000
## PHM_Int_11.12     0.0000           0.4571   1.000
## VSL.2011.12      0.0000           0.3429   1.000

```

```

##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.8028           0.7975           0.2607           0.0052
## Assets.2012       83763.0571       24299.3429 27592.8020 59463.7143
## Food.2012          0.4571           0.6857           0.4963           -0.2286
## CA_2011.2012_2     0.7429           0.8571           0.3741           -0.1143
## PHM_Int_11.12      0.9429           0.9429           0.2481           0.0000
## VSL.2011.12        0.4000           0.0286           0.1781           0.3714
##           eQQ Med      eQQ Mean      eQQ Max
## distance           0.2458           0.2302           0.3962
## Assets.2012       24930.0000 113888.8750 757434.0000
## Food.2012          0.0000           0.2500           1.0000
## CA_2011.2012_2     0.0000           0.1250           1.0000
## PHM_Int_11.12      0.0000           0.0000           0.0000
## VSL.2011.12        0.0000           0.2500           1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           99.1448  60.2320  63.2422  55.8309
## Assets.2012       -33.5226  11.7553 -130.4572 -37.6642
## Food.2012          43.0830   0.0000  41.6667   0.0000
## CA_2011.2012_2    79.1606 100.0000  78.1250   0.0000
## PHM_Int_11.12    100.0000  0.0000 100.0000 100.0000
## VSL.2011.12      -17.2932  0.0000  27.0833   0.0000
##
## Sample sizes:
##           Control Treated
## All           36         35
## Matched        8         35
## Unmatched      28         0
## Discarded       0         0

```

Core package plus irrigation

```

Assets.2017
## CA.PHM.VSL.IRRIG.16.17 31073.09364 10600.28671 2.931 0.00501 **

Food.2017
## CA.PHM.VSL.IRRIG.16.17 0.0408632843 0.0575620976 0.710 0.4809

Food.2017.9mnts
## CA.PHM.VSL.IRRIG.16.17 0.0177169302 0.0776119432 0.228 0.8203

Food.2016.9mnts
## CA.PHM.VSL.IRRIG.16.17 0.0877624910 0.0637444539 1.377 0.174592

## Summary of balance for all data:
## Means Treated Means Control SD Control Mean Diff
## distance 0.5015 0.0814 0.1284 0.4202
## Assets.2012 64578.5170 43475.8479 132276.2095 21102.6692
## Food.2012 0.3636 0.3293 0.4702 0.0343
## CA_2011.2012_2 0.6591 0.0983 0.2979 0.5608
## PHM_Int_11.12 0.9205 0.4666 0.4991 0.4538
## VSL.2011.12 0.4432 0.1002 0.3004 0.3430
## irrigated.2011.12 0.4943 0.1651 0.3715 0.3292
## eQQ Med eQQ Mean eQQ Max
## distance 0.4165 0.4193 0.7522
## Assets.2012 26079.0000 37460.4943 1576351.0000
## Food.2012 0.0000 0.0341 1.0000
## CA_2011.2012_2 1.0000 0.5568 1.0000
## PHM_Int_11.12 0.0000 0.4545 1.0000
## VSL.2011.12 0.0000 0.3409 1.0000
## irrigated.2011.12 0.0000 0.3295 1.0000
##
## Summary of balance for matched data:
## Means Treated Means Control SD Control Mean Diff
## distance 0.5015 0.4788 0.2813 0.0227
## Assets.2012 64578.5170 55971.8125 117186.9175 8606.7045
## Food.2012 0.3636 0.3807 0.4885 -0.0170
## CA_2011.2012_2 0.6591 0.6648 0.4750 -0.0057
## PHM_Int_11.12 0.9205 0.9034 0.2972 0.0170
## VSL.2011.12 0.4432 0.4716 0.5023 -0.0284
## irrigated.2011.12 0.4943 0.2955 0.4591 0.1989
## eQQ Med eQQ Mean eQQ Max
## distance 0.2539 0.2225 0.4347
## Assets.2012 15353.0000 24513.4268 387976.0000
## Food.2012 0.0000 0.0244 1.0000
## CA_2011.2012_2 0.0000 0.2683 1.0000
## PHM_Int_11.12 0.0000 0.1098 1.0000
## VSL.2011.12 0.0000 0.0976 1.0000
## irrigated.2011.12 0.0000 0.2561 1.0000
##
## Percent Balance Improvement:
## Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance 94.5970 39.0375 46.9353 42.2154

```

```

## Assets.2012          59.2151  41.1289  34.5619  75.3877
## Food.2012           50.3378   0.0000  28.4553  0.0000
## CA_2011.2012_2     98.9868 100.0000  51.8168  0.0000
## PHM_Int_11.12      96.2443   0.0000  75.8537  0.0000
## VSL.2011.12        91.7174   0.0000  71.3821  0.0000
## irrigated.2011.12  39.5914   0.0000  22.2876  0.0000
##
## Sample sizes:
##           Control Treated
## All           1078     176
## Matched         82     176
## Unmatched       996       0
## Discarded        0       0

```

Crop.income.2012_2016

```
## CA.PHM.VSL.IRRIG.16.17  0.0992306688  0.1371985383  0.723  0.4779
```

Summary of balance for all data:

```

##           Means Treated Means Control SD Control Mean Diff
## distance           0.4693           0.1720  0.1583  0.2973
## Assets.2012       55256.2000      47151.9444 70762.1462 8104.2556
## Food.2012          0.4857           0.3889  0.4898  0.0968
## CA_2011.2012_2    0.5714           0.1481  0.3569  0.4233
## PHM_Int_11.12     0.8857           0.5741  0.4968  0.3116
## VSL.2011.12       0.4857           0.1481  0.3569  0.3376
## irrigated.2011.12  0.4000           0.1944  0.3976  0.2056
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.3218     0.2971     0.505
## Assets.2012       7351.0000 19316.5143 162086.000
## Food.2012          0.0000     0.0857     1.000
## CA_2011.2012_2    0.0000     0.4286     1.000
## PHM_Int_11.12     0.0000     0.3143     1.000
## VSL.2011.12       0.0000     0.3429     1.000
## irrigated.2011.12  0.0000     0.2000     1.000
##
##

```

Summary of balance for matched data:

```

##           Means Treated Means Control SD Control Mean Diff
## distance           0.4693           0.4546  0.2586  0.0147
## Assets.2012       55256.2000      67599.6857 82872.9425 -12343.4857
## Food.2012          0.4857           0.6000  0.5033 -0.1143
## CA_2011.2012_2    0.5714           0.6000  0.5033 -0.0286
## PHM_Int_11.12     0.8857           0.9143  0.2876 -0.0286
## VSL.2011.12       0.4857           0.5143  0.5135 -0.0286
## irrigated.2011.12  0.4000           0.1429  0.3595  0.2571
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.1255     0.1315     0.268
## Assets.2012       2876.0000 9764.3158 60487.000
## Food.2012          0.0000     0.0000     0.000
## CA_2011.2012_2    0.0000     0.1579     1.000
## PHM_Int_11.12     0.0000     0.0000     0.000
## VSL.2011.12       0.0000     0.2105     1.000
## irrigated.2011.12  0.0000     0.2105     1.000
##
## Percent Balance Improvement:

```

```

##          Mean Diff. eQQ Med eQQ Mean  eQQ Max
## distance          95.0627 60.9861  55.7469  46.9319
## Assets.2012       -52.3087 60.8761  49.4509  62.6822
## Food.2012         -18.0328  0.0000 100.0000 100.0000
## CA_2011.2012_2    93.2500  0.0000  63.1579  0.0000
## PHM_Int_11.12     90.8319  0.0000 100.0000 100.0000
## VSL.2011.12       91.5361  0.0000  38.5965  0.0000
## irrigated.2011.12 -25.0965  0.0000  -5.2632  0.0000
##
## Sample sizes:
##          Control Treated
## All           108      35
## Matched        19      35
## Unmatched       89       0
## Discarded        0       0

```

irrigated.income.2016.17

```
## CA.PHM.VSL.IRRIG.16.17  0.003308158291  0.004950192196  0.668  0.509
```

Summary of balance for all data:

```

##          Means Treated Means Control  SD Control  Mean Diff
## distance          0.7921          0.2501      0.2734      0.5420
## Assets.2012      67199.7590      55800.1014 162344.8917 11399.6576
## Food.2012         0.3012          0.4493      0.5011     -0.1481
## CA_2011.2012_2   0.6627          0.1159      0.3225      0.5467
## PHM_Int_11.12    0.9398          0.4203      0.4972      0.5195
## VSL.2011.12      0.3614          0.1594      0.3687      0.2020
## irrigated.2011.12 0.3735          0.6087      0.4916     -0.2352
##
##          eQQ Med   eQQ Mean   eQQ Max
## distance          0.5828      0.5379      0.7711
## Assets.2012      17946.0000 32777.2899 710458.0000
## Food.2012         0.0000      0.1594      1.0000
## CA_2011.2012_2   1.0000      0.5362      1.0000
## PHM_Int_11.12    1.0000      0.5072      1.0000
## VSL.2011.12      0.0000      0.2029      1.0000
## irrigated.2011.12 0.0000      0.2464      1.0000
##
##

```

Summary of balance for matched data:

```

##          Means Treated Means Control  SD Control  Mean Diff
## distance          0.7921          0.7985      0.2409     -0.0064
## Assets.2012      67199.7590      29430.3253 31897.0529 37769.4337
## Food.2012         0.3012          0.3373      0.4874     -0.0361
## CA_2011.2012_2   0.6627          0.7108      0.4673     -0.0482
## PHM_Int_11.12    0.9398          0.7108      0.4673      0.2289
## VSL.2011.12      0.3614          0.3133      0.4781      0.0482
## irrigated.2011.12 0.3735          0.1084      0.3205      0.2651
##
##          eQQ Med   eQQ Mean   eQQ Max
## distance          0.2762      0.2376      0.4119
## Assets.2012      26458.0000 53909.5294 446169.0000
## Food.2012         0.0000      0.0000      0.0000
## CA_2011.2012_2   0.0000      0.4118      1.0000
## PHM_Int_11.12    0.0000      0.1765      1.0000

```

```

## VSL.2011.12          0.0000    0.1765    1.0000
## irrigated.2011.12   0.0000    0.1176    1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          98.8118  52.5968  55.8358  46.5785
## Assets.2012       -231.3208 -47.4312 -64.4722  37.1998
## Food.2012         75.5896   0.0000  100.0000 100.0000
## CA_2011.2012_2    91.1849  100.0000  23.2114  0.0000
## PHM_Int_11.12     55.9328  100.0000  65.2101  0.0000
## VSL.2011.12       76.1452   0.0000  13.0252  0.0000
## irrigated.2011.12 -12.6949   0.0000  52.2491  0.0000
##
## Sample sizes:
##           Control Treated
## All             69      83
## Matched         17      83
## Unmatched        52       0
## Discarded        0       0

```

irrigated.sell.2016.17

```
## CA.PHM.VSL.IRRIG.16.17 -0.1539604763  0.0580485173  -2.652  0.01087 *
```

Summary of balance for all data:

```

##           Means Treated Means Control  SD Control Mean Diff
## distance          0.6949          0.1808    0.2056    0.5141
## Assets.2012      64578.5170    56767.1246 128095.4599 7811.3925
## Food.2012         0.3636          0.4074    0.4922   -0.0438
## CA_2011.2012_2   0.6591          0.0943    0.2927    0.5648
## PHM_Int_11.12    0.9205          0.4882    0.5007    0.4322
## VSL.2011.12      0.4432          0.1448    0.3525    0.2984
## irrigated.2011.12 0.4943          0.5993    0.4909   -0.1050
## irrigated.sell.2011.12 0.8580          0.9024    0.2973   -0.0444
##           eQQ Med    eQQ Mean    eQQ Max
## distance          0.5965    0.5150    0.8192
## Assets.2012      20479.0000  27248.1875 710458.0000
## Food.2012         0.0000    0.0398    1.0000
## CA_2011.2012_2   1.0000    0.5682    1.0000
## PHM_Int_11.12    0.0000    0.4318    1.0000
## VSL.2011.12      0.0000    0.3011    1.0000
## irrigated.2011.12 0.0000    0.1023    1.0000
## irrigated.sell.2011.12 0.0000    0.0398    1.0000

```

Summary of balance for matched data:

```

##           Means Treated Means Control  SD Control Mean Diff
## distance          0.6949          0.6850    0.2825    0.0099
## Assets.2012      64578.5170    39446.9091 77222.0059 25131.6080
## Food.2012         0.3636          0.5739    0.4992   -0.2102
## CA_2011.2012_2   0.6591          0.6648    0.4766   -0.0057
## PHM_Int_11.12    0.9205          0.8125    0.3940    0.1080
## VSL.2011.12      0.4432          0.2557    0.4404    0.1875
## irrigated.2011.12 0.4943          0.2330    0.4268    0.2614
## irrigated.sell.2011.12 0.8580          0.9886    0.1070   -0.1307
##           eQQ Med    eQQ Mean    eQQ Max

```

```

## distance                0.2499    0.2664    0.5136
## Assets.2012             14865.0000 25994.9245 387976.0000
## Food.2012               0.0000    0.0000    0.0000
## CA_2011.2012_2         0.0000    0.4151    1.0000
## PHM_Int_11.12          0.0000    0.1321    1.0000
## VSL.2011.12            0.0000    0.1132    1.0000
## irrigated.2011.12      0.0000    0.1698    1.0000
## irrigated.sell.2011.12 0.0000    0.1321    1.0000
##
## Percent Balance Improvement:
##                          Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance                 98.0671  58.0977  48.2774  37.2993
## Assets.2012             -221.7302 27.4134   4.5994  45.3907
## Food.2012               -380.2885 0.0000  100.0000 100.0000
## CA_2011.2012_2         98.9940 100.0000  26.9434  0.0000
## PHM_Int_11.12          75.0243  0.0000  69.4141  0.0000
## VSL.2011.12            37.1650  0.0000  62.4066  0.0000
## irrigated.2011.12     -148.8978 0.0000 -66.0377  0.0000
## irrigated.sell.2011.12 -194.3128 0.0000 -232.0755 0.0000
##
## Sample sizes:
##                Control Treated
## All                297    176
## Matched              53    176
## Unmatched           244     0
## Discarded            0     0

```

FEMALE:

```

Assets.2017
## CA.PHM.VSL.IRRIG.16.17 22058.8441 12993.1414 1.698 0.102

Food.2017
## CA.PHM.VSL.IRRIG.16.17 0.1058619713 0.1156092127 0.916 0.369

Food.2017.9mnths
## CA.PHM.VSL.IRRIG.16.17 0.123098171 0.116915246 1.053 0.303

Food.2016.9mnths
## CA.PHM.VSL.IRRIG.16.17 0.262186424 0.147795116 1.774 0.0888 .

## Summary of balance for all data:
##                Means Treated Means Control SD Control Mean Diff
## distance                0.5725    0.0628    0.1275    0.5096
## CA_2011.2012_2         0.6389    0.0531    0.2246    0.5858
## PHM_Int_11.12          0.8611    0.4000    0.4909    0.4611
## Assets.2012             37764.0556 22809.8776 50609.7868 14954.1780
## Food.2012               0.1944    0.2857    0.4527   -0.0913
## VSL.2011.12            0.4722    0.0776    0.2680    0.3947
## irrigated.2011.12      0.5000    0.1347    0.3421    0.3653

```

```

##          eQQ Med   eQQ Mean   eQQ Max
## distance          0.5812    0.5012    0.9328
## CA_2011.2012_2    1.0000    0.5833    1.0000
## PHM_Int_11.12     0.0000    0.4722    1.0000
## Assets.2012      19694.0000  32245.9167  544725.0000
## Food.2012         0.0000    0.0833    1.0000
## VSL.2011.12      0.0000    0.3889    1.0000
## irrigated.2011.12 0.0000    0.3611    1.0000
##
##
## Summary of balance for matched data:
##          Means Treated Means Control SD Control Mean Diff
## distance          0.5725    0.4791    0.2548    0.0933
## CA_2011.2012_2    0.6389    0.2222    0.4294    0.4167
## PHM_Int_11.12     0.8611    0.8611    0.3572    0.0000
## Assets.2012      37764.0556    23254.2500  19182.2482  14509.8056
## Food.2012         0.1944    0.1389    0.3572    0.0556
## VSL.2011.12      0.4722    0.6389    0.4961   -0.1667
## irrigated.2011.12 0.5000    0.5556    0.5132   -0.0556
##          eQQ Med   eQQ Mean   eQQ Max
## distance          0.3138    0.2412    0.39
## CA_2011.2012_2    0.0000    0.3125    1.00
## PHM_Int_11.12     0.0000    0.0625    1.00
## Assets.2012      6392.0000  8196.1250  26641.00
## Food.2012         0.0000    0.1250    1.00
## VSL.2011.12      0.0000    0.0000    0.00
## irrigated.2011.12 0.0000    0.1875    1.00
##
## Percent Balance Improvement:
##          Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance          81.6841  46.0122  51.8803  58.1956
## CA_2011.2012_2    28.8756 100.0000  46.4286  0.0000
## PHM_Int_11.12     100.0000  0.0000  86.7647  0.0000
## Assets.2012         2.9716  67.5434  74.5824  95.1093
## Food.2012         39.1304  0.0000 -50.0000  0.0000
## VSL.2011.12       57.7708  0.0000 100.0000 100.0000
## irrigated.2011.12  84.7921  0.0000  48.0769  0.0000
##
## Sample sizes:
##          Control Treated
## All          245      36
## Matched       16      36
## Unmatched     229      0
## Discarded      0      0

```

Crop.income.2012_2016

```
## CA.PHM.VSL.IRRIG.16.17 0.167514309 0.128972461 1.299 0.2848
```

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.6899           0.1329           0.1985           0.5571
## Assets.2012       26028.5556       31786.8095 42436.2523 -5758.2540
## Food.2012           0.2222           0.3810           0.4976           -0.1587
## CA_2011.2012_2     0.4444           0.0476           0.2182           0.3968
## PHM_Int_11.12      0.7778           0.3810           0.4976           0.3968
## VSL.2011.12        0.6667           0.0476           0.2182           0.6190
## irrigated.2011.12  0.3333           0.2381           0.4364           0.0952
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.7258           0.5393           0.7539
## Assets.2012       6049.0000 15234.3333 90151.0000
## Food.2012           0.0000           0.1111           1.0000
## CA_2011.2012_2     0.0000           0.3333           1.0000
## PHM_Int_11.12      0.0000           0.4444           1.0000
## VSL.2011.12        1.0000           0.5556           1.0000
## irrigated.2011.12  0.0000           0.1111           1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.6899           0.6754           0.3442           0.0145
## Assets.2012       26028.5556       29325.6667 11486.0058 -3297.1111
## Food.2012           0.2222           0.0000           0.0000           0.2222
## CA_2011.2012_2     0.4444           0.0000           0.0000           0.4444
## PHM_Int_11.12      0.7778           0.8889           0.3849           -0.1111
## VSL.2011.12        0.6667           0.7778           0.5092           -0.1111
## irrigated.2011.12  0.3333           0.1111           0.3849           0.2222
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.1478           0.2527           0.604
## Assets.2012       8004.0000 21002.0000 51268.000
## Food.2012           0.0000           0.3333           1.000
## CA_2011.2012_2     0.0000           0.3333           1.000
## PHM_Int_11.12      0.0000           0.0000           0.000
## VSL.2011.12        0.0000           0.3333           1.000
## irrigated.2011.12  0.0000           0.0000           0.000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           97.3952  79.6374  53.1534  19.8815
## Assets.2012        42.7411 -32.3194 -37.8597  43.1310
## Food.2012          -40.0000  0.0000 -200.0000  0.0000
## CA_2011.2012_2     -12.0000  0.0000  0.0000  0.0000
## PHM_Int_11.12       72.0000  0.0000 100.0000 100.0000
## VSL.2011.12        82.0513 100.0000  40.0000  0.0000
## irrigated.2011.12 -133.3333  0.0000 100.0000 100.0000
##
## Sample sizes:
##           Control Treated
## All           21         9
## Matched        3         9
## Unmatched      18         0
## Discarded      0         0

```

irrigated.income.2016.17

CA.PHM.VSL.IRRIG.16.17 0.0954162499 0.0492179415 1.939 0.101

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.8708	0.2196	0.2939	0.6512
## Assets.2012	33061.7059	35972.2000	61061.8363	-2910.4941
## Food.2012	0.1176	0.6000	0.5164	-0.4824
## CA_2011.2012_2	0.6471	0.2000	0.4216	0.4471
## PHM_Int_11.12	0.8235	0.2000	0.4216	0.6235
## VSL.2011.12	0.3529	0.1000	0.3162	0.2529
## irrigated.2011.12	0.3529	0.6000	0.5164	-0.2471

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.7256	0.6205	0.8283
## Assets.2012	12214.0000	20019.4000	73539.0000
## Food.2012	0.5000	0.5000	1.0000
## CA_2011.2012_2	0.0000	0.4000	1.0000
## PHM_Int_11.12	1.0000	0.6000	1.0000
## VSL.2011.12	0.0000	0.2000	1.0000
## irrigated.2011.12	0.0000	0.3000	1.0000

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.8708	0.9191	0.2398	-0.0483
## Assets.2012	33061.7059	5594.2353	321.1097	27467.4706
## Food.2012	0.1176	0.0000	0.0000	0.1176
## CA_2011.2012_2	0.6471	0.9412	0.3328	-0.2941
## PHM_Int_11.12	0.8235	0.9412	0.3328	-0.1176
## VSL.2011.12	0.3529	0.0000	0.0000	0.3529
## irrigated.2011.12	0.3529	0.0000	0.0000	0.3529

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.0208	0.0208	0.0374
## Assets.2012	55947.0000	55947.0000	108160.0000
## Food.2012	0.5000	0.5000	1.0000
## CA_2011.2012_2	0.0000	0.0000	0.0000
## PHM_Int_11.12	0.0000	0.0000	0.0000
## VSL.2011.12	0.5000	0.5000	1.0000
## irrigated.2011.12	0.5000	0.5000	1.0000

Percent Balance Improvement:

##	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	92.5880	97.1390	96.6543	95.4888
## Assets.2012	-843.7391	-358.0563	-179.4639	-47.0784
## Food.2012	75.6098	0.0000	0.0000	0.0000
## CA_2011.2012_2	34.2105	0.0000	100.0000	100.0000
## PHM_Int_11.12	81.1321	100.0000	100.0000	100.0000
## VSL.2011.12	-39.5349	-Inf	-150.0000	0.0000
## irrigated.2011.12	-42.8571	-Inf	-66.6667	0.0000

Sample sizes:

##	Control	Treated
## All	10	17
## Matched	2	17
## Unmatched	8	0
## Discarded	0	0

irrigated.sell.2016.17

CA.PHM.VSL.IRRIG.16.17 -0.2207916969 0.1297684665 -1.701 0.10436

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.7748	0.1559	0.2347	0.6189
## Assets.2012	37764.0556	43106.2115	93355.0638	-5342.1560
## Food.2012	0.1944	0.3846	0.4913	-0.1902
## CA_2011.2012_2	0.6389	0.0962	0.2977	0.5427
## PHM_Int_11.12	0.8611	0.3077	0.4660	0.5534
## VSL.2011.12	0.4722	0.0962	0.2977	0.3761
## irrigated.2011.12	0.5000	0.6346	0.4862	-0.1346

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.667	0.6208	0.894
## Assets.2012	6262.500	22924.6111	544725.000
## Food.2012	0.000	0.1944	1.000
## CA_2011.2012_2	1.000	0.5556	1.000
## PHM_Int_11.12	1.000	0.5556	1.000
## VSL.2011.12	0.000	0.3889	1.000
## irrigated.2011.12	0.000	0.1111	1.000

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.7748	0.7671	0.2596	0.0077
## Assets.2012	37764.0556	21181.6111	23629.5555	16582.4444
## Food.2012	0.1944	0.1111	0.3360	0.0833
## CA_2011.2012_2	0.6389	0.5000	0.5345	0.1389
## PHM_Int_11.12	0.8611	0.9444	0.2449	-0.0833
## VSL.2011.12	0.4722	0.3889	0.5212	0.0833
## irrigated.2011.12	0.5000	0.4167	0.5270	0.0833

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.269	0.2486	0.4322
## Assets.2012	3996.000	7657.2500	22139.0000
## Food.2012	0.000	0.0000	0.0000
## CA_2011.2012_2	0.000	0.3750	1.0000
## PHM_Int_11.12	0.000	0.1250	1.0000
## VSL.2011.12	0.000	0.1250	1.0000
## irrigated.2011.12	0.000	0.0000	0.0000

Percent Balance Improvement:

##	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	98.7634	59.6729	59.9628	51.6581
## Assets.2012	-210.4073	36.1916	66.5981	95.9357
## Food.2012	56.1798	0.0000	100.0000	100.0000
## CA_2011.2012_2	74.4094	100.0000	32.5000	0.0000
## PHM_Int_11.12	84.9421	100.0000	77.5000	0.0000
## VSL.2011.12	77.8409	0.0000	67.8571	0.0000
## irrigated.2011.12	38.0952	0.0000	100.0000	100.0000

Sample sizes:

##	Control	Treated
## All	52	36
## Matched	8	36

```
## Unmatched      44      0
## Discarded      0      0
```

Disaster:

Assets.2017

```
## CA.PHM.VSL.IRRIG.16.17  26804.54584  11943.97064  2.244  0.03057 *
```

Food.2017

```
## CA.PHM.VSL.IRRIG.16.17  0.0670913016  0.0618484738  1.085  0.2847
```

Food.2016.9mnths

```
## CA.PHM.VSL.IRRIG.16.17  0.1326577277  0.0887458742  1.495  0.143014
```

Food.2017.9mnths

```
## CA.PHM.VSL.IRRIG.16.17  0.0681534101  0.0643809382  1.059  0.29630
```

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6178	0.1678	0.1851	0.4500
## CA_2011.2012_2	0.6852	0.1423	0.3500	0.5429
## PHM_Int_11.12	0.8981	0.4350	0.4968	0.4632
## Assets.2012	62769.4259	49637.1341	140449.5690	13132.2918
## Food.2012	0.3241	0.2846	0.4521	0.0395
## VSL.2011.12	0.3981	0.1098	0.3132	0.2884
## irrigated.2011.12	0.4722	0.2114	0.4091	0.2608

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.5732	0.4504	0.6898
## CA_2011.2012_2	1.0000	0.5463	1.0000
## PHM_Int_11.12	0.0000	0.4630	1.0000
## Assets.2012	21655.0000	36430.9815	822806.0000
## Food.2012	0.0000	0.0370	1.0000
## VSL.2011.12	0.0000	0.2870	1.0000
## irrigated.2011.12	0.0000	0.2593	1.0000

##

##

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6178	0.5421	0.2374	0.0757
## CA_2011.2012_2	0.6852	0.6852	0.4705	0.0000
## PHM_Int_11.12	0.8981	0.8426	0.3689	0.0556
## Assets.2012	62769.4259	16984.4537	26612.9753	45784.9722
## Food.2012	0.3241	0.6204	0.4916	-0.2963
## VSL.2011.12	0.3981	0.1759	0.3857	0.2222
## irrigated.2011.12	0.4722	0.1111	0.3184	0.3611

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.2678	0.2653	0.5098
## CA_2011.2012_2	0.0000	0.3333	1.0000

```

## PHM_Int_11.12      0.0000      0.2564      1.0000
## Assets.2012      19609.0000 36530.8462 401588.0000
## Food.2012        0.0000      0.0769      1.0000
## VSL.2011.12      0.0000      0.0769      1.0000
## irrigated.2011.12 0.0000      0.2564      1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean eQQ Max
## distance      83.1781  53.2781  41.0983 26.0870
## CA_2011.2012_2 100.0000 100.0000  38.9831  0.0000
## PHM_Int_11.12   88.0059   0.0000  44.6154  0.0000
## Assets.2012    -248.6442  9.4482  -0.2741 51.1929
## Food.2012     -649.7143  0.0000 -107.6923 0.0000
## VSL.2011.12    22.9444   0.0000  73.2010  0.0000
## irrigated.2011.12 -38.4416  0.0000   1.0989  0.0000
##
## Sample sizes:
##           Control Treated
## All           246     108
## Matched       39     108
## Unmatched     207      0
## Discarded      0      0

```

Crop.income.2012_2016

```

## CA.PHM.VSL.IRRIG.16.17 0.15911134 0.28516398 0.558 0.5921
##
## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance      0.7391      0.2763      0.2403 0.4628
## Assets.2012   53625.4444  47530.5882 79405.1690 6094.8562
## Food.2012     0.3889      0.0588      0.2425 0.3301
## CA_2011.2012_2 0.6111      0.1765      0.3930 0.4346
## PHM_Int_11.12 0.8889      0.3529      0.4926 0.5359
## VSL.2011.12   0.5000      0.1765      0.3930 0.3235
## irrigated.2011.12 0.3889      0.2941      0.4697 0.0948
##           eQQ Med  eQQ Mean  eQQ Max
## distance      0.5524  0.4480  0.6913
## Assets.2012   5904.0000 14117.0588 83624.0000
## Food.2012     0.0000  0.2941  1.0000
## CA_2011.2012_2 0.0000  0.4118  1.0000
## PHM_Int_11.12 1.0000  0.5294  1.0000
## VSL.2011.12   0.0000  0.2941  1.0000
## irrigated.2011.12 0.0000  0.0588  1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance      0.7391      0.6220      0.2011 0.1170
## Assets.2012   53625.4444  14070.1667 13637.4964 39555.2778
## Food.2012     0.3889      0.0000      0.0000 0.3889

```

```

## CA_2011.2012_2      0.6111      0.8333      0.4167      -0.2222
## PHM_Int_11.12      0.8889      0.8333      0.4167      0.0556
## VSL.2011.12        0.5000      0.1111      0.3514      0.3889
## irrigated.2011.12  0.3889      0.1111      0.3514      0.2778
##
##          eQQ Med   eQQ Mean   eQQ Max
## distance      0.2751   0.2069   0.3305
## Assets.2012   4858.0000 49741.0000 229097.0000
## Food.2012     0.0000   0.4000   1.0000
## CA_2011.2012_2 0.0000   0.2000   1.0000
## PHM_Int_11.12 0.0000   0.2000   1.0000
## VSL.2011.12   0.0000   0.0000   0.0000
## irrigated.2011.12 0.0000   0.2000   1.0000
##
## Percent Balance Improvement:
##          Mean Diff.   eQQ Med   eQQ Mean   eQQ Max
## distance           74.7127  50.2029  53.8141  52.1950
## Assets.2012       -548.9944  17.7168 -252.3468 -173.9608
## Food.2012         -17.8218   0.0000 -36.0000   0.0000
## CA_2011.2012_2    48.8722   0.0000  51.4286   0.0000
## PHM_Int_11.12     89.6341 100.0000  62.2222   0.0000
## VSL.2011.12      -20.2020   0.0000 100.0000 100.0000
## irrigated.2011.12 -193.1034   0.0000 -240.0000   0.0000
##
## Sample sizes:
##          Control Treated
## All             17      18
## Matched         5       18
## Unmatched       12       0
## Discarded       0       0

```

```

##
## irrigated.income.2016.17
## CA.PHM.VSL.IRRIG.16.17 0.00680827537 0.01044362598 0.652 0.521
##
## Summary of balance for all data:
##          Means Treated Means Control SD Control Mean Diff
## distance      0.8778      0.2993   0.2850   0.5786
## Assets.2012   64102.5306   33173.5000 51982.2265 30929.0306
## Food.2012     0.2449      0.3500   0.4894  -0.1051
## CA_2011.2012_2 0.6735      0.2000   0.4104   0.4735
## PHM_Int_11.12 0.9184      0.3500   0.4894   0.5684
## VSL.2011.12   0.3673      0.1500   0.3663   0.2173
## irrigated.2011.12 0.3265      0.5500   0.5104  -0.2235
##
##          eQQ Med   eQQ Mean   eQQ Max
## distance      0.6672   0.5613   0.7808
## Assets.2012   26472.5000 29314.6000 64469.0000
## Food.2012     0.0000   0.1000   1.0000
## CA_2011.2012_2 0.0000   0.4500   1.0000
## PHM_Int_11.12 1.0000   0.5500   1.0000
## VSL.2011.12   0.0000   0.2000   1.0000

```

```

## irrigated.2011.12      0.0000      0.2500      1.0000

## Summary of balance for matched data:
##                      Means Treated Means Control SD Control Mean Diff
## distance              0.8778          0.8824      0.2087    -0.0045
## Assets.2012          64102.5306      9871.0612 30214.7857 54231.4694
## Food.2012            0.2449          0.0204      0.1527     0.2245
## CA_2011.2012_2       0.6735          0.6939      0.4978    -0.0204
## PHM_Int_11.12        0.9184          0.8980      0.3270     0.0204
## VSL.2011.12          0.3673          0.0612      0.2590     0.3061
## irrigated.2011.12    0.3265          0.0612      0.2590     0.2653
##                      eQQ Med      eQQ Mean      eQQ Max
## distance              0.1435          0.2606      0.5954
## Assets.2012          33651.0000 37954.8571 100098.0000
## Food.2012            0.0000          0.1429      1.0000
## CA_2011.2012_2       0.0000          0.4286      1.0000
## PHM_Int_11.12        0.0000          0.4286      1.0000
## VSL.2011.12          0.0000          0.1429      1.0000
## irrigated.2011.12    0.0000          0.0000      0.0000
##
## Percent Balance Improvement:
##                      Mean Diff.      eQQ Med      eQQ Mean      eQQ Max
## distance              99.2149      78.4950      53.5771      23.7451
## Assets.2012          -75.3416     -27.1168     -29.4742     -55.2653
## Food.2012            -113.5922      0.0000     -42.8571      0.0000
## CA_2011.2012_2       95.6897      0.0000       4.7619      0.0000
## PHM_Int_11.12        96.4093     100.0000      22.0779      0.0000
## VSL.2011.12          -40.8451      0.0000      28.5714      0.0000
## irrigated.2011.12    -18.7215      0.0000     100.0000     100.0000
##
## Sample sizes:
##                      Control Treated
## All                   20      49
## Matched                7      49
## Unmatched             13       0
## Discarded              0       0

```

irrigated.sell.2016.17

```
## CA.PHM.VSL.IRRIG.16.17 -0.20702168755 0.08827169939 -2.345 0.0254 *
```

```

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7730           0.2724           0.2433           0.5006
## Assets.2012       62769.4259       59140.6111 138098.6374 3628.8148
## Food.2012         0.3241           0.3778           0.4875          -0.0537
## CA_2011.2012_2    0.6852           0.1333           0.3418           0.5519
## PHM_Int_11.12     0.8981           0.4222           0.4967           0.4759
## VSL.2011.12       0.3981           0.1667           0.3748           0.2315
## irrigated.2011.12 0.4722           0.5778           0.4967          -0.1056
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.535      0.4978      0.723
## Assets.2012       15693.000 29820.0111 398443.000
## Food.2012         0.000      0.0556      1.000
## CA_2011.2012_2    1.000      0.5444      1.000
## PHM_Int_11.12     0.000      0.4667      1.000
## VSL.2011.12       0.000      0.2222      1.000
## irrigated.2011.12 0.000      0.1111      1.000
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7730           0.7711           0.2570           0.0018
## Assets.2012       62769.4259       26411.5278 90423.7638 36357.8981
## Food.2012         0.3241           0.0741           0.2678           0.2500
## CA_2011.2012_2    0.6852           0.4907           0.5111           0.1944
## PHM_Int_11.12     0.8981           0.8611           0.3536           0.0370
## VSL.2011.12       0.3981           0.3519           0.4883           0.0463
## irrigated.2011.12 0.4722           0.0833           0.2826           0.3889
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.3121      0.2532      0.3828
## Assets.2012       18333.0000 27366.7826 92701.0000
## Food.2012         0.0000      0.0870      1.0000
## CA_2011.2012_2    0.0000      0.4783      1.0000
## PHM_Int_11.12     0.0000      0.2174      1.0000
## VSL.2011.12       0.0000      0.0870      1.0000
## irrigated.2011.12 0.0000      0.2174      1.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           99.6320 41.6631 49.1246 47.0504
## Assets.2012       -901.9221 -16.8228 8.2268 76.7342
## Food.2012         -365.5172 0.0000 -56.5217 0.0000
## CA_2011.2012_2    64.7651 100.0000 12.1562 0.0000
## PHM_Int_11.12     92.2179 0.0000 53.4161 0.0000
## VSL.2011.12       80.0000 0.0000 60.8696 0.0000
## irrigated.2011.12 -268.4211 0.0000 -95.6522 0.0000
##
## Sample sizes:
##           Control Treated
## All           90      108
## Matched       23      108
## Unmatched     67       0
## Discarded     0       0

```

Core package plus received goats or pigs

Assets.2017

CA.PHM.VSL.LIVE.16.17.NEW 50459.58300 12082.34468 4.176 0.000138 ***
Food.2017

CA.PHM.VSL.LIVE.16.17.NEW 0.1463520990 0.0764134104 1.915 0.062 .
Food.2017.9mnths

CA.PHM.VSL.LIVE.16.17.NEW 0.1856906641 0.0745322192 2.491 0.01657

Food.2016.9mnths

CA.PHM.VSL.LIVE.16.17.NEW -0.0084367171 0.0837551976 -0.101 0.920
2

Summary of balance for all data:

	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.3906	0.0567	0.1100	0.3338
## Assets.2012	77478.6238	43453.3853	131858.1773	34025.2385
## Food.2012	0.4158	0.3281	0.4697	0.0877
## CA_2011.2012_2	0.6733	0.1023	0.3032	0.5710
## PHM_Int_11.12	0.9604	0.4700	0.4993	0.4903
## VSL.2011.12	0.3861	0.1014	0.3020	0.2848
## livestock.small.2012	3.8515	1.0590	2.8920	2.7925

	eQQ Med	eQQ Mean	eQQ Max
## distance	0.3277	0.3297	0.6544
## Assets.2012	31672.0000	55143.6931	1497084.0000
## Food.2012	0.0000	0.0891	1.0000
## CA_2011.2012_2	1.0000	0.5644	1.0000
## PHM_Int_11.12	0.0000	0.4950	1.0000
## VSL.2011.12	0.0000	0.2772	1.0000
## livestock.small.2012	1.0000	2.7426	11.0000

Summary of balance for matched data:

	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.3906	0.3917	0.2690	-0.0011
## Assets.2012	77478.6238	74700.8713	161082.6436	2777.7525
## Food.2012	0.4158	0.4455	0.5012	-0.0297
## CA_2011.2012_2	0.6733	0.6832	0.4691	-0.0099
## PHM_Int_11.12	0.9604	0.9406	0.2383	0.0198
## VSL.2011.12	0.3861	0.4257	0.4986	-0.0396
## livestock.small.2012	3.8515	3.6238	5.4582	0.2277

	eQQ Med	eQQ Mean	eQQ Max
## distance	0.0847	0.0954	0.2536
## Assets.2012	14274.0000	37113.9016	733072.0000
## Food.2012	0.0000	0.0820	1.0000
## CA_2011.2012_2	0.0000	0.1311	1.0000
## PHM_Int_11.12	0.0000	0.0492	1.0000
## VSL.2011.12	0.0000	0.0328	1.0000
## livestock.small.2012	0.0000	0.8361	4.0000

Percent Balance Improvement:

	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	99.6600	74.1396	71.0698	61.2437
## Assets.2012	91.8362	54.9318	32.6960	51.0333

```

## Food.2012          66.1431  0.0000  8.0146  0.0000
## CA_2011.2012_2    98.2659 100.0000 76.7616  0.0000
## PHM_Int_11.12     95.9617  0.0000  90.0656  0.0000
## VSL.2011.12       86.0920  0.0000  88.1733  0.0000
## livestock.small.2012 91.8452 100.0000 69.5153 63.6364
##
## Sample sizes:
##           Control Treated
## All           1085     101
## Matched         61     101
## Unmatched      1024      0
## Discarded        0      0

```

livestock.income.2012_2017

```
## CA.PHM.VSL.LIVE.16.17.NEW 0.7064985926 0.5499034651 1.285 0.234822
```

Summary of balance for all data:

```

##           Means Treated Means Control  SD Control Mean Diff
## distance           0.5462           0.1547           0.1903           0.3916
## Assets.2012       100465.0000       98410.6818 123066.6006 2054.3182
## Food.2012          0.4667           0.4545           0.5037           0.0121
## CA_2011.2012_2    0.7333           0.1818           0.3902           0.5515
## PHM_Int_11.12     0.9333           0.6364           0.4866           0.2970
## VSL.2011.12       0.4667           0.0909           0.2908           0.3758
## livestock.small.2012 5.8667           3.1364           4.6535           2.7303
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.3519           0.3807           0.709
## Assets.2012       20279.0000 36439.2000 289937.000
## Food.2012          0.0000           0.0000           0.000
## CA_2011.2012_2    1.0000           0.5333           1.000
## PHM_Int_11.12     0.0000           0.3333           1.000
## VSL.2011.12       0.0000           0.4000           1.000
## livestock.small.2012 3.0000           2.6667           10.000

```

Summary of balance for matched data:

```

##           Means Treated Means Control  SD Control Mean Diff
## distance           0.5462           0.5386           0.2903           0.0077
## Assets.2012       100465.0000       67685.5333 146297.1636 32779.4667
## Food.2012          0.4667           0.3333           0.4969           0.1333
## CA_2011.2012_2    0.7333           0.8000           0.4216          -0.0667
## PHM_Int_11.12     0.9333           1.0000           0.0000          -0.0667
## VSL.2011.12       0.4667           0.4000           0.5164           0.0667
## livestock.small.2012 5.8667           2.6000           3.9215           3.2667
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.078           0.1243           0.3654
## Assets.2012       34613.500 66440.7000 289937.0000
## Food.2012          0.000           0.0000           0.0000
## CA_2011.2012_2    0.000           0.0000           0.0000
## PHM_Int_11.12     0.000           0.1000           1.0000
## VSL.2011.12       0.000           0.2000           1.0000

```

```

## livestock.small.2012      0.000      2.2000      10.0000
##
## Percent Balance Improvement:
##           Mean Diff.   eQQ Med   eQQ Mean   eQQ Max
## distance           98.0374   77.8276   67.3582   48.4675
## Assets.2012       -1495.6373  -70.6864  -82.3330   0.0000
## Food.2012         -1000.0000   0.0000   0.0000   0.0000
## CA_2011.2012_2     87.9121  100.0000  100.0000  100.0000
## PHM_Int_11.12     77.5510   0.0000   70.0000   0.0000
## VSL.2011.12       82.2581   0.0000   50.0000   0.0000
## livestock.small.2012 -19.6448  100.0000  17.5000   0.0000
##
## Sample sizes:
##           Control Treated
## All           44      15
## Matched       10      15
## Unmatched     34       0
## Discarded     0       0

```

livestock.income.2012_2017

```
## CA.PHM.VSL.LIVE.16.17.NEW 0.7064985926 0.5499034651 1.285 0.234822
```

Summary of balance for all data:

```

##           Means Treated Means Control   SD Control Mean Diff
## distance           0.5462           0.1547           0.1903   0.3916
## Assets.2012       100465.0000       98410.6818  123066.6006  2054.3182
## Food.2012         0.4667           0.4545           0.5037   0.0121
## CA_2011.2012_2     0.7333           0.1818           0.3902   0.5515
## PHM_Int_11.12     0.9333           0.6364           0.4866   0.2970
## VSL.2011.12       0.4667           0.0909           0.2908   0.3758
## livestock.small.2012 5.8667           3.1364           4.6535   2.7303
##           eQQ Med   eQQ Mean   eQQ Max
## distance           0.3519   0.3807   0.709
## Assets.2012       20279.0000  36439.2000  289937.000
## Food.2012         0.0000   0.0000   0.000
## CA_2011.2012_2     1.0000   0.5333   1.000
## PHM_Int_11.12     0.0000   0.3333   1.000
## VSL.2011.12       0.0000   0.4000   1.000
## livestock.small.2012 3.0000   2.6667   10.000
##

```

Summary of balance for matched data:

```

##           Means Treated Means Control   SD Control Mean Diff
## distance           0.5462           0.5386           0.2903   0.0077
## Assets.2012       100465.0000       67685.5333  146297.1636  32779.4667
## Food.2012         0.4667           0.3333           0.4969   0.1333
## CA_2011.2012_2     0.7333           0.8000           0.4216  -0.0667
## PHM_Int_11.12     0.9333           1.0000           0.0000  -0.0667
## VSL.2011.12       0.4667           0.4000           0.5164   0.0667
## livestock.small.2012 5.8667           2.6000           3.9215   3.2667

```

```

##                eQQ Med    eQQ Mean    eQQ Max
## distance                0.078      0.1243      0.3654
## Assets.2012          34613.500 66440.7000 289937.0000
## Food.2012                0.000      0.0000      0.0000
## CA_2011.2012_2        0.000      0.0000      0.0000
## PHM_Int_11.12         0.000      0.1000      1.0000
## VSL.2011.12           0.000      0.2000      1.0000
## livestock.small.2012  0.000      2.2000     10.0000
##
## Percent Balance Improvement:
##                Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance                98.0374  77.8276  67.3582  48.4675
## Assets.2012           -1495.6373 -70.6864 -82.3330  0.0000
## Food.2012           -1000.0000  0.0000  0.0000  0.0000
## CA_2011.2012_2        87.9121 100.0000 100.0000 100.0000
## PHM_Int_11.12         77.5510  0.0000  70.0000  0.0000
## VSL.2011.12           82.2581  0.0000  50.0000  0.0000
## livestock.small.2012 -19.6448 100.0000 17.5000  0.0000
##
## Sample sizes:
##                Control Treated
## All                44      15
## Matched            10      15
## Unmatched          34       0
## Discarded           0       0

```

FHHs:

```

Assets.2017
## CA.PHM.VSL.LIVE.16.17.NEW 13064.6550 11870.1546 1.101 0.299622
Food.2017
## CA.PHM.VSL.LIVE.16.17.NEW 0.570389058 0.181707491 3.139 0.0119 *
# Summary of balance for all data:
##                Means Treated Means Control SD Control Mean Diff
## distance                0.5912      0.0250  0.0842  0.5661
## CA_2011.2012_2          0.8667      0.0531  0.2246  0.8136
## PHM_Int_11.12           0.9333      0.4000  0.4909  0.5333
## Assets.2012            54574.4667  22809.8776 50609.7868 31764.5891
## Food.2012                0.4000      0.2857  0.4527  0.1143
## VSL.2011.12             0.4000      0.0776  0.2680  0.3224
## livestock.small.2012    3.0667      0.6163  1.8106  2.4503
##                eQQ Med    eQQ Mean    eQQ Max
## distance                0.4951      0.5480      0.9404
## CA_2011.2012_2          1.0000      0.8000      1.0000
## PHM_Int_11.12           1.0000      0.5333      1.0000
## Assets.2012            37636.0000 70087.4000 548378.0000
## Food.2012                0.0000      0.1333      1.0000

```

```

## VSL.2011.12          0.0000      0.2667      1.0000
## livestock.small.2012 0.0000      2.0000      9.0000

##
## Summary of balance for matched data:
##                Means Treated Means Control SD Control Mean Diff
## distance          0.5912          0.4335      0.1800      0.1577
## CA_2011.2012_2    0.8667          0.8667      0.3672      0.0000
## PHM_Int_11.12     0.9333          0.9333      0.2694      0.0000
## Assets.2012       54574.4667      22963.4000 12303.9807 31611.0667
## Food.2012         0.4000          0.1333      0.3672      0.2667
## VSL.2011.12       0.4000          0.0667      0.2694      0.3333
## livestock.small.2012 3.0667          1.2000      1.0583      1.8667
##                eQQ Med      eQQ Mean      eQQ Max
## distance          0.1899          0.2251          0.462
## CA_2011.2012_2    0.0000          0.1429          1.000
## PHM_Int_11.12     0.0000          0.0000          0.000
## Assets.2012       28492.0000 35294.8571 77114.000
## Food.2012         0.0000          0.2857          1.000
## VSL.2011.12       0.0000          0.2857          1.000
## livestock.small.2012 0.0000          2.5714          12.000
##
## Percent Balance Improvement:
##                Mean Diff.      eQQ Med      eQQ Mean      eQQ Max
## distance          72.1461      61.6423      58.9242      50.8793
## CA_2011.2012_2    100.0000 100.0000      82.1429      0.0000
## PHM_Int_11.12     100.0000 100.0000 100.0000 100.0000
## Assets.2012         0.4833      24.2959      49.6417      85.9378
## Food.2012        -133.3333      0.0000     -114.2857      0.0000
## VSL.2011.12       -3.3755      0.0000      -7.1429      0.0000
## livestock.small.2012 23.8201      0.0000     -28.5714     -33.3333
##
## Sample sizes:
##                Control Treated
## All              245      15
## Matched          7        15
## Unmatched        238      0
## Discarded        0        0

```

```

## Summary of balance for all data:
##                Means Treated Means Control SD Control Mean Diff
## distance          1          0.0000      0.0000      NA
## CA_2011.2012_2    0          0.0976      0.2985      NA
## PHM_Int_11.12     1          0.3902      0.4908      NA

```

```

## Assets.2012          30990    16441.3902 28592.7647    NA
## Food.2012            1         0.2805    0.4520    NA
## VSL.2011.12         0         0.1220    0.3292    NA
## livestock.small.2012 0         0.5610    1.7004    NA
##                      eQQ Med eQQ Mean eQQ Max
## distance             NA      NA      NA
## CA_2011.2012_2      NA      NA      NA
## PHM_Int_11.12      NA      NA      NA
## Assets.2012         NA      NA      NA
## Food.2012           NA      NA      NA
## VSL.2011.12        NA      NA      NA
## livestock.small.2012 NA      NA      NA
##
##
## Summary of balance for matched data:
##                      Means Treated Means Control SD Control Mean Diff
## distance              1              0      NaN      NA
## CA_2011.2012_2        0              0      NaN      NA
## PHM_Int_11.12         1              1      NaN      NA
## Assets.2012           30990           2865      NaN      NA
## Food.2012              1              1      NaN      NA
## VSL.2011.12           0              0      NaN      NA
## livestock.small.2012  0              0      NaN      NA
##                      eQQ Med eQQ Mean eQQ Max
## distance             NA      NA      NA
## CA_2011.2012_2      NA      NA      NA
## PHM_Int_11.12      NA      NA      NA
## Assets.2012         NA      NA      NA
## Food.2012           NA      NA      NA
## VSL.2011.12        NA      NA      NA
## livestock.small.2012 NA      NA      NA
##
## Percent Balance Improvement:
##                      Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance              0.0000      NA      NA      NA
## CA_2011.2012_2       100.0000      NA      NA      NA
## PHM_Int_11.12        100.0000      NA      NA      NA
## Assets.2012          -93.3174      NA      NA      NA
## Food.2012            100.0000      NA      NA      NA
## VSL.2011.12          100.0000      NA      NA      NA
## livestock.small.2012 100.0000      NA      NA      NA
##
## Sample sizes:
##                      Control Treated
## All                    82          1
## Matched                 1          1
## Unmatched               81          0
## Discarded                0          0

```

Households exposed to disaster:

[Assets.2017](#)

```
## CA.PHM.VSL.LIVE.16.17.NEW 54621.3529 17793.2221 3.070 0.004617 **
```

```
Food.2017
```

```
## CA.PHM.VSL.LIVE.16.17.NEW 0.1996763266 0.0767291895 2.602 0.0144 *
```

```
Food.2017.9mnths
```

```
## CA.PHM.VSL.LIVE.16.17.NEW 0.207557083 0.081289137 2.553 0.0162 *
```

```
Food.2016.9mnths
```

```
## CA.PHM.VSL.LIVE.16.17.NEW 0.349844482 0.088160449 3.968 0.000436 **
*
```

```
# Summary of balance for all data:
```

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.5316	0.1171	0.1735	0.4146
## CA_2011.2012_2	0.6774	0.1492	0.3570	0.5282
## PHM_Int_11.12	0.9516	0.4395	0.4973	0.5121
## Assets.2012	65817.3065	49467.7621	139907.4416	16349.5444
## Food.2012	0.3710	0.2823	0.4510	0.0887
## VSL.2011.12	0.2742	0.1089	0.3121	0.1653
## livestock.small.2012	2.6774	1.3024	3.2145	1.3750

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.5093	0.4122	0.6197
## CA_2011.2012_2	1.0000	0.5323	1.0000
## PHM_Int_11.12	1.0000	0.5161	1.0000
## Assets.2012	27314.5000	53630.0806	1173701.0000
## Food.2012	0.0000	0.0806	1.0000
## VSL.2011.12	0.0000	0.1613	1.0000
## livestock.small.2012	0.0000	1.3387	6.0000

```
##
##
```

```
## Summary of balance for matched data:
```

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.5316	0.5189	0.2508	0.0127
## CA_2011.2012_2	0.6774	0.6613	0.4820	0.0161
## PHM_Int_11.12	0.9516	0.9516	0.2185	0.0000
## Assets.2012	65817.3065	49924.4516	64091.3916	15892.8548
## Food.2012	0.3710	0.4839	0.5089	-0.1129
## VSL.2011.12	0.2742	0.1452	0.3587	0.1290
## livestock.small.2012	2.6774	3.1774	3.9926	-0.5000

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.1497	0.1512	0.3619
## CA_2011.2012_2	0.0000	0.2857	1.0000
## PHM_Int_11.12	0.0000	0.0357	1.0000
## Assets.2012	18163.5000	30210.8214	223481.0000
## Food.2012	0.0000	0.0357	1.0000
## VSL.2011.12	0.0000	0.0357	1.0000
## livestock.small.2012	0.0000	0.7500	8.0000

```
##
```

```
## Percent Balance Improvement:
```

```

##                               Mean Diff.  eQQ Med eQQ Mean  eQQ Max
## distance                      96.9258  70.6114  63.3252  41.5982
## CA_2011.2012_2                 96.9466 100.0000  46.3203   0.0000
## PHM_Int_11.12                  100.0000 100.0000  93.0804   0.0000
## Assets.2012                     2.7933  33.5024  43.6681  80.9593
## Food.2012                       -27.2727  0.0000  55.7143   0.0000
## VSL.2011.12                     21.9512  0.0000  77.8571   0.0000
## livestock.small.2012            63.6364  0.0000  43.9759 -33.3333
##
## Sample sizes:
##           Control Treated
## All           248     62
## Matched       28     62
## Unmatched     220     0
## Discarded      0     0

```

Core package plus DRR/EWS

Assets.2017

```
## CA.PHM.VSL.DIST.16.17  33651.91569  11921.45829  2.823 0.00677 **
```

Food.2017

```
## CA.PHM.VSL.DIST.16.17  0.0621389492  0.0572572911  1.085 0.2829
```

Food.2017.9mnths

```
## CA.PHM.VSL.DIST.16.17  0.0505715345  0.0608049284  0.832 0.409455
```

Food.2016.9mnths

```
## CA.PHM.VSL.DIST.16.17  0.0759259055  0.0803946258  0.944 0.349410
```

Summary of balance for all data:

```

##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5397           0.0745           0.1278           0.4652
## Assets.2012       79446.3218       43350.5981 132204.4475 36095.7237
## Food.2012           0.3851           0.3265           0.4692           0.0585
## CA_2011.2012_2     0.6839           0.0967           0.2957           0.5872
## PHM_Int_11.12     0.9080           0.4660           0.4991           0.4420
## VSL.2011.12        0.4425           0.1005           0.3008           0.3421
## Forecast.2011.12  0.8103           0.4000           0.4901           0.4103
## VCPC.2011          0.7414           0.2660           0.4421           0.4753
##
##           eQQ Med  eQQ Mean  eQQ Max
## distance           0.5064           0.4641           0.8261
## Assets.2012       31885.5000 45812.0000 1308507.0000
## Food.2012           0.0000           0.0575           1.0000
## CA_2011.2012_2     1.0000           0.5862           1.0000
## PHM_Int_11.12     0.0000           0.4425           1.0000
## VSL.2011.12        0.0000           0.3391           1.0000

```

```

## Forecast.2011.12      0.0000      0.4080      1.0000
## VCPC.2011            0.0000      0.4770      1.0000
##
##
## Summary of balance for matched data:
##                Means Treated Means Control  SD Control  Mean Diff
## distance                0.5397            0.5115      0.2893      0.0282
## Assets.2012            79446.3218        86582.7184 170467.6976 -7136.3966
## Food.2012                0.3851            0.5690      0.4983     -0.1839
## CA_2011.2012_2         0.6839            0.6897      0.4655     -0.0057
## PHM_Int_11.12          0.9080            0.9138      0.2824     -0.0057
## VSL.2011.12            0.4425            0.4310      0.4983      0.0115
## Forecast.2011.12       0.8103            0.5402      0.5014      0.2701
## VCPC.2011              0.7414            0.7241      0.4497      0.0172
##                eQQ Med    eQQ Mean    eQQ Max
## distance                0.2519      0.2415      0.4684
## Assets.2012            14489.0000 27086.1585 544495.0000
## Food.2012                0.0000      0.0610      1.0000
## CA_2011.2012_2         0.0000      0.2561      1.0000
## PHM_Int_11.12          0.0000      0.0732      1.0000
## VSL.2011.12            0.0000      0.2073      1.0000
## Forecast.2011.12       0.0000      0.1585      1.0000
## VCPC.2011              0.0000      0.2317      1.0000
##
## Percent Balance Improvement:
##                Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance                93.9314  50.2547  47.9568  43.2991
## Assets.2012             80.2292  54.5593  40.8754  58.3881
## Food.2012              -214.1266  0.0000  -6.0976  0.0000
## CA_2011.2012_2         99.0212 100.0000  56.3128  0.0000
## PHM_Int_11.12          98.6997  0.0000  83.4653  0.0000
## VSL.2011.12            96.6397  0.0000  38.8590  0.0000
## Forecast.2011.12       34.1737  0.0000  61.1474  0.0000
## VCPC.2011              96.3728  0.0000  51.4252  0.0000
##
## Sample sizes:
##                Control Treated
## All                1075      174
## Matched              82       174
## Unmatched           993         0
## Discarded           0         0

```

Crop.prodn.2012_2016

```
## CA.PHM.VSL.DIST.16.17 0.7994208430 0.2237650042 3.573 0.000805 ***
```

```

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5272           0.0716           0.1284           0.4556
## Assets.2012       86481.0423       40550.0458 131171.8374 45930.9964
## Food.2012         0.4014           0.3209           0.4671           0.0805
## CA_2011.2012_2    0.6972           0.1013           0.3019           0.5959
## PHM_Int_11.12     0.9225           0.4670           0.4992           0.4556
## VSL.2011.12       0.4155           0.1002           0.3004           0.3153
## Forecast.2011.12  0.8169           0.4062           0.4914           0.4107
## VCPC.2011         0.7254           0.2697           0.4441           0.4556
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.4847    0.4538    0.7991
## Assets.2012       40061.0000 57392.5915 1308507.0000
## Food.2012         0.0000    0.0775    1.0000
## CA_2011.2012_2    1.0000    0.5915    1.0000
## PHM_Int_11.12     0.0000    0.4577    1.0000
## VSL.2011.12       0.0000    0.3169    1.0000
## Forecast.2011.12  0.0000    0.4085    1.0000
## VCPC.2011         0.0000    0.4577    1.0000
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5272           0.5118           0.2955           0.0154
## Assets.2012       86481.0423       428892.2254 603375.2039 -342411.1831
## Food.2012         0.4014           0.3028           0.4629           0.0986
## CA_2011.2012_2    0.6972           0.7394           0.4422           -0.0423
## PHM_Int_11.12     0.9225           0.9014           0.3003           0.0211
## VSL.2011.12       0.4155           0.1127           0.3185           0.3028
## Forecast.2011.12  0.8169           0.8380           0.3712           -0.0211
## VCPC.2011         0.7254           0.7042           0.4598           0.0211
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.2146    0.2130    0.4323
## Assets.2012       12242.0000 30730.2647 544495.0000
## Food.2012         0.0000    0.0441    1.0000
## CA_2011.2012_2    0.0000    0.1912    1.0000
## PHM_Int_11.12     0.0000    0.1029    1.0000
## VSL.2011.12       0.0000    0.2353    1.0000
## Forecast.2011.12  0.0000    0.0882    1.0000
## VCPC.2011         0.0000    0.1765    1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           96.6239  55.7200  53.0671  45.9047
## Assets.2012       -645.4904  69.4416  46.4560  58.3881
## Food.2012         -22.4543   0.0000  43.0481  0.0000
## CA_2011.2012_2    92.9093 100.0000  67.6821  0.0000
## PHM_Int_11.12     95.3627   0.0000  77.5113  0.0000
## VSL.2011.12       3.9529   0.0000  25.7516  0.0000
## Forecast.2011.12  94.8561   0.0000  78.3976  0.0000
## VCPC.2011         95.3632   0.0000  61.4480  0.0000
##

```

```
## Sample sizes:
##           Control Treated
## All           938    142
## Matched       68    142
## Unmatched     870     0
## Discarded      0     0
```

```
number.harvest.2016.2017
```

```
## CA.PHM.VSL.DIST.16.17 -0.2511509879  0.1007010587  -2.494  0.0169 *
```

```
## Summary of balance for all data:
```

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.5972	0.1579	0.1687	0.4393
## Assets.2012	66791.1780	56582.3821	127277.5613	10208.7959
## Food.2012	0.3475	0.4053	0.4918	-0.0579
## CA_2011.2012_2	0.6525	0.0997	0.3001	0.5529
## PHM_Int_11.12	0.8898	0.4950	0.5008	0.3948
## VSL.2011.12	0.3814	0.1429	0.3505	0.2385
## Forecast.2011.12	0.7797	0.4917	0.5008	0.2880
## VCPC.2011	0.6949	0.3355	0.4730	0.3594

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.5537	0.4392	0.6869
## Assets.2012	19736.0000	32241.9576	631191.0000
## Food.2012	0.0000	0.0593	1.0000
## CA_2011.2012_2	1.0000	0.5508	1.0000
## PHM_Int_11.12	0.0000	0.3983	1.0000
## VSL.2011.12	0.0000	0.2373	1.0000
## Forecast.2011.12	0.0000	0.2881	1.0000
## VCPC.2011	0.0000	0.3559	1.0000

```
## Summary of balance for matched data:
```

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.5972	0.5730	0.2917	0.0243
## Assets.2012	66791.1780	28146.2373	48188.6281	38644.9407
## Food.2012	0.3475	0.3305	0.4753	0.0169
## CA_2011.2012_2	0.6525	0.6610	0.4783	-0.0085
## PHM_Int_11.12	0.8898	0.8814	0.3267	0.0085
## VSL.2011.12	0.3814	0.1356	0.3459	0.2458
## Forecast.2011.12	0.7797	0.7797	0.4188	0.0000
## VCPC.2011	0.6949	0.6949	0.4652	0.0000

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.2218	0.2720	0.5243
## Assets.2012	16175.0000	31511.4082	339558.0000
## Food.2012	0.0000	0.1020	1.0000
## CA_2011.2012_2	0.0000	0.3673	1.0000
## PHM_Int_11.12	0.0000	0.1429	1.0000
## VSL.2011.12	0.0000	0.1224	1.0000

```

## Forecast.2011.12      0.0000      0.2041      1.0000
## VCPC.2011            0.0000      0.2245      1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          94.4717  59.9412  38.0806  23.6729
## Assets.2012       -278.5455  18.0432   2.2658  46.2036
## Food.2012         70.7056   0.0000 -72.0117  0.0000
## CA_2011.2012_2    98.4672 100.0000  33.3124  0.0000
## PHM_Int_11.12     97.8535   0.0000  64.1337  0.0000
## VSL.2011.12       -3.0457   0.0000  48.3965  0.0000
## Forecast.2011.12  100.0000   0.0000  29.1717  0.0000
## VCPC.2011         100.0000   0.0000  36.9291  0.0000
##
## Sample sizes:
##           Control  Treated
## All             301     118
## Matched         49     118
## Unmatched       252      0
## Discarded        0      0

```

changed.livelihood.climate.808

```
## CA.PHM.VSL.DIST.16.17  0.1211152295  0.0719337968  1.684      0.0984
```

Summary of balance for all data:

```

##           Means Treated  Means Control  SD Control  Mean Diff
## distance          0.5542      0.1069      0.1489      0.4473
## Assets.2012      80112.6163  45398.5049 112604.3945 34714.1114
## Food.2012         0.3779      0.3487      0.4769      0.0292
## CA_2011.2012_2   0.6860      0.1213      0.3267      0.5647
## PHM_Int_11.12    0.9128      0.4798      0.4999      0.4330
## VSL.2011.12      0.4419      0.1116      0.3151      0.3303
## Forecast.2011.12  0.8198      0.5997      0.4903      0.2200
## VCPC.2011        0.7384      0.3417      0.4746      0.3967
##           eQQ Med    eQQ Mean    eQQ Max
## distance          0.5376      0.4462      0.7533
## Assets.2012      30922.0000 39011.9884 544495.0000
## Food.2012         0.0000      0.0291      1.0000
## CA_2011.2012_2   1.0000      0.5640      1.0000
## PHM_Int_11.12    0.0000      0.4360      1.0000
## VSL.2011.12      0.0000      0.3314      1.0000
## Forecast.2011.12  0.0000      0.2209      1.0000
## VCPC.2011        0.0000      0.3953      1.0000

```

Summary of balance for matched data:

```
##           Means Treated  Means Control  SD Control  Mean Diff
```

```

## distance          0.5542          0.5462          0.3020          0.0080
## Assets.2012      80112.6163      73504.5349 146748.9399 6608.0814
## Food.2012        0.3779          0.5698          0.4983         -0.1919
## CA_2011.2012_2   0.6860          0.6802          0.4694          0.0058
## PHM_Int_11.12    0.9128          0.9070          0.2923          0.0058
## VSL.2011.12      0.4419          0.4360          0.4991          0.0058
## Forecast.2011.12 0.8198          0.5523          0.5005          0.2674
## VCPC.2011        0.7384          0.7616          0.4288         -0.0233
##
##                eQQ Med    eQQ Mean    eQQ Max
## distance          0.2685      0.2458      0.4697
## Assets.2012      21828.0000 43842.8077 611625.0000
## Food.2012        0.0000      0.0385      1.0000
## CA_2011.2012_2   0.0000      0.3077      1.0000
## PHM_Int_11.12    0.0000      0.1026      1.0000
## VSL.2011.12      0.0000      0.1923      1.0000
## Forecast.2011.12 0.0000      0.1026      1.0000
## VCPC.2011        0.0000      0.1923      1.0000
##
## Percent Balance Improvement:
##                Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          98.2034  50.0622  44.9167  37.6473
## Assets.2012       80.9643  29.4095 -12.3829 -12.3289
## Food.2012        -556.3384  0.0000 -32.3077  0.0000
## CA_2011.2012_2   98.9704 100.0000  45.4401  0.0000
## PHM_Int_11.12    98.6573  0.0000  76.4786  0.0000
## VSL.2011.12      98.2397  0.0000  41.9703  0.0000
## Forecast.2011.12 -21.5389  0.0000  53.5762  0.0000
## VCPC.2011        94.1372  0.0000  51.3575  0.0000
##
## Sample sizes:
##                Control Treated
## All              717      172
## Matched          78       172
## Unmatched        639       0
## Discarded        0        0

```

dependence.livelihood.climate.809

```

## CA.PHM.VSL.DIST.16.17 0.0940299730 0.2101235801 0.447 0.6569
##
## Summary of balance for all data:
##                Means Treated Means Control  SD Control  Mean Diff
## distance          0.5642          0.1654          0.1733          0.3988
## Assets.2012      80013.6585      58630.1481 143720.9951 21383.5104
## Food.2012        0.3333          0.3827          0.4868         -0.0494
## CA_2011.2012_2   0.6585          0.1451          0.3527          0.5135
## PHM_Int_11.12    0.9106          0.5340          0.4996          0.3766
## VSL.2011.12      0.4715          0.1235          0.3295          0.3481
## Forecast.2011.12 0.7886          0.6728          0.4699          0.1158
## VCPC.2011        0.7398          0.4043          0.4915          0.3355
##
##                eQQ Med    eQQ Mean    eQQ Max

```

```

## distance          0.4432      0.3982      0.6623
## Assets.2012      27255.0000 32710.1789 544495.0000
## Food.2012        0.0000      0.0488      1.0000
## CA_2011.2012_2   1.0000      0.5122      1.0000
## PHM_Int_11.12    0.0000      0.3821      1.0000
## VSL.2011.12      0.0000      0.3496      1.0000
## Forecast.2011.12 0.0000      0.1220      1.0000
## VCPC.2011        0.0000      0.3333      1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance          0.5642      0.5565      0.2858      0.0078
## Assets.2012      80013.6585    49374.6667 32381.0954 30638.9919
## Food.2012        0.3333      0.5366      0.5034     -0.2033
## CA_2011.2012_2   0.6585      0.6667      0.4759     -0.0081
## PHM_Int_11.12    0.9106      0.8699      0.3396      0.0407
## VSL.2011.12      0.4715      0.4959      0.5048     -0.0244
## Forecast.2011.12 0.7886      0.4553      0.5028      0.3333
## VCPC.2011        0.7398      0.7480      0.4383     -0.0081
##           eQQ Med    eQQ Mean    eQQ Max
## distance          0.2675      0.2350      0.3842
## Assets.2012      28141.0000 49141.6415 750824.0000
## Food.2012        0.0000      0.0566      1.0000
## CA_2011.2012_2   0.0000      0.2830      1.0000
## PHM_Int_11.12    0.0000      0.1698      1.0000
## VSL.2011.12      0.0000      0.2075      1.0000
## Forecast.2011.12 0.0000      0.1509      1.0000
## VCPC.2011        0.0000      0.2453      1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          98.0559 39.6582 40.9850 41.9821
## Assets.2012      -43.2833 -3.2508 -50.2335 -37.8936
## Food.2012       -311.5854 0.0000 -16.0377 0.0000
## CA_2011.2012_2   98.4167 100.0000 44.7439 0.0000
## PHM_Int_11.12    89.2065 0.0000 55.5600 0.0000
## VSL.2011.12      92.9931 0.0000 40.6319 0.0000
## Forecast.2011.12 -187.9064 0.0000 -23.7736 0.0000
## VCPC.2011        97.5768 0.0000 26.4151 0.0000
##
## Sample sizes:
##           Control Treated
## All          324      123
## Matched       53      123
## Unmatched     271       0
## Discarded      0       0

confidence.climate.810

## CA.PHM.VSL.DIST.16.17 0.1618385232 0.1195585454 1.354 0.18171

```

```

## Summary of balance for all data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5542           0.1069           0.1489           0.4473
## Assets.2012       80112.6163       45398.5049  112604.3945  34714.1114
## Food.2012         0.3779           0.3487           0.4769           0.0292
## CA_2011.2012_2    0.6860           0.1213           0.3267           0.5647
## PHM_Int_11.12     0.9128           0.4798           0.4999           0.4330
## VSL.2011.12       0.4419           0.1116           0.3151           0.3303
## Forecast.2011.12  0.8198           0.5997           0.4903           0.2200
## VCPC.2011         0.7384           0.3417           0.4746           0.3967
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.5376           0.4462           0.7533
## Assets.2012       30922.0000  39011.9884  544495.0000
## Food.2012         0.0000           0.0291           1.0000
## CA_2011.2012_2    1.0000           0.5640           1.0000
## PHM_Int_11.12     0.0000           0.4360           1.0000
## VSL.2011.12       0.0000           0.3314           1.0000
## Forecast.2011.12  0.0000           0.2209           1.0000
## VCPC.2011         0.0000           0.3953           1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.5542           0.5462           0.3020           0.0080
## Assets.2012       80112.6163       73504.5349  146748.9399  6608.0814
## Food.2012         0.3779           0.5698           0.4983           -0.1919
## CA_2011.2012_2    0.6860           0.6802           0.4694           0.0058
## PHM_Int_11.12     0.9128           0.9070           0.2923           0.0058
## VSL.2011.12       0.4419           0.4360           0.4991           0.0058
## Forecast.2011.12  0.8198           0.5523           0.5005           0.2674
## VCPC.2011         0.7384           0.7616           0.4288           -0.0233
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.2685           0.2458           0.4697
## Assets.2012       21828.0000  43842.8077  611625.0000
## Food.2012         0.0000           0.0385           1.0000
## CA_2011.2012_2    0.0000           0.3077           1.0000
## PHM_Int_11.12     0.0000           0.1026           1.0000
## VSL.2011.12       0.0000           0.1923           1.0000
## Forecast.2011.12  0.0000           0.1026           1.0000
## VCPC.2011         0.0000           0.1923           1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           98.2034  50.0622  44.9167  37.6473
## Assets.2012       80.9643  29.4095 -12.3829 -12.3289
## Food.2012        -556.3384  0.0000 -32.3077  0.0000
## CA_2011.2012_2    98.9704  100.0000  45.4401  0.0000
## PHM_Int_11.12     98.6573  0.0000  76.4786  0.0000
## VSL.2011.12       98.2397  0.0000  41.9703  0.0000
## Forecast.2011.12 -21.5389  0.0000  53.5762  0.0000
## VCPC.2011         94.1372  0.0000  51.3575  0.0000
##

```

```
## Sample sizes:
##           Control Treated
## All           717    172
## Matched       78    172
## Unmatched     639     0
## Discarded      0     0
```

FHH:

Assets.2017

```
## CA.PHM.VSL.DIST.16.17  24473.7078  16283.3281  1.503  0.15119
```

Food.2017 ~

```
## CA.PHM.VSL.DIST.16.17  0.273103901  0.129441476  2.110  0.05000 *
```

Food.2017.9mnths

```
## CA.PHM.VSL.DIST.16.17  0.052267979  0.147580619  0.354  0.7276
```

Food.2016.9mnths

```
## CA.PHM.VSL.DIST.16.17  0.150228337  0.155418705  0.967  0.3473
```

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6634	0.0372	0.1011	0.6262
## CA_2011.2012_2	0.7778	0.0492	0.2167	0.7286
## PHM_Int_11.12	0.8889	0.3975	0.4904	0.4913
## Assets.2012	48860.5926	22767.9344	50709.5481	26092.6582
## Food.2012	0.3704	0.2869	0.4532	0.0835
## VSL.2011.12	0.4815	0.0779	0.2685	0.4036
## Forecast.2011.12	0.8148	0.3443	0.4761	0.4706
## VCPC.2011	0.8148	0.2664	0.4430	0.5484

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.7694	0.6090	0.9635
## CA_2011.2012_2	1.0000	0.7037	1.0000
## PHM_Int_11.12	0.0000	0.4815	1.0000
## Assets.2012	31556.0000	48459.7778	544725.0000
## Food.2012	0.0000	0.0741	1.0000
## VSL.2011.12	0.0000	0.4074	1.0000
## Forecast.2011.12	0.0000	0.4815	1.0000
## VCPC.2011	1.0000	0.5556	1.0000

##

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6634	0.6065	0.2979	0.0570
## CA_2011.2012_2	0.7778	0.8519	0.3745	-0.0741
## PHM_Int_11.12	0.8889	0.9259	0.2761	-0.0370
## Assets.2012	48860.5926	13743.1111	24623.1250	35117.4815
## Food.2012	0.3704	0.1111	0.3313	0.2593

```

## VSL.2011.12          0.4815          0.0370          0.1991          0.4444
## Forecast.2011.12    0.8148          0.8148          0.4095          0.0000
## VCPC.2011           0.8148          0.7778          0.4382          0.0370
##
##                eQQ Med    eQQ Mean    eQQ Max
## distance        0.3341    0.2924    0.4998
## CA_2011.2012_2   0.0000    0.1000    1.0000
## PHM_Int_11.12    0.0000    0.0000    0.0000
## Assets.2012      26666.0000  26751.0000  56260.0000
## Food.2012        0.0000    0.2000    1.0000
## VSL.2011.12      0.0000    0.4000    1.0000
## Forecast.2011.12  0.0000    0.3000    1.0000
## VCPC.2011        0.0000    0.2000    1.0000
##
## Percent Balance Improvement:
##                Mean Diff.    eQQ Med    eQQ Mean    eQQ Max
## distance        90.9037    56.5721    51.9770    48.1229
## CA_2011.2012_2  89.8333   100.0000    85.7895    0.0000
## PHM_Int_11.12   92.4622    0.0000   100.0000   100.0000
## Assets.2012     -34.5876    15.4963    44.7975    89.6719
## Food.2012       -210.5455    0.0000   -170.0000    0.0000
## VSL.2011.12     -10.1166    0.0000     1.8182    0.0000
## Forecast.2011.12 100.0000    0.0000    37.6923    0.0000
## VCPC.2011       93.2466   100.0000    64.0000    0.0000
##
## Sample sizes:
##                Control Treated
## All              244      27
## Matched          10      27
## Unmatched        234      0
## Discarded         0      0

```

Crop.prodn.2012_2016

```

## CA.PHM.VSL.DIST.16.17 0.546051750 0.790328934 0.691 0.505

## Summary of balance for all data:
##                Means Treated Means Control SD Control Mean Diff
## distance        0.6754          0.0322    0.0906    0.6432
## Assets.2012     48355.7619    19951.1840  29920.8452  28404.5779
## Food.2012       0.3333          0.2736    0.4469    0.0597
## CA_2011.2012_2  0.8095          0.0519    0.2223    0.7576
## PHM_Int_11.12   0.9048          0.4057    0.4922    0.4991
## VSL.2011.12     0.5238          0.0802    0.2722    0.4436
## Forecast.2011.12 0.8571          0.3585    0.4807    0.4987
## VCPC.2011       0.7619          0.2642    0.4419    0.4978
##
##                eQQ Med    eQQ Mean    eQQ Max
## distance        0.7539    0.6258    0.9661
## Assets.2012     32418.0000  31850.0476  77192.0000

```

```

## Food.2012          0.0000      0.0476      1.0000
## CA_2011.2012_2    1.0000      0.7619      1.0000
## PHM_Int_11.12     0.0000      0.4762      1.0000
## VSL.2011.12       0.0000      0.4286      1.0000
## Forecast.2011.12  0.0000      0.4762      1.0000
## VCPC.2011         0.0000      0.4762      1.0000
##
##
## Summary of balance for matched data:
##                Means Treated Means Control SD Control Mean Diff
## distance                0.6754      0.5398      0.2635      0.1355
## Assets.2012            48355.7619    28871.2857 41598.0810 19484.4762
## Food.2012                0.3333      0.2381      0.4600      0.0952
## CA_2011.2012_2         0.8095      0.7619      0.4600      0.0476
## PHM_Int_11.12         0.9048      0.9048      0.3171      0.0000
## VSL.2011.12           0.5238      0.1905      0.4241      0.3333
## Forecast.2011.12      0.8571      0.7143      0.4880      0.1429
## VCPC.2011              0.7619      0.7619      0.4600      0.0000
##                eQQ Med   eQQ Mean   eQQ Max
## distance                0.3207      0.3084      0.5179
## Assets.2012            3393.0000 7515.7143 20834.0000
## Food.2012                0.0000      0.1429      1.0000
## CA_2011.2012_2         0.0000      0.2857      1.0000
## PHM_Int_11.12         0.0000      0.0000      0.0000
## VSL.2011.12           0.0000      0.1429      1.0000
## Forecast.2011.12      0.0000      0.4286      1.0000
## VCPC.2011              0.0000      0.2857      1.0000
##
## Percent Balance Improvement:
##                Mean Diff.   eQQ Med   eQQ Mean   eQQ Max
## distance                78.9284  57.4662  50.7198  46.3901
## Assets.2012            31.4037  89.5336  76.4028  73.0102
## Food.2012              -59.3985  0.0000 -200.0000  0.0000
## CA_2011.2012_2        93.7148 100.0000  62.5000  0.0000
## PHM_Int_11.12        100.0000  0.0000  100.0000 100.0000
## VSL.2011.12          24.8608  0.0000  66.6667  0.0000
## Forecast.2011.12     71.3514  0.0000  10.0000  0.0000
## VCPC.2011            100.0000  0.0000  40.0000  0.0000
##
## Sample sizes:
##                Control Treated
## All                212      21
## Matched              7      21
## Unmatched           205      0
## Discarded            0      0

```

number.harvest.2016.2017

```

## CA.PHM.VSL.DIST.16.17 -0.006757568 0.160562759 -0.042 0.967184

## Summary of balance for all data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7248           0.1059           0.1833           0.6189
## Assets.2012       44544.3500        43106.2115 93355.0638 1438.1385
## Food.2012         0.2500           0.3846           0.4913          -0.1346
## CA_2011.2012_2    0.7500           0.0962           0.2977           0.6538
## PHM_Int_11.12     0.8500           0.3077           0.4660           0.5423
## VSL.2011.12       0.4500           0.0962           0.2977           0.3538
## Forecast.2011.12 0.8500           0.5192           0.5045           0.3308
## VCPC.2011         0.8000           0.4038           0.4955           0.3962
##           eQQ Med eQQ Mean           eQQ Max
## distance           0.7374           0.61           0.8568
## Assets.2012       14975.5000 41057.15 544725.0000
## Food.2012         0.0000           0.15           1.0000
## CA_2011.2012_2    1.0000           0.65           1.0000
## PHM_Int_11.12     1.0000           0.55           1.0000
## VSL.2011.12       0.0000           0.35           1.0000
## Forecast.2011.12 0.0000           0.35           1.0000
## VCPC.2011         0.0000           0.40           1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.7248           0.691           0.2879           0.0338
## Assets.2012       44544.3500        13771.850 15737.0929 30772.5000
## Food.2012         0.2500           0.000           0.0000           0.2500
## CA_2011.2012_2    0.7500           0.600           0.5292           0.1500
## PHM_Int_11.12     0.8500           0.850           0.3857           0.0000
## VSL.2011.12       0.4500           0.300           0.4950           0.1500
## Forecast.2011.12 0.8500           0.850           0.3857           0.0000
## VCPC.2011         0.8000           0.850           0.3857          -0.0500
##           eQQ Med eQQ Mean           eQQ Max
## distance           0.2733           0.2431           0.4151
## Assets.2012       26875.0000 29731.0000 72236.0000
## Food.2012         0.0000           0.2857           1.0000
## CA_2011.2012_2    0.0000           0.2857           1.0000
## PHM_Int_11.12     0.0000           0.2857           1.0000
## VSL.2011.12       0.0000           0.1429           1.0000
## Forecast.2011.12 0.0000           0.2857           1.0000
## VCPC.2011         0.0000           0.0000           0.0000
##
## Percent Balance Improvement:
##           Mean Diff. eQQ Med eQQ Mean eQQ Max
## distance           94.5376 62.9331 60.1444 51.5496
## Assets.2012       -2039.7453 -79.4598 27.5863 86.7390
## Food.2012         -85.7143 0.0000 -90.4762 0.0000
## CA_2011.2012_2    77.0588 100.0000 56.0440 0.0000
## PHM_Int_11.12     100.0000 100.0000 48.0519 0.0000
## VSL.2011.12       57.6087 0.0000 59.1837 0.0000
## Forecast.2011.12 100.0000 0.0000 18.3673 0.0000
## VCPC.2011         87.3786 0.0000 100.0000 100.0000

```

```
##
## Sample sizes:
##           Control Treated
## All           52      20
## Matched       7       20
## Unmatched     45       0
## Discarded     0       0
```

changed.livelihood.climate.808

```
## CA.PHM.VSL.DIST.16.17  0.592994918  0.131365254  4.514 0.000412 ***
```

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6567	0.0554	0.1193	0.6013
## Assets.2012	49194.5769	26827.9503	58908.5017	22366.6266
## Food.2012	0.3462	0.3106	0.4642	0.0356
## CA_2011.2012_2	0.7692	0.0683	0.2531	0.7009
## PHM_Int_11.12	0.8846	0.4099	0.4934	0.4747
## VSL.2011.12	0.5000	0.0870	0.2827	0.4130
## Forecast.2011.12	0.8462	0.5217	0.5011	0.3244
## VCPC.2011	0.8077	0.3851	0.4881	0.4226

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.7465	0.5893	0.9491
## Assets.2012	28282.0000	47059.2692	544725.0000
## Food.2012	0.0000	0.0385	1.0000
## CA_2011.2012_2	1.0000	0.6923	1.0000
## PHM_Int_11.12	0.0000	0.4615	1.0000
## VSL.2011.12	0.0000	0.3846	1.0000
## Forecast.2011.12	0.0000	0.3462	1.0000
## VCPC.2011	0.0000	0.4231	1.0000

```
##
##
```

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6567	0.5909	0.2904	0.0659
## Assets.2012	49194.5769	16326.0769	27154.2732	32868.5000
## Food.2012	0.3462	0.1154	0.3368	0.2308
## CA_2011.2012_2	0.7692	0.7308	0.4676	0.0385
## PHM_Int_11.12	0.8846	0.8846	0.3368	0.0000
## VSL.2011.12	0.5000	0.1538	0.3803	0.3462
## Forecast.2011.12	0.8462	0.8462	0.3803	0.0000
## VCPC.2011	0.8077	0.8846	0.3368	-0.0769

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.3746	0.3172	0.5135
## Assets.2012	25348.5000	21657.0000	43491.0000
## Food.2012	0.0000	0.0000	0.0000
## CA_2011.2012_2	0.0000	0.3000	1.0000
## PHM_Int_11.12	0.0000	0.1000	1.0000
## VSL.2011.12	0.0000	0.2000	1.0000
## Forecast.2011.12	0.0000	0.2000	1.0000

```

## VCPC.2011          0.0000      0.1000      1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance          89.0444  49.8212  46.1766  45.8972
## Assets.2012       -46.9533  10.3723  53.9793  92.0160
## Food.2012         -548.3221  0.0000  100.0000  100.0000
## CA_2011.2012_2    94.5126  100.0000  56.6667  0.0000
## PHM_Int_11.12    100.0000  0.0000  78.3333  0.0000
## VSL.2011.12       16.1943  0.0000  48.0000  0.0000
## Forecast.2011.12  100.0000  0.0000  42.2222  0.0000
## VCPC.2011         81.7976  0.0000  76.3636  0.0000
##
## Sample sizes:
##           Control Treated
## All           161      26
## Matched        10      26
## Unmatched     151       0
## Discarded       0       0

```

dependence.livelihood.climate.809

```

## CA.PHM.VSL.DIST.16.17 -0.372500985  0.342121232  -1.089  0.30179
##
## Summary of balance for all data:
##           Means Treated Means Control SD Control  Mean Diff
## distance          0.7483          0.0809  0.1201  0.6674
## Assets.2012      57614.0000      38721.6964  89897.9262  18892.3036
## Food.2012         0.3333          0.3750  0.4885  -0.0417
## CA_2011.2012_2    0.7222          0.0536  0.2272  0.6687
## PHM_Int_11.12    0.8889          0.4286  0.4994  0.4603
## VSL.2011.12       0.4444          0.0357  0.1873  0.4087
## Forecast.2011.12  0.7778          0.5893  0.4964  0.1885
## VCPC.2011         0.7778          0.5179  0.5042  0.2599
##           eQQ Med  eQQ Mean  eQQ Max
## distance          0.8477  0.6615  0.8996
## Assets.2012      31656.5000  59787.8333  544725.0000
## Food.2012         0.0000  0.0556  1.0000
## CA_2011.2012_2    1.0000  0.6667  1.0000
## PHM_Int_11.12    0.0000  0.4444  1.0000
## VSL.2011.12       0.0000  0.3889  1.0000
## Forecast.2011.12  0.0000  0.2222  1.0000
## VCPC.2011         0.0000  0.2778  1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control  Mean Diff
## distance          0.7483          0.5084  0.2251  0.2398
## Assets.2012      57614.0000      52985.2222  21574.7036  4628.7778
## Food.2012         0.3333          0.7778  0.4648  -0.4444
## CA_2011.2012_2    0.7222          0.0556  0.2561  0.6667

```

```

## PHM_Int_11.12      0.8889      0.8889      0.3514      0.0000
## VSL.2011.12       0.4444      0.7778      0.4648     -0.3333
## Forecast.2011.12  0.7778      0.1111      0.3514      0.6667
## VCPC.2011         0.7778      0.8889      0.3514     -0.1111
##                   eQQ Med    eQQ Mean   eQQ Max
## distance           0.4177     0.4346     0.815
## Assets.2012       27690.0000  26629.4000 51736.000
## Food.2012         0.0000     0.2000     1.000
## CA_2011.2012_2    0.0000     0.4000     1.000
## PHM_Int_11.12     0.0000     0.2000     1.000
## VSL.2011.12       0.0000     0.2000     1.000
## Forecast.2011.12  0.0000     0.4000     1.000
## VCPC.2011         0.0000     0.2000     1.000
##
## Percent Balance Improvement:
##                   Mean Diff.   eQQ Med   eQQ Mean  eQQ Max
## distance           64.0629   50.7181   34.3004   9.4022
## Assets.2012       75.4991   12.5298   55.4602  90.5024
## Food.2012        -966.6667   0.0000  -260.0000  0.0000
## CA_2011.2012_2    0.2967  100.0000   40.0000   0.0000
## PHM_Int_11.12     100.0000   0.0000   55.0000   0.0000
## VSL.2011.12       18.4466   0.0000   48.5714   0.0000
## Forecast.2011.12 -253.6842   0.0000  -80.0000   0.0000
## VCPC.2011         57.2519   0.0000   28.0000   0.0000
##
## Sample sizes:
##                   Control Treated
## All                56      18
## Matched            5      18
## Unmatched          51       0
## Discarded          0       0

```

confidence.climate.810

```

## CA.PHM.VSL.DIST.16.17 0.624909477 0.286319767 2.183 0.04538 *
## Summary of balance for all data:
##                   Means Treated Means Control SD Control Mean Diff
## distance           0.6567           0.0554    0.1193    0.6013
## Assets.2012       49194.5769       26827.9503 58908.5017 22366.6266
## Food.2012         0.3462           0.3106    0.4642    0.0356
## CA_2011.2012_2    0.7692           0.0683    0.2531    0.7009
## PHM_Int_11.12     0.8846           0.4099    0.4934    0.4747
## VSL.2011.12       0.5000           0.0870    0.2827    0.4130
## Forecast.2011.12  0.8462           0.5217    0.5011    0.3244
## VCPC.2011         0.8077           0.3851    0.4881    0.4226
##                   eQQ Med    eQQ Mean   eQQ Max
## distance           0.7465     0.5893     0.9491
## Assets.2012       28282.0000  47059.2692 544725.0000
## Food.2012         0.0000     0.0385     1.0000
## CA_2011.2012_2    1.0000     0.6923     1.0000

```

```

## PHM_Int_11.12      0.0000      0.4615      1.0000
## VSL.2011.12       0.0000      0.3846      1.0000
## Forecast.2011.12  0.0000      0.3462      1.0000
## VCPC.2011         0.0000      0.4231      1.0000
##
##
## Summary of balance for matched data:
##           Means Treated Means Control SD Control Mean Diff
## distance           0.6567           0.5909   0.2904   0.0659
## Assets.2012      49194.5769      16326.0769 27154.2732 32868.5000
## Food.2012        0.3462           0.1154   0.3368   0.2308
## CA_2011.2012_2   0.7692           0.7308   0.4676   0.0385
## PHM_Int_11.12    0.8846           0.8846   0.3368   0.0000
## VSL.2011.12      0.5000           0.1538   0.3803   0.3462
## Forecast.2011.12 0.8462           0.8462   0.3803   0.0000
## VCPC.2011        0.8077           0.8846   0.3368  -0.0769
##           eQQ Med    eQQ Mean    eQQ Max
## distance           0.3746      0.3172      0.5135
## Assets.2012      25348.5000 21657.0000 43491.0000
## Food.2012        0.0000      0.0000      0.0000
## CA_2011.2012_2   0.0000      0.3000      1.0000
## PHM_Int_11.12    0.0000      0.1000      1.0000
## VSL.2011.12      0.0000      0.2000      1.0000
## Forecast.2011.12 0.0000      0.2000      1.0000
## VCPC.2011        0.0000      0.1000      1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           89.0444  49.8212  46.1766  45.8972
## Assets.2012       -46.9533  10.3723  53.9793  92.0160
## Food.2012        -548.3221   0.0000 100.0000 100.0000
## CA_2011.2012_2   94.5126 100.0000  56.6667   0.0000
## PHM_Int_11.12    100.0000   0.0000  78.3333   0.0000
## VSL.2011.12      16.1943   0.0000  48.0000   0.0000
## Forecast.2011.12 100.0000   0.0000  42.2222   0.0000
## VCPC.2011        81.7976   0.0000  76.3636   0.0000
##
## Sample sizes:
##           Control Treated
## All           161      26
## Matched        10      26
## Unmatched      151       0
## Discarded       0       0

```

Assets.2017

```

## CA.PHM.VSL.DIST.16.17 46210.7477 17566.3241 2.631 0.0123 *
Food.2017
## CA.PHM.VSL.DIST.16.17 0.0972145352 0.0736867699 1.319 0.195
Food.2017.9mnths
## CA.PHM.VSL.DIST.16.17 0.0757016949 0.0836361727 0.905 0.3713
Food.2016.9mnths
## CA.PHM.VSL.DIST.16.17 0.1574377730 0.1078268233 1.460 0.153

## Summary of balance for all data:
## Means Treated Means Control SD Control Mean Diff
## distance 0.6526 0.1787 0.1992 0.4739
## CA_2011.2012_2 0.7040 0.1440 0.3518 0.5600
## PHM_Int_11.12 0.8960 0.4321 0.4964 0.4639
## Assets.2012 79533.9680 49935.1317 141266.2914 29598.8363
## Food.2012 0.3680 0.2716 0.4457 0.0964
## VSL.2011.12 0.4000 0.1111 0.3149 0.2889
## Forecast.2011.12 0.8320 0.5679 0.4964 0.2641
## VCPC.2011 0.7680 0.7202 0.4498 0.0478
## eQQ Med eQQ Mean eQQ Max
## distance 0.6022 0.4752 0.7058
## CA_2011.2012_2 1.0000 0.5600 1.0000
## PHM_Int_11.12 0.0000 0.4640 1.0000
## Assets.2012 33305.0000 42292.2720 544495.0000
## Food.2012 0.0000 0.0960 1.0000
## VSL.2011.12 0.0000 0.2880 1.0000
## Forecast.2011.12 0.0000 0.2640 1.0000
## VCPC.2011 0.0000 0.0480 1.0000
##
##
## Summary of balance for matched data:
## Means Treated Means Control SD Control Mean Diff
## distance 0.6526 0.6405 0.2809 0.0122
## CA_2011.2012_2 0.7040 0.7280 0.4504 -0.0240
## PHM_Int_11.12 0.8960 0.8800 0.3289 0.0160
## Assets.2012 79533.9680 46185.4640 96089.7273 33348.5040
## Food.2012 0.3680 0.5120 0.5059 -0.1440
## VSL.2011.12 0.4000 0.1040 0.3090 0.2960
## Forecast.2011.12 0.8320 0.8720 0.3381 -0.0400
## VCPC.2011 0.7680 0.5600 0.5024 0.2080
## eQQ Med eQQ Mean eQQ Max
## distance 0.2267 0.2456 0.5099
## CA_2011.2012_2 0.0000 0.3095 1.0000
## PHM_Int_11.12 0.0000 0.1190 1.0000
## Assets.2012 22493.0000 31887.1667 189978.0000
## Food.2012 0.0000 0.0476 1.0000
## VSL.2011.12 0.0000 0.2381 1.0000
## Forecast.2011.12 0.0000 0.1190 1.0000
## VCPC.2011 0.0000 0.0476 1.0000

```

```

##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance           97.4306  62.3569  48.3223  27.7578
## CA_2011.2012_2     95.7140 100.0000  44.7279  0.0000
## PHM_Int_11.12      96.5510  0.0000  74.3432  0.0000
## Assets.2012        -12.6683  32.4636  24.6029  65.1093
## Food.2012          -49.3852  0.0000  50.3968  0.0000
## VSL.2011.12        -2.4615  0.0000  17.3280  0.0000
## Forecast.2011.12   84.8542  0.0000  54.9062  0.0000
## VCPC.2011          -334.8245  0.0000  0.7937  0.0000
##
## Sample sizes:
##           Control Treated
## All           243      125
## Matched        42      125
## Unmatched      201       0
## Discarded       0       0

```

Crop.prodn.2012_2016

```
## CA.PHM.VSL.DIST.16.17  0.7629853200  0.2759060394  2.765  0.00891 **
```

Summary of balance for all data:

```

##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.6592           0.1696           0.2076           0.4895
## Assets.2012       83772.8909       42336.9955 123857.4311 41435.8954
## Food.2012          0.3727           0.2443           0.4307           0.1284
## CA_2011.2012_2     0.7091           0.1538           0.3616           0.5552
## PHM_Int_11.12      0.9182           0.4389           0.4974           0.4793
## VSL.2011.12        0.4000           0.1131           0.3175           0.2869
## Forecast.2011.12   0.8273           0.5611           0.4974           0.2662
## VCPC.2011          0.7636           0.7240           0.4480           0.0397

```

```

##           eQQ Med  eQQ Mean  eQQ Max
## distance           0.599  0.4911  0.7287
## Assets.2012       38308.500 50659.9818 544495.0000
## Food.2012          0.000  0.1273  1.0000
## CA_2011.2012_2     1.000  0.5545  1.0000
## PHM_Int_11.12      0.000  0.4818  1.0000
## VSL.2011.12        0.000  0.2909  1.0000
## Forecast.2011.12   0.000  0.2727  1.0000
## VCPC.2011          0.000  0.0455  1.0000

```

Summary of balance for matched data:

```

##           Means Treated Means Control  SD Control  Mean Diff
## distance           0.6592           0.6473           0.2767           0.0118
## Assets.2012       83772.8909       65128.9455 187678.6554 18643.9455
## Food.2012          0.3727           0.5182           0.5064          -0.1455
## CA_2011.2012_2     0.7091           0.7182           0.4559          -0.0091

```

```

## PHM_Int_11.12      0.9182      0.9273      0.2632      -0.0091
## VSL.2011.12       0.4000      0.0818      0.2778      0.3182
## Forecast.2011.12  0.8273      0.8818      0.3272      -0.0545
## VCPC.2011         0.7636      0.5091      0.5066      0.2545
##
##                eQQ Med   eQQ Mean   eQQ Max
## distance        0.2097   0.2222   0.4463
## Assets.2012    29601.0000  45731.6579  544495.0000
## Food.2012      0.0000   0.0789   1.0000
## CA_2011.2012_2  0.0000   0.2632   1.0000
## PHM_Int_11.12  0.0000   0.0789   1.0000
## VSL.2011.12    0.0000   0.2368   1.0000
## Forecast.2011.12  0.0000   0.1053   1.0000
## VCPC.2011      0.0000   0.0789   1.0000
##
## Percent Balance Improvement:
##                Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance        97.5815   64.9925  54.7576  38.7467
## Assets.2012     55.0053   22.7299   9.7282  0.0000
## Food.2012      -13.2970   0.0000  37.9699  0.0000
## CA_2011.2012_2  98.3627  100.0000  52.5453  0.0000
## PHM_Int_11.12  98.1032   0.0000  83.6147  0.0000
## VSL.2011.12   -10.9120   0.0000  18.5855  0.0000
## Forecast.2011.12  79.5086   0.0000  61.4035  0.0000
## VCPC.2011     -541.9087   0.0000 -73.6842  0.0000
##
## Sample sizes:
##                Control Treated
## All              221      110
## Matched          38       110
## Unmatched        183        0
## Discarded         0         0

```

number.harvest.2016.2017

```
## CA.PHM.VSL.DIST.16.17 -0.2727301082  0.1719799830  -1.586      0.124
```

Summary of balance for all data:

```

##                Means Treated Means Control  SD Control Mean Diff
## distance        0.7310      0.2542      0.2141   0.4768
## Assets.2012    64420.8256   58555.3077  137442.7366  5865.5179
## Food.2012      0.3140      0.3736      0.4864  -0.0597
## CA_2011.2012_2  0.6977      0.1429      0.3519   0.5548
## PHM_Int_11.12  0.8837      0.4286      0.4976   0.4551
## VSL.2011.12    0.3372      0.1648      0.3731   0.1724
## Forecast.2011.12  0.8140      0.5934      0.4939   0.2205
## VCPC.2011      0.7442      0.7473      0.4370  -0.0031
##
##                eQQ Med   eQQ Mean   eQQ Max
## distance        0.5525   0.4824   0.753
## Assets.2012    20219.5000  35574.8140  677112.000
## Food.2012      0.0000   0.0581   1.000

```

```

## CA_2011.2012_2      1.0000      0.5581      1.000
## PHM_Int_11.12      0.0000      0.4651      1.000
## VSL.2011.12        0.0000      0.1744      1.000
## Forecast.2011.12   0.0000      0.2209      1.000
## VCPC.2011          0.0000      0.0000      0.000
##
##
## Summary of balance for matched data:
##              Means Treated Means Control  SD Control  Mean Diff
## distance              0.7310           0.7132      0.2712      0.0178
## Assets.2012          64420.8256       42753.2907 164428.3364 21667.5349
## Food.2012              0.3140           0.0698      0.2600      0.2442
## CA_2011.2012_2      0.6977           0.7558      0.4385     -0.0581
## PHM_Int_11.12       0.8837           0.8372      0.3768      0.0465
## VSL.2011.12         0.3372           0.0930      0.2965      0.2442
## Forecast.2011.12   0.8140           0.8488      0.3656     -0.0349
## VCPC.2011           0.7442           0.8721      0.3409     -0.1279
##
##              eQQ Med    eQQ Mean    eQQ Max
## distance              0.317      0.3111      0.5402
## Assets.2012          18994.000 68536.1200 677112.0000
## Food.2012              0.000      0.1600      1.0000
## CA_2011.2012_2      0.000      0.3600      1.0000
## PHM_Int_11.12       0.000      0.2800      1.0000
## VSL.2011.12         0.000      0.0800      1.0000
## Forecast.2011.12   0.000      0.0800      1.0000
## VCPC.2011           0.000      0.0400      1.0000
##
## Percent Balance Improvement:
##              Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance              96.2626  42.6246  35.5065  28.2598
## Assets.2012          -269.4053   6.0610 -92.6535  0.0000
## Food.2012            -309.2077   0.0000 -175.2000  0.0000
## CA_2011.2012_2      89.5210 100.0000  35.5000  0.0000
## PHM_Int_11.12       89.7810   0.0000  39.8000  0.0000
## VSL.2011.12        -41.6605   0.0000  54.1333  0.0000
## Forecast.2011.12   84.1831   0.0000  63.7895  0.0000
## VCPC.2011          -4070.8333   0.0000   -Inf    -Inf
##
## Sample sizes:
##              Control Treated
## All              91      86
## Matched          25      86
## Unmatched        66       0
## Discarded         0       0

```

changed.livelihood.climate.808

CA.PHM.VSL.DIST.16.17 0.3273781168 0.0982613072 3.332 0.00187 **

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6614	0.1950	0.2046	0.4664
## Assets.2012	79533.9680	53549.2995	148615.7903	25984.6685
## Food.2012	0.3680	0.2765	0.4483	0.0915
## CA_2011.2012_2	0.7040	0.1429	0.3507	0.5611
## PHM_Int_11.12	0.8960	0.4332	0.4967	0.4628
## VSL.2011.12	0.4000	0.1244	0.3308	0.2756
## Forecast.2011.12	0.8320	0.6359	0.4823	0.1961
## VCPC.2011	0.7680	0.7281	0.4460	0.0399

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.5862	0.468	0.7044
## Assets.2012	30609.0000	40471.728	544495.0000
## Food.2012	0.0000	0.096	1.0000
## CA_2011.2012_2	1.0000	0.560	1.0000
## PHM_Int_11.12	0.0000	0.464	1.0000
## VSL.2011.12	0.0000	0.280	1.0000
## Forecast.2011.12	0.0000	0.200	1.0000
## VCPC.2011	0.0000	0.040	1.0000

##

##

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.6614	0.6494	0.2788	0.012
## Assets.2012	79533.9680	38392.2000	85333.7140	41141.768
## Food.2012	0.3680	0.5440	0.5038	-0.176
## CA_2011.2012_2	0.7040	0.7280	0.4501	-0.024
## PHM_Int_11.12	0.8960	0.8640	0.3468	0.032
## VSL.2011.12	0.4000	0.1200	0.3287	0.280
## Forecast.2011.12	0.8320	0.8640	0.3468	-0.032
## VCPC.2011	0.7680	0.5440	0.5038	0.224

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.2458	0.2452	0.4657
## Assets.2012	28722.5000	37801.3409	191899.0000
## Food.2012	0.0000	0.0909	1.0000
## CA_2011.2012_2	0.0000	0.2955	1.0000
## PHM_Int_11.12	0.0000	0.2045	1.0000
## VSL.2011.12	0.0000	0.1591	1.0000
## Forecast.2011.12	0.0000	0.0909	1.0000
## VCPC.2011	0.0000	0.0227	1.0000

##

Percent Balance Improvement:

##	Mean Diff.	eQQ Med	eQQ Mean	eQQ Max
## distance	97.4225	58.0719	47.5976	33.8957
## Assets.2012	-58.3309	6.1632	6.5982	64.7565
## Food.2012	-92.3449	0.0000	5.3030	0.0000
## CA_2011.2012_2	95.7230	100.0000	47.2403	0.0000
## PHM_Int_11.12	93.0859	0.0000	55.9169	0.0000
## VSL.2011.12	-1.6054	0.0000	43.1818	0.0000

```

## Forecast.2011.12      83.6781  0.0000  54.5455  0.0000
## VCPC.2011            -461.5527  0.0000  43.1818  0.0000
##
## Sample sizes:
##           Control Treated
## All           217     125
## Matched       44     125
## Unmatched     173      0
## Discarded      0      0

```

dependence.livelihood.climate.

```
## CA.PHM.VSL.DIST.16.17  0.0674028472  0.2250156206  0.300  0.766
```

Summary of balance for all data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.7187	0.2513	0.2359	0.4674
## Assets.2012	79005.1739	70600.7282	185924.5943	8404.4458
## Food.2012	0.3261	0.3398	0.4760	-0.0137
## CA_2011.2012_2	0.6957	0.1553	0.3640	0.5403
## PHM_Int_11.12	0.9022	0.4272	0.4971	0.4750
## VSL.2011.12	0.4565	0.1359	0.3444	0.3206
## Forecast.2011.12	0.7935	0.6699	0.4725	0.1236
## VCPC.2011	0.7826	0.8350	0.3730	-0.0523

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.5435	0.4714	0.7177
## Assets.2012	29759.0000	40207.3261	544495.0000
## Food.2012	0.0000	0.0109	1.0000
## CA_2011.2012_2	1.0000	0.5435	1.0000
## PHM_Int_11.12	0.0000	0.4783	1.0000
## VSL.2011.12	0.0000	0.3261	1.0000
## Forecast.2011.12	0.0000	0.1304	1.0000
## VCPC.2011	0.0000	0.0435	1.0000

Summary of balance for matched data:

##	Means Treated	Means Control	SD Control	Mean Diff
## distance	0.7187	0.7147	0.2658	0.0040
## Assets.2012	79005.1739	46351.1413	146749.0502	32654.0326
## Food.2012	0.3261	0.1848	0.3958	0.1413
## CA_2011.2012_2	0.6957	0.6957	0.4692	0.0000
## PHM_Int_11.12	0.9022	0.9022	0.3030	0.0000
## VSL.2011.12	0.4565	0.1304	0.3435	0.3261
## Forecast.2011.12	0.7935	0.8913	0.3174	-0.0978
## VCPC.2011	0.7826	0.4783	0.5094	0.3043

##	eQQ Med	eQQ Mean	eQQ Max
## distance	0.2339	0.2344	0.5025
## Assets.2012	33060.0000	37303.8462	120132.0000
## Food.2012	0.0000	0.0769	1.0000
## CA_2011.2012_2	0.0000	0.3846	1.0000

```

## PHM_Int_11.12      0.0000      0.1538      1.0000
## VSL.2011.12       0.0000      0.1923      1.0000
## Forecast.2011.12  0.0000      0.0000      0.0000
## VCPC.2011         0.0000      0.0769      1.0000
##
## Percent Balance Improvement:
##           Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance      99.1479  56.9605  50.2810  29.9919
## Assets.2012  -288.5328 -11.0924   7.2213  77.9370
## Food.2012    -930.0000  0.0000 -607.6923  0.0000
## CA_2011.2012_2  100.0000 100.0000  29.2308  0.0000
## PHM_Int_11.12  100.0000  0.0000  67.8322  0.0000
## VSL.2011.12   -1.7117  0.0000  41.0256  0.0000
## Forecast.2011.12  20.8369  0.0000 100.0000 100.0000
## VCPC.2011    -481.4516  0.0000 -76.9231  0.0000
##
## Sample sizes:
##           Control Treated
## All           103      92
## Matched       26      92
## Unmatched     77       0
## Discarded     0       0

```

confidence.climate.810

```
## CA.PHM.VSL.DIST.16.17  0.1602479975  0.1496699948  1.071 0.290733
```

Summary of balance for all data:

```

##           Means Treated Means Control  SD Control  Mean Diff
## distance      0.6614      0.1950      0.2046      0.4664
## Assets.2012   79533.9680   53549.2995 148615.7903 25984.6685
## Food.2012     0.3680      0.2765      0.4483      0.0915
## CA_2011.2012_2  0.7040      0.1429      0.3507      0.5611
## PHM_Int_11.12  0.8960      0.4332      0.4967      0.4628
## VSL.2011.12   0.4000      0.1244      0.3308      0.2756
## Forecast.2011.12  0.8320      0.6359      0.4823      0.1961
## VCPC.2011     0.7680      0.7281      0.4460      0.0399
##
##           eQQ Med  eQQ Mean  eQQ Max
## distance      0.5862  0.468  0.7044
## Assets.2012   30609.0000 40471.728 544495.0000
## Food.2012     0.0000  0.096  1.0000
## CA_2011.2012_2  1.0000  0.560  1.0000
## PHM_Int_11.12  0.0000  0.464  1.0000
## VSL.2011.12   0.0000  0.280  1.0000
## Forecast.2011.12  0.0000  0.200  1.0000
## VCPC.2011     0.0000  0.040  1.0000
##
##

```

Summary of balance for matched data:

```

##           Means Treated Means Control  SD Control  Mean Diff
## distance      0.6614      0.6494      0.2788      0.012

```

```

## Assets.2012          79533.9680    38392.2000  85333.7140  41141.768
## Food.2012           0.3680         0.5440     0.5038     -0.176
## CA_2011.2012_2      0.7040         0.7280     0.4501     -0.024
## PHM_Int_11.12      0.8960         0.8640     0.3468     0.032
## VSL.2011.12        0.4000         0.1200     0.3287     0.280
## Forecast.2011.12   0.8320         0.8640     0.3468     -0.032
## VCPC.2011          0.7680         0.5440     0.5038     0.224
##
##                      eQQ Med    eQQ Mean    eQQ Max
## distance             0.2458     0.2452     0.4657
## Assets.2012         28722.5000  37801.3409  191899.0000
## Food.2012           0.0000     0.0909     1.0000
## CA_2011.2012_2     0.0000     0.2955     1.0000
## PHM_Int_11.12      0.0000     0.2045     1.0000
## VSL.2011.12        0.0000     0.1591     1.0000
## Forecast.2011.12   0.0000     0.0909     1.0000
## VCPC.2011          0.0000     0.0227     1.0000
##
## Percent Balance Improvement:
##                      Mean Diff.  eQQ Med  eQQ Mean  eQQ Max
## distance             97.4225   58.0719  47.5976  33.8957
## Assets.2012         -58.3309   6.1632   6.5982  64.7565
## Food.2012           -92.3449   0.0000   5.3030  0.0000
## CA_2011.2012_2     95.7230  100.0000  47.2403  0.0000
## PHM_Int_11.12      93.0859   0.0000  55.9169  0.0000
## VSL.2011.12        -1.6054   0.0000  43.1818  0.0000
## Forecast.2011.12   83.6781   0.0000  54.5455  0.0000
## VCPC.2011          -461.5527  0.0000  43.1818  0.0000
##
## Sample sizes:
##                      Control Treated
## All                   217     125
## Matched                44     125
## Unmatched             173      0
## Discarded              0      0

```



Enhancing Community Resilience Programme: Annex K

Intervention Package Cost-Benefit Analysis

Submitted to DFID by LTS International and the Centre for Development Management

Tillem Burlace

29 September 2017

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Acronyms

BCR	Benefit-Cost Ratio
CAHW	Community Animal Health Worker
CBA	Cost-Benefit Analysis
CEPA	Centre for Environmental Policy and Advocacy
DFID	Department for International Development
ECRP	Enhancing Community Resilience Programme
IPs	Implementing Partners
M&E	Monitoring and Evaluation
MTR	Mid-Term Review
MWK	Malawi Kwacha (currency)
NPV	Net Present Value
VFM	Value for Money
VSL	Village Savings and Loans groups

Glossary

Cost-benefit analysis is a systematic approach to weighing up the costs and benefits that accrue from an activity over a specific period of time. The analysis uses the following terminology:

- The **net present value (NPV)** refers to the current value of the flow of costs and benefits from the activity that occur over a specified period of time. For example, using a 10% discount rate. £100 of benefits in the first year would be included as £100, whereas £100 of benefits from the second year would only be include as £90 – 90% of the costs.
- The **benefit/cost ratio (BCR)** refers to value of benefits received for every £1 of investment, calculated over the same period. For example, in the example above, for every £1 invested, the analysis shows £15.40 in benefits.
- The **discount rate** is the percentage reduction in future costs and benefits that accounts for the potential return from having the money in the current period (for example, investing it in an alternative activity) and the uncertainty surrounding whether the amount will actually be received in the future.

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Executive Summary

The Enhancing Community Resilience Programme (ECRP) was designed to increase the resilience of vulnerable communities to climate variability and change in 11 districts of Malawi. The majority of funding for the £30.6 million six-year programme, which is closing in 2017, was provided by the United Kingdom's Department for International Development (£30.6 million), with additional support from Irish Aid and the Royal Norwegian Embassy.

This report forms part of the Final Evaluation of the ECRP. Given that a key focus of the ECRP is to increase resilience by encouraging beneficiaries to participate in multiple activities, a community-based financial cost-benefit analysis (CBA) of a combination of ECRP interventions was undertaken. The packages of interventions assessed are:

- The **core package**: including conservation agriculture, improved seeds, post-harvest management and village savings and lending groups;
- The **core package plus irrigation**; and
- The **core package plus livestock**; and
- A **combination package**: including the core package, plus irrigation and livestock.

The analysis draws on cost reporting by ECRP Implementing Partners, beneficiary costs – assessed through focus group discussions – and benefits of the interventions, based on results from a representative household survey and focus group discussions. The analysis offsets the present value of these costs and benefits over a 10-year lifetime, using a 10% discount rate, to calculate benefit-cost ratios for each of the intervention packages.

The analysis finds that, based on the aggregated costs and benefits from the CBA model¹, all four packages are economically viable – that is all packages achieve a positive return on investment. The analysis found that all of the packages of interventions would achieve at least £2 of benefit for every £1 invested. These results are more modest than previously calculated (in 2014 and 2016) due to the ability to clearly identify additional beneficiaries and benefits compared to the adoption of similar interventions and benefits achieved by non-beneficiaries. Likewise, the results are on the lower-end but in-line with results from similar interventions in Africa. Potentially due to the tendency to over-estimate benefits when results are based on beneficiaries reached and focus group discussions, rather than a representative survey. In addition, it should be noted that it would be expected that these ratios would be lower given ECRP's strong focus on equity.

¹ The assumptions and values included in the analysis are discussed in detail in Section 3 and summarised in Annex 1.

ECRP targeted poorer households, including a strong focus on female-headed households, whose benefits are likely to be lower. For example, poorer households have less access to land and resources; include those with disabilities (reducing labour inputs); are more likely to consume their entire harvest (thus being less likely to earn income that can be invested in productive activities or used to accumulate assets). Nevertheless, from a resilience perspective, although the comparative impact for these households may be smaller, the relative impact for a poorer household is likely to be greater.

The analysis also considered the impact of different components of the package and found that the post-harvest management and livestock components do not appear to be viable. For post-harvest management, benefits are relatively low due to the high level of existing practices, meaning that there are very few additional beneficiaries and the marginal impact of the ECRP practices is low. In the case of livestock, the high level of livestock ownership in the general population also significantly reduces the benefits that can be attributed to ECRP. For example, the intervention appears viable (a benefit-cost ratio of 2.75) when sensitivity analysis was conducted using beneficiary numbers reported by the implementing partners. In addition, the income from livestock is likely to have been lower than previous years due the floods and droughts experienced in 2015/16. It is likely that households sold animals during these periods to cope, which would have reduced the size of their herd/flock.

Additional sensitivity analysis found that variations in programme implementation costs had the largest impact on the results, while variations in beneficiary costs and benefits had a more marginal impact. In addition, for all scenarios, apart from the beneficiary perspective, the order of performance was the same. That is, the core package performed most strongly, followed by core package and irrigation, followed by core package plus livestock (these last two were reversed for beneficiaries).

When interpreting CBA results, it is also important not to understand that this only reflects quantifiable benefits and cannot be used on their own to draw conclusions about the relative importance of different activities, particularly given the extent to which beneficiaries and local Government stakeholders highly value livestock and irrigation interventions in focus group discussions. Such activities have other non-quantifiable benefits which are important – for example they provide food and income at a different time of year - outside of the main rain-fed harvest. Furthermore, our assessment does not consider thresholds of resilience or suffering. ECRP's basic package has not been sufficient to allow households to grow their income and food security in the face of the severity of shocks that they had faced (Finding 15). The cost-benefit analysis therefore only tells us that it would cost less to help a greater number of households to make smaller improvements in their livelihoods, than to help a smaller number of people to make slightly larger ones. It does not tell us what the level of investment required per household to protect them from the majority of disaster and climate risks would be.

1 Introduction

1.1 Background to ECRP

The Enhancing Community Resilience Programme (ECRP) was designed to address the context of chronic climate vulnerability faced by rural people in Malawi. It started in 2011 and is closing in 2017. The purpose of the ECRP is to increase the resilience of vulnerable communities to climate variability and change. The United Kingdom's Department for International Development (DFID), Irish Aid and the Royal Norwegian Embassy fund the ECRP. Its total budget is £30.6 million, of which £27 million is provided by DFID.

The programme has the following elements:

- Non-Government Organisations (NGOs) work with communities in 11 target districts. Five districts are covered by the DISCOVER consortium led by United Purpose (formerly Concern Universal), seven districts are covered by the ECRP consortium led by Christian Aid (with one district covered by both);
- Both consortia work with the Malawi-based Centre for Environmental Policy and Advocacy (CEPA) to deliver advocacy and policy influence.

In the original programme design, ECRP was intended to support the Malawi Vulnerability Analysis Committee (MVAC) to enhance the timeliness, comprehensiveness and accuracy of early warning information. However, this support was not provided, having been withdrawn along with other direct budget support to the Government of Malawi in 2011. Whilst the absence of this support changes the programme's theory of change, the MVAC has continued to function, supported by other partners.

ECRP's theory of change includes five major components that aim to build resilience to climate change at the household, community and district levels. They include 1) improved capacity of local authorities (especially village, area and district civil protection committees), 2) improved and resilient livelihoods, 3) enhanced early warning response, 4) informed policy and 5) humanitarian response and recovery. Component 4 is managed by CEPA which aims to distil lessons learnt by the Consortia to advocate for improved policies and programmes at district and national level.

A key part of the ECRP model is that households are encouraged to adopt multiple disaster risk reduction or climate change adaptation strategies in combination. The programme also aims to ensure that local institutions have increased knowledge of local risks, vulnerabilities and capacities with the goal of improving ECRP, government and other development partners' investment and targeting. In 2015-16, following large scale floods that affected the

country in January 2015 and the drought that followed that same farming season, the programme recognised the importance of humanitarian response and recovery activities to protect beneficiaries from large-scale drought and flood shocks. The humanitarian and response component was therefore only added at this point in the programme's lifetime. There has also been a growing recognition that those households receiving humanitarian response were not always being targeted for resilience support. To tackle this issue, the World Food Programme (WFP) provided funds to CA-ECRP to integrate humanitarian beneficiaries into ECRP in Machinga, Mulanje and Thyolo.

1.2 Background to the cost-benefit analysis

The DFID (2011) Approach to Value for Money² highlights the importance of developing a better articulation of costs and results. DFID's framework highlights the need to conduct the following components of value for money analysis:

- **Economy Analysis:** This is input focused. It asks whether inputs are being procured at appropriate quality and the right price. It can involve studying cost drivers in a financial report, procurement systems or the unit costs paid for particular comparable inputs.
- **Efficiency Analysis:** This is output focused and studies results over which the intervention has strong control. Different delivery decisions will impact the quality and quantity of outputs, but there may also be contextual differences. For example, training farmers or installing solar home systems in remote rural areas would be expected to have higher costs than those closer to major urban centres.
- **Cost-Effectiveness Analysis:** This is outcome focused and studies the extent to which outputs from an intervention are achieving the desired outcome on poverty reduction. The costs incurred in achieving the desired outcome can then be investigated.
- **Equity Analysis:** To what extent are the benefits of the intervention (both outputs and outcomes) reaching the most vulnerable, including women and girls? What are the factors which enable greater benefits to be accessed?

The methods for conducting these types of analysis depend on programme management priorities, available data and resources available for the study.

During the ECRP mid-term evaluation (2014), the M&E Technical Agency conducted a Value for Money (VFM) Assessment of the activities implemented by NGOs under the ECRP. The

² DFID (2011) DFID's Approach to Value for Money. Available online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/67479/DFID-approach-value-money.pdf

analysis included Economy, Efficiency and Effectiveness sections. Economy focussed on analysing the unit costs of the main procurement items; efficiency reported against 15 indicators and compared the Implementing Partners (IPs) in their performance; and finally the effectiveness section consisted of the results of two Cost-Benefit Analyses (CBAs) done on conservation agriculture and village savings and loans groups. The economy and efficiency indicators were added to the programme logframe, and the analysis has been updated annually. The 2017 VFM indicators are presented in the main evaluation report.

A VFM training took place in Lilongwe in mid May 2015. The participants were drawn from both Implementing Partners and were informed of the main elements of a CBA, what it involves, and the information requirements. Additional training on cost-efficiency reporting was provided in January 2016. The participants of the 2015 training requested that the budget for the CBA in the final evaluation be brought forward so that both the livestock and the irrigation interventions could be assessed in 2015, which was done.

However, ECRP focuses on increasing resilience by encouraging beneficiaries to participate in multiple activities. In 2016, the need for a further CBA focusing on the combination of ECRP interventions was therefore identified and approved. The CBA and VFM analysis are expected to generate evidence that would be useful in the design of the new resilience programme by DFID Malawi. Further, it will generate learning for development practitioners more broadly.

1.3 Objectives of the VFM analysis

The objectives of this analysis are to:

- Update the VFM logframe indicators to track progress and allow comparison across and between consortia and implementing partners;
- Assess the socio-economic return on a bundle of ECRP interventions. This will be done by conducting a CBA on conservation agriculture, improved seeds, post-harvest management, irrigation, livestock and village savings and lending groups introduced by ECRP IPs. The CBA builds on the 2014 and 2015 CBAs, which focused on individual interventions (VSL, sustainable agriculture, irrigation and livestock);
- To improve programme planning for the next phase of ECRP by providing information on differences in economic viability of intervention options, for them to consider along with other chosen criteria (such as, which options are feasible in a certain location, and extent of non-quantifiable social benefits) when making choices;
- To add another dimension to the results reported by partners under ECRP by increasing the amount of cost and results data collected and reported. The results of the CBA will feed into the VFM reporting of IPs (effectiveness level performance); and

- To serve as a public good to research community and development practitioners in Malawi and elsewhere by increasing understanding of costs and impacts of interventions.

1.4 Limitations

- The analysis relies heavily on data combined from various sources, including information collected for two CBAs conducted in 2014 and 2016, the household survey, beneficiary focus group discussions and reporting by the two consortia. This means that a number of assumptions have been made in terms of combining this information, in particular, disaggregated cost data provided by the two consortia, beneficiary numbers calculated based on the difference-in-difference additional beneficiaries (compared with matched non-beneficiaries) undertaking activities within the ECRP programme area, as well as additional benefits calculated from the household survey and cost data gathered through small focus groups. It should be noted that data collected through FGDs or interviews will not be representative of the full programme. Where costs or benefits from previous years are included in the analysis, these have been adjusted to 2017 prices.
- During this final evaluation, additional analysis was undertaken to understand the cost effectiveness of specific measures undertaken to target interventions to the most vulnerable people and to improve sustainability (through increased surveillance or increased engagement with government extension workers). However, while qualitative assessments of the additional costs and benefits were provided, it was not possible to quantify these aspects or to conduct formal cost effectiveness analysis.
- Although different packages of interventions are considered as part of this analysis, it is important to stress that this analysis provides an aggregation of benefits across a set of activities with strong overlap both in terms of uptake and benefits. For example, money from VSL or irrigation is sometimes used to buy livestock or to pay for farm inputs such as seeds or fertiliser. The cost benefit ratios generated should not therefore be treated as absolute values, nor differences in ratios necessarily indicating that a particular component is less important to ECRP's success. A key focus of the ECRP was to increase beneficiary resilience by encouraging the uptake of multiple activities, meaning that the majority of beneficiaries have adopted multiple interventions (96% of direct beneficiaries adopted at least three interventions). If the key objective had been to test the impact and cost effectiveness of different packages of intervention, a randomised control trial, where beneficiaries were assigned different combinations of activities, would have been more appropriate.
- In particular, the information collected through the household survey was not well suited to isolating the benefits of disaster risk reduction and early warning systems. By its nature EWS is very different to the other interventions (i.e. costs apply to

everyone, while different households are exposed to very different levels of risk. In addition, the level of coverage by CPCs is largely driven by government decisions. Although there is a big difference in the role of CPCs, ECRP supported CPCs are reported to have a much bigger role, and they are twice as likely to provide warnings (in terms of warnings received), ECRP-CPCs are much more likely to provide support after a disaster and are much more likely to participate in MVAC (therefore increasing other support to those impacted). Another challenge is the types of benefits from EWS, which are often indirect or long-term in nature. For example, a key benefit from EWS is the provision of information for decision making around timing and choice of crop planting (a benefit captured indirectly through the core package). Another frequently mentioned benefit was avoided loss of life, however, trying to quantify or place a value on this benefit is both insensitive and difficult. EWS is therefore included in the analysis but its results, in particular, should be interpreted with caution. EWS costs and benefits were therefore excluded from the model.

2 Methodology

2.1 Data collection

The approach to developing and sampling for the representative household survey, key informant interviews and beneficiary focus group discussions is discussed in detail in the ECRP Final Evaluation Report. Different aspects of the VFM analysis draw more heavily on different data sources, as such, the findings section includes a brief description of the choice of indicators and data sources.

2.2 Analysis of cost effectiveness

The study uses a community-level CBA focused on cost effectiveness of a combination of ECRP interventions: VSL, sustainable agriculture interventions (including drought tolerant seeds, conservation agriculture and post-harvest management) and livestock. The analysis considers both:

- The aggregate cost-benefit ratios for the adoption of a set of packages of interventions, based on medium-term impacts, such as increased income and assets compared to non-beneficiaries; and
- The beneficiary cost-benefit ratios for the adoption of the same packages of interventions.

The development of the CBA included the following components³:

- An **impact assessment** that investigates the impacts of a selection of ECRP interventions, including VSL, sustainable agriculture, irrigation and livestock, specifically in relation to the “without” intervention case/counterfactual, complemented by a more qualitative assessment of the broader social, economic and environmental costs and benefits faced by targeted communities, considering monetary and non-monetary elements;
- Consideration of **hazard scenarios** when estimating the range of impacts and benefits that the scheme is likely to have in good and bad years (for example, the impact of drought or flood years on harvest);

³ Informed by “Cost benefit analysis for community based climate and disaster risk management: synthesis report”, August 2010, Oxfam America and Tearfund; and “Managing uncertainty: an economic evaluation of community-based adaptation in Dakoro, Niger”, January 2014, CARE.

- An **ex-post estimate** of the returns both from the perspective of the participating communities (**private return**), as well as for the project as a whole (**social return**) both using the benefit-cost ratio as the measure of return, in keeping with DFID policy.

The CBA draws on existing literature on CBA in disaster risk reduction, resilience and climate adaptation; data from secondary sources collected by ECRP partners in their M&E systems; and fieldwork in Malawi to validate assumptions. The main sources of information on the interventions are:

- Current reporting and discussions with the programme staff of the IPs, including disaggregated financial reports to estimate the programme's cost of providing each activity;
- Information on beneficiary benefits from the household survey and FGDs (including information gathered during the 2014 FGDs on VSLs and sustainable agriculture and the 2015 FGDs on livestock and irrigation); and
- Information on beneficiary upfront and ongoing costs of involvement from FGDs (intervention cost data from previous CBA FGDs, validated for through beneficiary cost FGDs across all 11 ECRP districts, undertaken as part of this final evaluation).

2.3 The CBA tool

A community-based financial cost benefit analysis was undertaken, combining information on beneficiary costs and benefits collected through a household survey and focus groups, with programme-level data on cost per beneficiary for implementing the interventions. This information was used to develop a set of assumptions about the range of benefits from the programme per beneficiary.

The collected data on 'benefits' is then offset against the 'costs' for those specific sets of interventions. The analysis is based on a series of assumptions which are substantiated by evidence documented within the literature from inside and outside the target area, interviews and/or focus group discussions with beneficiaries of the interventions and expert opinion. The costs and benefits for each intervention, as well as associated assumptions, are discussed in more detail in the following section.

The cost-benefit model is run over a 10-year lifetime, using a discount rate of 10%. The model considers the costs and benefits of adopting a package of interventions, including VSL, improved seeds, conservation agriculture, irrigation, livestock pass-on and early warning systems.

Beneficiary numbers were estimated as part of the Final Evaluation, which using matching of ECRP beneficiaries with non-beneficiaries to isolate adoption and benefits that are additional

from business as usual trends (i.e. ECRP beneficiary increases in adoption and benefits since the start of the programme were calculated net of increases for matched non-beneficiaries over the same period⁴).

Programme costs are based on activity costs plus technical staff costs and a share of the remainder of the programme costs. The methodology for the 'efficiency analysis' undertaken as part of the mid-term evaluation documents this calculation. In the CBA model, programme costs are allocated to different interventions based on a formula agreed with the two consortia as part of the Mid-Term Evaluation. The total cost for each intervention is applied equally over the six years of implementation, while beneficiaries (and hence their costs and benefits) are assumed to continue for a further four years, with 20% of new livestock beneficiaries also continuing to pass-on after the programme closes. Beneficiary costs were estimated based on the values identified through detailed CBA focus groups undertaken for two previous CBAs (VSL and the agricultural package consisting of conservation agriculture, improved seeds and post-harvest management were assessed in 2014, while irrigation and livestock pass-on groups were assessed in late 2015). These values were then validated and adjusted based on FGDs and the representative household survey carried out for the final evaluation, as well as adjusting the values for inflation.

Benefits for the model are estimated based on reported crop, asset and livestock information from a representative household survey of both ECRP beneficiaries and non-beneficiaries (which captures the impact of replication and beneficiaries ceasing to practice certain activities).

The model considers the average cost-benefit ratio for ECRP beneficiaries who adopt a selection of these interventions. Sensitivity analysis is then used to calculate the impact of varying beneficiary costs and benefits for irrigation (an intervention that had a lot of variation in upfront costs), the potential cost-benefit ratio if all IPs achieved minimum per beneficiary implementation costs, the cost-benefit ratio basing adoption on IP reporting, and the cost-benefit ratio of adoption from the beneficiary perspective (i.e. net of programme costs).

⁴ For the impact analyses, statistical matching was first conducted to improve the overlap and balance between the beneficiary and comparison groups using selected baseline confounder variables (see Annex J for details). The R statistical package called "*MatchIt*" was used to do the matching. Matching was done using the propensity score approach with the nearest neighbour distance algorithm. All matching was done with replacement to minimise bias. We then took the beneficiary and matched non-beneficiary units and conducted a regression analyses to adjust for any remaining baseline imbalances. The regressions used robust standard errors to account for the effects of clustering, using the package called "*srvyr*".

As a robustness test, at the core package level, we compared the above impact estimates with difference-in-difference estimator which relies on the parallel-trends assumption. All results were qualitatively similar improving our confidence in the results.

3 Findings

The CBA model estimates the costs (to both the programme and beneficiaries) and benefits across a package of ECRP interventions. The cost and benefit estimates are summarised in Table 2 (refer to Annex 1) and described in more detail throughout the rest of this section. The results from the CBA model and sensitivity analysis can be found at the end of this section.

3.1 Village savings and loans

The Village Savings and Loans (VSL) intervention involves communities forming shared village savings groups. Each group is provided with training (and in some cases some materials, such as a lockable safety-deposit box), after which the groups are largely autonomous. The VSL groups agree on share values, which are purchased each time the group meets at predetermined intervals (for example, weekly or monthly). The money raised through the sale of shares is then used to provide loans to group members who can use the money for productive purposes (such as setting up small businesses, or purchasing agricultural inputs), purchasing assets (such as livestock or bicycles), improving the quality of their houses (using burnt bricks or adding corrugated iron rooves) or to meet other family needs. Borrowers then repay the loans over an agreed period at the groups' interest rate.

In a number of areas, VSL was used as an entry point activity for the ECRP programme. In these cases, beneficiaries were required to first set up a VSL group and other activities were then rolled out via these groups. Implementing partners noted that this approach reduced the costs of outreach.

3.1.1 Beneficiary costs

The CBA model assumes no net cost to beneficiaries. Although VSL membership involves an opportunity cost, because beneficiaries are required to save income rather than using it for current consumption/needs and are required to pay back their loans with interest, the VSL groups function as a type of cooperative banking, meaning that interest repayments are also indirectly savings. Given that all money raised through the VSL groups is later redistributed back to group members who receive annual or biannual pay-outs, the opportunity cost of saving is covered by the interest earned on VSL savings, while the interest is not a true cost because it is later returned. However, in a very small number of cases there may be a loss of value when other members fail to pay back loans – largely mitigated through the involvement of chiefs and bylaws, and in a few extreme cases, failure to repay loans may include the seizure of assets or even land, resulting in certain members becoming significantly worse off as a result of involvement in VSL.

The costs and benefits related to the purchase of livestock using VSL loans or payouts (5% of VSL beneficiaries) is included in the model. The assumptions and calculations of these costs and benefits are discussed in detail under the livestock component. For the purposes of the VSL component, the average for goats and chickens is used (given that outside of the programme, approximately half of the population own chickens and/or goats). The model therefore assumes £32.67 in upfront costs, which includes the purchase of animals, and £8.91 in ongoing costs for 5% of VSL beneficiaries.

3.1.2 Beneficiary benefits

In 2014, in-depth FGDs were conducted with ECRP VSL members. Where possible, these benefits have been valued based on the household survey. In particular, involvement in VSL results in the following qualitative and quantitative benefits:

Qualitative benefits

- Reduction in interest rates compared to borrowing from other commercial sources. However, given that access to alternative sources of credit – apart from no interest loans from friends or family – is almost non-existent in the ECRP communities, this benefit is excluded from the analysis.
- Leveraging VSL loans to start small businesses (27% of beneficiaries in 2016/17). However, the household survey did not find a statistically significant increase in enterprises for VSL members. This benefit is therefore excluded from the analysis.
- Leveraging VSL loans to purchase inputs for crop production (27% of beneficiaries in 2016/17). Crop production benefits are captured indirectly through the sustainable agriculture aspect of the model and are therefore captured indirectly through the agricultural package in following section.
- Improvement in living conditions through improved housing, including construction with burnt bricks and roofing with iron sheets. VSL beneficiaries are 6% to 7% more likely to have improved their dwellings' walls or roof, which is likely to result in significant improvements in health and safety. However, the benefits from improved housing are difficult to value and hence not included in the model.
- Avoided distress sales of livestock at low prices (partially captured through the value of ECRP livestock pass on groups below).
- Smoothing consumption, for example buying food during lean periods. Beneficiaries noted that the ability to buy food meant they could continue to work their fields rather than having to work as labourers (*ganyu* work) to feed their families, therefore increasing crop productivity (indirectly captured through agricultural package benefits below).

Quantitative benefits

- Increased schooling, resulting in improved future earnings. Completion of each year of secondary school results in a 10% increase in annual earnings, resulting in a net benefit of £5.06 per beneficiary per year (applied to 15% of VSL beneficiaries who reported using their loans for school fees in 2016/17).
- Ability to purchase additional assets (through loans or savings pay-outs). This benefit is partially captured through the average £63.18 in livestock benefits per beneficiary attributed to the 5% of households who bought livestock with their VSL loans in 2016/17 (discussed below under the livestock component of the model).

3.2 Agricultural package

ECRP implemented a package of conservation agriculture and supporting activities, including mulching, minimum tillage, introduction of drought tolerant seeds, as well as improved post-harvest storage and management.

3.2.1 Beneficiary costs

FGDs focused on the costs of the ECRP activities were carried out in the eleven ECRP districts. Upfront costs, comparing the cost of old and new practices related to conservation agriculture were reported in eight of these FGDs, and included:

- Purchase of equipment, such as knives for cutting maize stalks, sickles for cutting grass for mulching; and
- Labour, for example pit digging, development of plant stations.

The average upfront cost of undertaking conservation agriculture participating in the ECRP agricultural package is approximately £10.72 per person, which consists of the cost of equipment plus labour cost based on local *ganyu* labour rates for undertaking the work. Similar estimates were made for post-harvest management, which showed a reduction in upfront costs (included under benefits). This is likely due to the promotion of plastic sacks rather than granaries by some IPs.

In terms of ongoing costs, conservation agriculture results in a saving (included in benefits below). Conversely, ongoing post-harvest management costs increased to £16.61 per beneficiary. FGD participants were also asked to estimate the cost of purchasing improved seeds, which they estimated at £5.30 per farmer per year.

3.2.2 Beneficiary benefits

Qualitative benefits

In general, ECRP beneficiaries are able to improve crop productivity as a result of the ECRP-related activities, including the ECRP-agricultural package and benefits from VSL (such as investment in fertiliser and seeds, purchase of *ganyu* labour or avoided lost work days due to the need to undertake *ganyu* labour).

Quantitative benefits

This increase was estimated based on the results from the representative household survey by comparing crop productivity in a good (2016/17) and bad year (2015/16) for ECRP beneficiaries who adopted conservation agriculture and improved seeds compared with the productivity of communities not using these practices.

Increased crop productivity was estimated for the six most important crops (those practiced by 15% or more of respondents, i.e. maize, sorghum, rice, cassava, pigeon peas and sweet potatoes). The value of these crops were then estimated based on the median crop sale price – a conservative estimate of their value, as households with larger productivity are likely to sell the additional crops later in the year, when most households are running low on reserves and prices are higher. Although, it is worth noting that over time, if improved harvests are maintained, prices may stabilise. As such, a more conservative estimate is appropriate.

Since conservation agriculture is mainly effective in reducing the impact of drought, the annual weighted benefits are calculated based on the exceedance probability of normal (60%) or moderate or severe (40%) drought hazards, which was validated through FGDs. On average, the weighted additional crop benefit to ECRP-beneficiaries from participating in these activities was therefore £75.02 per person.

FGD participants were also asked to estimate the ongoing costs of farming using normal and conservation agriculture farming techniques. Costs were estimated for the full farming cycle, from ploughing to planting and top dressing (applying fertilisers), to weeding, harvesting, and managing residue. There was considerable variation in these estimates, with four of the eleven districts reporting an increase in costs under conservation agriculture, while the remaining seven districts reporting a saving in costs. Overall, beneficiaries reported a saving of approximately £13.73 from using the ECRP conservation agriculture and improved seeds approach, which is included in the benefits below.

In addition, participants reported a saving in upfront costs (of £19.1 on average per person), as well as a small additional reduction in losses of stored harvest, as a result of using the ECRP-approach to post-harvest management. The impact of the post-harvest management

activities is relatively low due to the high level of existing – although less effective – post-harvest management techniques. The reduction in losses is valued based on the median maize price, giving an average reduction in loss of approximate £1.30 per person.

3.3 Irrigation

A total of 68 irrigation schemes are being implemented by the two consortia across the 11 districts. ECRP assists interested community members with building a permanent irrigation system with concrete weirs and canals and pipes. In some cases, community members had unsuccessfully tried to implement irrigation on their own prior to ECRP. The schemes are usually gravity fed, with some schemes using treadle pumps and one scheme using a motorised diesel pump. To ensure sustainability, the participants are expected to form a group and contribute around 25% of in-kind resources, including labour, sand and rocks collected from nearby. In some cases, where suitable rocks are not available, participants make or buy bricks to use in the construction.

In-depth FGDs were carried out in November 2015, which were complemented with additional FGDs carried out in May 2017 to validate the results from the original CBA. While construction required considerable investment, the overall impression was that participants were very pleased with the results. By irrigating the land, farmers are able to produce one or two crops in addition to the one they grow during the rainy season. In many cases, these crops are grown on *dambo* (or floodplain) land that belongs to other members of the community. In some cases, the implementing partners have helped community groups negotiate memorandums of understanding with these landowners to enable poorer households to have long-term use of the land. These agreements are important to sustainability, as one village noted that a nearby irrigation scheme, not under the ECRP, had used a similar approach without official agreements and the owners of the land had since reclaimed the land and irrigation benefits for their own.

3.3.1 Beneficiary costs

The major upfront cost incurred by participants is the construction of the irrigation scheme, including provision of materials and digging the irrigation canals. The cost of constructing the schemes ranged from 1,000 to 161,000 kwacha (£21-£181) per beneficiary. Cost per beneficiary in Mwanza and Thyolo was less than 10,000 kwacha per beneficiary, Karonga, Kasungu and Chikwawa were all around the 20,000 kwacha per beneficiary, whereas costs per beneficiary in Dedza were on average around 140,000 kwacha. The higher participant costs in Dedza were largely due to much longer construction times (and related labour inputs), although Nambuna Irrigation Scheme (also in Dedza) had higher costs because the local soil was not suitable for brick making so these were purchased externally. Technology type does not appear to be a major factor in participants' upfront costs. The analysis

assumes a weighted average per beneficiary cost of 80,000 (£86.40). However, the impact of these large variations in upfront costs is assessed as part of the sensitivity analysis (adjusted for correlations between investment and benefits).

Ongoing costs incurred by participants include maintenance costs and water and membership fees, as well as additional fertiliser and pesticide costs. Ongoing costs were approximately £29.70 per beneficiary.

3.3.2 Beneficiary benefits

Qualitative benefits

Focus group participants described the benefits they had experienced from participating in the irrigation scheme, including direct benefits such as:

- Income and in-kind value of additional crops produced, which is used (or swapped) to attain indirect benefits including:
 - Purchasing food: for example, most participants produce green maize, which they sell or swap for maize flour. The additional crop means that most households have food that lasts until the next rainy season, whereas previously in a bad season many households noted that their food supplies would run out three or four months before the next harvest.
 - Purchasing medical care and medicines: households are able to meet medical costs with their additional income.
 - Purchasing assets: participants reported purchasing cows, goats, pigs.
 - Increasing educational benefits: participants noted that as a result of the irrigation scheme there has been a reduction in children dropping out or skipping school. Before the schemes, primary school children also often missed school during the lean months because of hunger and sickness. In addition, they are now able to pay school fees for their children attending high school and to afford school uniforms and materials.
 - Investing in Village Savings and Loans (VSL) groups (for those that belong to them), and therefore being able to leverage for other activities.
 - Consumption: most households grow some vegetables, which make for a more diverse and nutritious diet.
- Empowerment of women: This was particularly noted in Dedza, where women and men participate independently and couples receive their own plots. At the Nambuna Irrigation Scheme, some of the men mentioned that women's roles have changed within their households as the women now have an independent income. While the women from female-headed households at Nakainga Irrigation Scheme explained

that they had become involved in the scheme because they heard radio advertisements from other schemes about women being able to afford to send their children to school on their own. One woman went on to explain how she no longer has to do *ganyu* work to send her children to school and how she is now able to purchase animals as assets and is saving up to build her own house.

Quantitative benefits

Irrigation enables beneficiaries to produce an additional crop, as such, the full benefits of this additional crop can be attributed to ECRP. Irrigation crop productivity was estimated for the five main irrigation crops (maize, tomatoes, vegetables, common beans and sweet potatoes), using results for irrigation productivity from the household survey. The value of this additional crop is conservatively estimated using the median crop prices, which is likely to significantly under-value the crop as irrigation crops are harvested during the lean period, when crop prices are at their highest. On average, the benefit from irrigation is £161.77 per beneficiary.

3.4 Livestock

The main livestock intervention implemented by the two ECRP consortia was a goat pass on scheme. The pass on scheme involves beneficiaries building an elevated enclosure to protect the goats from predators and flooding and to reduce the risk of disease. Participants receive training in building the enclosure, livestock disease and livestock management. 'First generation' beneficiaries then receive two female goats each, while the group receives a number of male goats to share. Once the goats start reproducing, beneficiaries are required to 'pass on' two female kids to the next generation of participants. In this way, the intervention is designed to be self-sustaining.

In addition, the two consortia experimented with livestock pass-on groups for pigs, chickens and guinea fowl. These groups followed a similar approach to the goat pass-on intervention; beneficiaries were first expected to form groups and build an enclosure, they then received livestock and were expected to pass-on a number of offspring once their animals started breeding.

Overall, approximately 22% of ECRP beneficiaries received goats (either directly or through pass on), 9% received chickens, 2% received pigs and less than 1% received guinea fowl. However, due to the high level of livestock ownership in both beneficiary and non-beneficiary populations, only 2.5% of ECRP beneficiaries are considered additional and included in the model. The model also assumes that 20% of new beneficiaries each year continue to pass on. Given the small number of pig and guinea fowl beneficiaries, only costs and benefits related to the goat and chicken schemes are included in the CBA model.

It is worth noting that beneficiaries reported relatively high livestock mortality rates, however despite this, herd size has remained constant since overall. The model therefore assumes that herd size will continue to remain constant, while loss of animals is offset by new births, but that herd/flock size will not increase. However, it is worth noting that the lack of growth in number of animals may actually reflect the difficult 2015/16 year, when households may have been forced to sell some animals to survive.

3.4.1 Beneficiary costs

The major upfront cost incurred by participants is the building of an elevated goat kraal (£15.12) or chicken hutch (£7.02). Participants either incurred these costs directly by hiring someone to undertake the work or indirectly through their labour inputs and the potential income from sale of the building materials had they sold them instead of using them. In some cases – such as Karonga – the programme provided nails to first generation beneficiaries (those receiving animals directly from the programme), however it was the opportunity cost of poles that contributed to their kraals being the most expensive.

Ongoing costs incurred by participants include maintenance costs for their shed, in a few cases the costs of shepherds (and food for the shepherd), food for the animals and membership fees to revolving drug funds. On average, annual ongoing costs were £12.42 for goats and £5.40 for chickens. The highest ongoing costs were for the few participants who pay shepherd costs, which can cost as much as £4.36 per month. Only a small proportion of participants pay shepherd fees, which are likely to be participants with larger herds of goats. Given that the average participant only has three goats, this cost is therefore excluded.

Other costs or disbenefits occur when goats destroy crops or trees when free range grazing. In one district, focus group members noted that this externality is directly repaid through a fine system, while other groups try to limit the negative consequences by tethering goats during the rainy season. Nevertheless, in areas where irrigation enables farmers to grow an additional crop during the dry season, there is some potential for conflict to occur if goats destroy crops (although no incidence was reported).

3.4.2 Beneficiary benefits

Qualitative benefits

Focus group discussions with beneficiaries of the goat pass-on groups identified the following direct benefits:

- Increased income:

- The sale of animals is the main benefit for beneficiaries of the goat pass-on scheme. By selling male offspring, participants are able to gain income without decreasing the number of breeding goats they own.
- Manure: Many households have been able to substitute goat manure for inorganic fertilisers, saving on crop input costs and/or increasing yields.
- Increased nutrition: Some households are using goat milk to improve their children's nutrition, while households also eat some goats.
- Livestock ownership provides a safety net for families, increasing their resilience and food security in times of crises. For example, goats can be sold and the money used to buy food in times of crisis, and some money has been invested in improved housing, such as tin roofs, helping households better withstand extreme weather.
- Livestock ownership helps protect households' asset base: In Malawi, annual inflation rates have fluctuated between 8% and 27% over the last 10 years⁵, acting as a strong deterrent against saving income. However, livestock values increase in-line with inflation, helping to protect households' savings against inflation.
- Increased sense of community: Strong group cohesion appears to play a strong role in the success of livestock groups. For example, members of the Chanthika goat pass-on club noted that goats could only be sold with group approval to ensure that sufficient breeding stock remained within the community. In addition, the village chief explained that the aim was to eventually include the whole village under the scheme. Some focus group members described how, having met their obligation under the scheme, they are continuing passing on informally by lending pregnant goats to friends who then either return the goat and keep the kids or keep the goat but repay a certain number of male kids.

Focus group participants also mentioned indirect benefits from livestock ownership, although these benefits were less frequent than for the irrigation beneficiaries. Indirect benefits from sale of goats included:

- Improved educational outcomes: Participants noted that a higher number of children are now attending high school as some families are now able to sell a goat to cover the costs of school books and uniforms or fees.
- Payment of medical bills: Goats can be sold in times of need to meet one-off high costs such as medical bills or medication cost.

⁵ <http://www.indexmundi.com/g/g.aspx?c=mi&v=71>

- Purchase food: Households are able to sell goats in times of need and use the money to buy staples such maize flour.

Quantitative of benefits

It was only possible to quantify the benefits from sale/consumption of livestock, plus the benefit of selling eggs from chickens. This resulted in an average benefit of £55.08 for goat beneficiaries and £71.29 for chicken beneficiaries, weighted by the proportion of beneficiaries (72% goats versus 28% chickens).

3.5 Results of the cost-benefit analysis

The CBA model uses average financial cost values from IP reporting and focus group discussions, while the benefit values are largely drawn from the representative household survey, with additional benefits identified through comparison with non-beneficiaries. Based on the assumptions outlined above, over a ten-year period (i.e. with results continuing for four-years after the programme closes), with a discount rate of 10%, the aggregated costs and benefits from across the packages of interventions are as follows (refer to Table 1, which also presents the findings from the sensitivity analysis):

- The **core package** (conservation agriculture, improved seeds, post-harvest management and VSL) is expected to achieve a benefit-cost ratio of 2.71, indicating that for every £1 invested, the programme can be expected to achieve at least £2 of participant benefits.
- **Core package plus irrigation:** Despite strong results in terms of additional productivity from irrigation, the high costs of setting up an irrigation scheme mean that this combination of interventions has a slightly lower benefit-cost ratio of 2.51, although the package can still be expected to achieve at least £2 of benefit for every £1 invested.
- **Core package plus livestock:** Similarly, the inclusion of livestock, with their high upfront cost provides a benefit-cost ratio of 2.45, also indicating a benefit of at least £2 for every £1 invested. This ratio would be somewhat lower (2.29) if beneficiaries who adopted indirectly as a result of ECRP were excluded from the model.
- A **combination package** (including the core package, irrigation and livestock) results in a benefit-cost ratio of 2.41, suggesting that for every £1 invested, the aggregated benefits across the combination of interventions, offset against the costs, continue to result in a benefit of at least £2.

Table 1. Variations in key benefit-cost ratios

	Core Package	Core Package + Irrigation	Core Package + Livestock	Combination Package
Main Model	2.71	2.51	2.45	2.41
MIS Beneficiaries	1.61	2.17	1.90	2.28
Lowest Cost IPs	5.11	3.59	4.39	3.49
Beneficiary Perspective	8.63	4.92	7.21	4.86

Overall, it can be seen that the analysis suggests that the core package offers the best return on investment. It should however be noted that some income from the other activities may be invested in agriculture, therefore offering the core package in isolation may result in lower benefits overall. A comparison of cost-benefit analysis of similar interventions⁶ found that benefit-cost ratios for sustainable agriculture and disaster risk reduction activities range from below one (not economically viable) to £86 for every £1 of investment. Therefore, although generally cost-effective, there may have been room to improve the cost effectiveness of the programme. The results are also far more modest than those calculated in the earlier CBAs (2014 and 2016).

This is partially due to the use of a different source of beneficiary numbers. This CBA used only those beneficiaries found to be additional by a statistically significant impact evaluation, rather than those reported in previous focus group discussions and using programme monitoring data. In addition, some benefits were excluded because the household survey did not find a significant increase in benefits from these activities (compared to non-beneficiaries).

The analysis also considered the impact of different components of the package and found that, if implemented alone, the post-harvest management and livestock components do not appear to be viable. For post-harvest management, benefits are relatively low due to the high level of existing practices, meaning that there are very few additional beneficiaries and the marginal impact of the ECRP practices is low. In the case of livestock, the high level of livestock ownership in the general population also significantly reduces the benefits that can be attributed to ECRP. For example, the intervention appears viable (a benefit-cost ratio of 2.75) when sensitivity analysis was conducted using beneficiary numbers reported by the implementing partners. In addition, the income from livestock is likely to have been lower than previous years due the floods and droughts experienced in 2015/16. It is likely that

⁶ Cabot Venton, C. (2010) *Cost Benefit Analysis for Community Based Climate and Disaster Risk Management: Synthesis Report*. TearFund (available at: http://tilz.tearfund.org/~media/files/tilz/topics/14851_finalcbasynthesisreportaugust2010.pdf).

households sold animals during these periods to cope, which would have reduced the size of their herd/flock.

3.6 Sensitivity analysis

Sensitivity analysis was undertaken to test how robust the analysis is to changes in the underlying cost and benefit assumptions. Results from the sensitivity analysis show the following:

- Variation in IP implementation costs strongly affects the analysis. For example, when the benefit-cost ratio for the core package is recalculated using the lowest IP costs per beneficiary for conservation agriculture, improved seeds, post-harvest management and VSL, the ratio doubles from 2.71 to 5.11 (refer to Table 1).
- The analysis in the Final Evaluation allows additional beneficiaries and costs to be identified (by comparing adoption and benefits to the non-beneficiary population and ignoring benefits that overlap with those in the existing population). This makes the results more accurate but it should be noted that many evaluations do not have the resources to make these assessments. As such, comparing results with other programmes may provide a false sense that ECRP has achieved less than other programmes. The sensitivity analysis also looked at the impact of only using additional beneficiaries. Because implementing partners reported a similar number of beneficiaries (compared to the household survey) for the activities included in the core package (within 26%), using reported beneficiaries instead of estimated beneficiaries does not have a large impact on the main results. However, when it comes to livestock and irrigation beneficiaries (13% and 53%, respectively, of the beneficiary numbers reported by implementing partners), the difference is much higher and this has had a large impact on the reported results. In particular, the livestock only intervention appears uneconomical under the main model, with a benefit-cost ratio of 0.73 but economical using reported beneficiaries, with a benefit-cost ratio of 2.75. While for irrigation only, the benefit-cost ratio increases somewhat, from 2.37 to 2.83.
- From a beneficiary perspective, the core package results in the most benefits (with a benefit-cost ratio of 8.63). While the other interventions follow similar trends to the programme level CBA, apart from livestock being more beneficial than irrigation (with benefit-cost ratios of 4.68 and 3.60, respectively).
- On the other hand, the inclusion of less strongly performing interventions has a less of an impact on the benefit-cost ratios. For example, excluding post-harvest management (which did not have strong results due to the high level of existing post-harvest management techniques) only increases the benefit-cost ratio for the core package from 2.71 to 3.20.

- Similarly, variations in beneficiaries' costs and benefits was less important than programme costs and beneficiary numbers. For example, sensitivity analysis was conducted for irrigation (the intervention with the greatest variation in costs). The analysis looked at highest and lowest net upfront costs (minus first year benefits to allow for any correlation between higher costs and higher benefits). This analysis found that when the highest net cost is included, the ratio decreases from 2.51 to 2.17, whereas lowest net costs increase the ratio to 3.08. One of the seven schemes assessed skewed the costs upwards, suggesting that additional information from other schemes is more likely to improve the benefit-cost ratio than decrease it.

3.7 Equity

While cost-benefit analysis is a useful tool for helping to understand the value of the ECRP interventions, given ECRP's strong focus on equity, the cost-benefit analysis should be interpreted with caution. First, poorer households tend to have small plots of land and are less able to afford farming inputs, such as fertiliser and seeds or feed for livestock, as such, the quantitative benefits of poorer households tend to be lower and the cost-benefit ratios for interventions that target poorer households can therefore be expected to be lower than those targeting households involved in higher value activities. Second, improvements in equity are difficult to quantify and are therefore largely ignored in the analysis. Third, the increased resilience of poorer households may be comparatively lower (in monetary terms) but the relative impact on these households is likely to be far greater⁷. Finally, poorer households and the most vulnerable are the most likely to require assistance after climatic shocks but by accumulating some assets they may be able to at least manage smaller shocks.

In addition, each of the different interventions has equity impacts in and of itself. While not the main focus of this analysis, some considerations that should be taken into account when considering the choice of interventions include:

- **VSL:** By allowing participants to form VSL groups to set their own contribution and interest values, and encouraging beneficiaries to form groups with other members of a similar socio-economic level, the VSL model can be accessible to almost anyone. Nevertheless, the poorest households may still find it difficult to manage even the smallest contributions prior to having benefited from other interventions. As such, the choice by some IPs to first establish VSLs and then only introduce interventions

⁷ For example, if a poor household improved its food security from seven to nine months, while a poorer household improved its food security from two to three months, the absolute impact is that the poor household achieved double the improvement of the poorer household. However, the relative impact is that the poorer household achieved a 21% greater improvement in food security (150% compared with 129% for the poor household).

via these groups, may prevent the poorest households from becoming involved in any of the ECRP interventions. In addition, in a small number of cases, FGDs reported potentially predatory lending behaviour (i.e. better off households joining VSL groups simply to collect interest on their savings), while in some cases, challenges with repaying loans resulted in participants having their assets or even their home repossessed, hence increasing their vulnerability. It should however be noted that at least one FGD participant (who had not been able to repay his loan on time) noted that repossession is a method of last resort (only used when VSL participants take loans and make no attempt to repay them).

- **Conservation agriculture:** Conservation agriculture is a good intervention in terms of equity as it requires fewer inputs than normal agriculture. However, it is labour intensive, which means there may be issues with participation for people with disabilities.
- **Improved seeds:** Seeds were distributed free and targeted poorer households. However, after three seasons seeds can no longer be reused. Therefore, once ECRP closes, assuming seeds are available to purchase (which is not always the case), it is likely that better off households will be better at continuing with improved seeds.
- **Irrigation:** The equity impact of irrigation is likely to be mixed, depending on targeting and households access to land and labour. In some cases, IPs facilitated access to land for poorer households – either through free loans or leases of better off households' land during the winter (dry) season, increasing participation of poorer households. Conversely, people with disabilities may have had difficulty participating in irrigation schemes, particularly where participation in scheme construction was a prerequisite for involvement. Some FGD participants also dropped out of schemes because they found it was too exhausting to work the treadle pumps.
- **Livestock:** Livestock beneficiaries were selected based on not owning livestock at the time and ability to care for the animals. The latter criteria may have excluded poorer households, particularly in the case of pigs, which have very high upfront and ongoing costs. On the other hand, poultry interventions specifically targeted the most vulnerable, including the disabled and mothers of vulnerable children.

4 Conclusions

All of the ECRP packages of interventions appear to be economically viable, with benefits between £2 and £3 for every £1 invested (by the programme and beneficiaries). Benefit-cost ratios for the ECRP package of interventions range from 2.45 (for the core package plus livestock) to 2.71 (for the standalone core package). These benefits are in-line with other similar programmes (although on the lower-end), potentially due to the use of lower beneficiary numbers, as the household survey data meant that only additional beneficiaries were included in the analysis. This means that attribution of these benefits to the ECRP programme is strong but beneficiary numbers are lower than those reported by the implementing partners. Overall, however, sensitivity analysis found that the difference in costs for implementing partners has more impact on the economic viability of the interventions compared to differences in beneficiary numbers or variations in beneficiary costs and benefits.

Nevertheless, the analysis suggests that certain interventions may not be economically viable on their own. For example, when assessed on its own, post-harvest monitoring has benefit-cost ratio of 0.11. This is partly due to the majority of beneficiaries and non-beneficiaries already adopting some form of post-harvest management, as well as high costs of the new approach resulting in some beneficiaries choosing to not continue with the new practices. As such, the marginal (additional) benefit for this activity is very low.

Based on the assumptions used in the main CBA model, the livestock component also does not appear to be economically viable on its own (BCR 0.73). However, this is partly due to the high level of livestock purchase by outwith the programme (reducing attribution of beneficiaries). For example, when beneficiaries reached by the programme are included in the analysis (based on reporting by implementing partners) the intervention appears economically viable (BCR 2.75). It is also likely that benefits are lower for livestock because households may have been forced to sell some animals to cope with the 2015/16 floods and droughts. If this is the case, the lower benefit-cost ratio hides the important role livestock may have played in increasing resilience. From a beneficiary perspective, livestock are highly economical (BCR 4.68), even when purchased themselves using income from other activities (BCR 4.68).

It should however be noted that there is a risk in looking at cost-benefit ratios for individual interventions as ECRP promoted uptake of packages of interventions and almost all beneficiaries were involved in at least three activities, with benefits from each intervention feeding into one-another. For example, beneficiaries use income from all activities for crop inputs, schooling, purchasing assets including livestock, meeting other general costs and purchasing food, which in turn frees up time that might have been used for paid labour for

undertaking productive activities, such as farming. Given the overlap in benefits across interventions and the relatively small variation between models, it is not possible to draw strong conclusions about the best package of interventions for future, similar programmes.

Annex 1. Values and Assumptions of the CBA

Table 2. Beneficiary cost and benefit values and assumptions included in the CBA model

	Value (GBP)	Value (MKW)	Source	Calculation	Comments
Conservation agriculture and improved seeds					
Costs					
<u>Upfront Costs</u>		<u>9,922</u>			
Average additional upfront farming costs	10.72	9,922	FGDs	Calculation of upfront costs of conservation agriculture minus costs of original practices	Costs include making pits and buying tools, such as panga knives. Average based on FGDs in all 11 districts. Lowest cost is zero (i.e. borrow tools), highest cost is 30,000 kwacha.
<u>Ongoing Costs</u>		<u>4,906</u>			
Average additional ongoing farming costs	n/a	n/a	FGDs	Calculation of ongoing costs of conservation agriculture minus costs of original practices	On average, costs of farming reduce with CA (although this varies), therefore listed under benefits.
Expected additional cost of improved seeds	5.30	4,906	FGDs	Expected cost of improved seeds (if available) minus current cost of seeds.	
Benefits		<u>82,175</u>			
Reduction in farming costs	13.73	12,711	FGDs	Overall, beneficiaries reported a reduction in of farming costs of MKW 12,711. However, this varied considerably between regions.	Average based on FGDs in all 11 districts. Average normal farming cost is 103,717. New ongoing costs range from a reduction of 66,500 kwach to an increase of 78,000 kwacha.

Crop benefits	75.02	69,464	HHS	Weighted (60% good / 40% bad years) additional crop benefits for CA+seed beneficiaries.	Weighted value of increased crop productivity in 2016/17 and 2015/16 as proxy for good /bad years. Calculated for top six crops (those practiced by 15% or more of respondents, i.e. maize, sorghum, rice, cassava, pigeon peas and sweet potato) based on median crop sale price for the average increase in crop productivity for beneficiaries using CA and improved seeds compared to productivity of communities not using these practices (using data that has been cleaned for outliers). Assume value of crops is the same whether consumed or sold (i.e. if market price is greater than household value, would sell rather than consume).
Post-harvest management					
Costs					
<u>Upfront Costs</u>		<u>n/a</u>			
Average additional upfront storage costs	n/a	n/a	FGDs	On average, upfront storage costs reduced (although this varies), therefore listed under benefits.	
<u>Ongoing Costs</u>		<u>15,383</u>			
Average additional ongoing storage costs	16.61	15,383	FGDs	Average difference in ongoing storage costs. Average original cost was 23,858. New costs vary from 7,000 to 36,500 kwacha per year.	
<u>Upfront Benefits</u>		<u>17,692</u>			
Average reduction in upfront storage costs	19.11	17,692	FGDs	Reduction in upfront cost based on 6 districts that responded. Average original ongoing cost was 5,792. New costs vary from nothing to 20,000 kwacha.	

Ongoing Benefits		<u>1,200</u>			
Reduction in loss of crops	1.30	1,200	HHS	Reduction in percent of crops lost (reduced from 5% to 3%) applied to average number of 50kg bags stored (12) valued at the median price of maize (100 kwacha per kilo)	Very low number because little additional benefit but including to maintain balance in the analysis.
<u>Irrigation</u>					
<u>Upfront Costs</u>		<u>80,000</u>			
Irrigation scheme construction costs	86.40	80,000	FGDs	Average cost, however, big variation in upfront costs between 18,615 and 161,000 per beneficiary based on original CBA.	Largely in-kind payments through labour and materials collected locally. From 2016 CBA, adjusted to 2017 prices and validated with additional FGDs (only 2 of 11 districts covered by 2017 Cost FGDs had irrigation schemes).
<u>Ongoing Costs</u>		<u>27,500</u>			
Membership and farming costs	29.70	27,500	FGDs	Average scheme membership 1,000 kwacha, plus fertiliser (21,000 kwacha) and pesticide (1,500 kwacha) for a half acre.	2016 CBA, adjusted and validated. Fertiliser and pesticide costs not reported by Cost FGDs but mentioned in other FGDs, therefore based on reported costs of normal farming practices.
<u>Benefits</u>		<u>149,783</u>			
Crop benefits	161.77	149,783	HHS	Weighted (60% good / 40% bad years) irrigation yield for 5 main irrigation crops (maize, tomatoes, vegetables, common beans and sweet potatoes). Valued based on median crop prices.	100% of value, as irrigation is an additional crop and only additional beneficiaries are included in the analysis. 2016 CBA estimated weighted crop values of 171,366.

Livestock				72% of livestock beneficiaries (goats and chickens) have goats, 28% have chickens. Pigs and guinea fowl were only 3% and 1% of beneficiaries, respectively, so excluded from the analysis (these beneficiaries are included based on goat/chicken weighted costs and benefits).
<u>Upfront Costs (Total)</u>	<u>12.85</u>	<u>11,900</u>		Weighted upfront costs from goats and chickens (72% goats, 28% chickens)
<u>Ongoing Costs (Total)</u>	<u>10.45</u>	<u>9,680</u>		Weighted ongoing costs
<u>Benefits (Total)</u>	<u>59.62</u>	<u>55,203</u>		Weighted benefits
Goats				
<u>Upfront Costs</u>	<u>15.12</u>	<u>14,000</u>		
Cost of building kraal	15.12	14,000	FGDs	Average labour (priced at local <i>ganyu</i> rate) and material costs. Combination of responses from 2016 CBA, adjusted to 2017 prices, and feedback from 2017 Cost FGDs (9 of 11 districts covered by 2017 Cost FGDs had goats).
<u>Ongoing Costs</u>	<u>12.42</u>	<u>11,500</u>		
Veterinary membership, feed	12.42	11,500	FGDs	Average membership and care (feed and labour) costs.
<u>Benefits</u>	<u>55.08</u>	<u>51,000</u>		
Sale of animals	46.98	43,500	HHS	Average number of goats sold (2.9) times median sale value (15,000 kwacha).
Consumption of animals	8.10	7,500	HHS	Average number of goats consumed (0.5) times median sale value (15,000 kwacha). Assume value of consumption is at least equal to sale price as otherwise household would sell.

Animal products (milk/manure)	n/a	n/a	HHS	Not significant in HHS. 2016 CBA had calculated manure value at 10,000 kwacha per year but excluded it did not fit with results from the flood survey.	From 2016 CBA, adjusted to 2017 prices and validated with additional FGDs (only 1 of 11 districts covered by 2017 Cost FGDs had chickens).
<u>Chickens</u>					
Upfront Costs	7.02	6,500			
Cost of building hutch	7.02	6,500			
Ongoing Costs	5.40	5,000			
Veterinary membership, feed	5.40	5,000			
Benefits	71.29	66,009			
Sale of animals	12.74	11,800		Mean is 5.9 per beneficiary @ 2,000 kwacha (average price)	
Consumption of animals	9.72	9,000		Mean is 4.5 per beneficiary	
Sale of eggs	11.73	10,865		Mean is 41 per month for 5 months @ 53 kwacha	
Consumption of eggs	37.09	34,344		Mean is 54 per month (all year) valued at market price (53 kwacha)	
<u>Village savings and loans</u>					
Upfront Costs	1.63	1,513			Membership varies by district but all areas (apart from Mangochi) practice and no area has 100% coverage. [HHSq505&HH3]
VSL-related upfront costs	n/a	n/a			Low cost and provided by project (i.e. a lockable box and exercise book for keeping records).

Livestock upfront costs	32.67	30,250		Average value (from goats and chickens), plus average cost of purchasing 2 goats (@15,000 kwacha) or 5 chickens (@2,000).	Have used 50:50 because more-or-less approximately half of all respondents to the household survey had chickens (1,450 of 2,236) and/or goats (1,015). [HHSq153] Households may buy only one animal but this keeps benefit and cost calculations similar to previous calculation.
Applied livestock costs	1.63	1,513	HHS	5% of VSL beneficiaries (2016/17) used loans to purchase goats.	
<u>Ongoing Costs</u>	<u>0.45</u>	<u>413</u>			
VSL-related ongoing costs	n/a	n/a			VSL costs are opportunity cost of saving (but this is returned with interest so do not included) and interest (assumed to cover present value of access to future earnings, so also excluded - particularly as members receive interest back as part of payouts).
Livestock ongoing costs	8.91	8,250		Average value (from goats and chickens).	
Applied livestock costs	0.45	413	HHS	5% of VSL beneficiaries (2016/17) used loans to purchase goats.	
<u>Benefits</u>	<u>4.50</u>	<u>4,163</u>			Note a lot of benefit goes into improved crop productivity, which is captured under CA/seeds.
Livestock benefit	63.18	58,505	HHS	Average value (from goats and chickens).	This value also applies to 6% of beneficiaries who bought livestock and accredit ECRP but not clear which intervention.
Applied livestock benefits	3.16	2,925	HHS	5% of VSL beneficiaries (2016/17) used loans to purchase goats.	
Increased future earnings from increased schooling	8.91	8,250	FGDs	Benefit calculation from 2014 CBA adjusted for inflation.	Refer to MTE. For every additional school year, income increases by 10%.

Applied school benefit	1.34	1,238	HHS	15% of beneficiaries used VSL loans for school fees in 2016/17 (this is lower than previous year so may not be a full year or may indicate reduction in need for loans to pay school fees due to better harvests). No counterfactual for households paying for school fees without VSL but number is consistent across years and is FGD respondents commonly reported that they could now afford to send kids to school.
Source of loan	n/a	n/a		94.9% of loans come from VSL, less than 2% of population have used other financial providers. All respondents: 44% have used VSL, <2% have used any other financial provider. For beneficiaries, this increases to 63% and <3%. For non-beneficiaries, this reduces to 24% and <1%. [HHSq503]
Reduction in interest	n/a	n/a		Excluded. So few beneficiarie taking other loans. VSL is median of 20% over 1 month in 2016/17.
Improved housing	n/a	n/a		Qualitative improvements from better housing (health/resilience). Difficult to place a value on benefits.
Income from businesses	n/a	n/a		Excluded because not significantly different from matched non-beneficiaries.

Table 3. Beneficiary numbers included in the CBA model (based on the household survey)

Beneficiaries (HHS)	Total	Drought tolerant seeds	Conservation agriculture	Seeds+CA (CA only)	PHM	Irrigation	Livestock	VSL
2012 (calc.)	29,549	2,955	6,855	6,855	990	4,521	742	8,303
2013 (calc.)	29,549	2,955	6,855	6,855	990	4,521	742	8,303
2014 (calc.)	29,549	2,955	6,855	6,855	990	4,521	742	8,303
2015 (calc.)	29,549	2,955	6,855	6,855	990	4,521	742	8,303
2016 (calc.)	29,549	2,955	6,855	6,855	990	4,521	742	8,303
2017 (calc.)	29,549	2,955	6,855	6,855	990	4,521	742	8,303
Total (calc.)	177,295	17,730	41,132	41,132	5,939	27,126	4,450	49,820

Table 4. Beneficiary numbers included in the CBA model (based on implementing partners' reporting)

Beneficiaries (MIS)	Total	Drought tolerant seeds	Conservation agriculture	Seeds+CA (CA only - calc.)	PHM	Irrigation	Livestock	VSL
2012 (calc.)	29,549	3,373	9,245	9,245	20,789	8,585	5,758	8,239
2013 (calc.)	29,549	3,373	9,245	9,245	20,789	8,585	5,758	8,239
2014 (calc.)	29,549	3,373	9,245	9,245	20,789	8,585	5,758	8,239
2015 (calc.)	29,549	3,373	9,245	9,245	20,789	8,585	5,758	8,239
2016 (calc.)	29,549	3,373	9,245	9,245	20,789	8,585	5,758	8,239
2017 (calc.)	29,549	3,373	9,245	9,245	20,789	8,585	5,758	8,239
Total	177,295	20,241	55,472	55,472	124,735	51,509	34,548	49,431

Table 5. Programme costs included in the CBA model (total programme costs)

Programme costs (GBP)	Total	Drought tolerant seeds	Conservation agriculture	Seeds + CA (calc.)	PHM	Irrigation	Livestock	VSL
2012 (calc.)	474,368	53,267	21,761	75,027	24,138	91,398	36,843	35,680
2013 (calc.)	2,846,208	319,601	130,563	450,164	144,830	548,386	221,055	214,079
2014 (calc.)	6,166,785	692,468	282,887	975,355	313,799	1,188,170	478,953	463,839
2015 (calc.)	6,096,251	227,655	496,264	723,919	79,407	890,302	445,360	522,860
2016 (calc.)	5,028,279	173,126	237,771	410,897	61,159	628,707	537,617	453,834
2017 (calc.)	3,131,921	194,823	65,791	260,614	56,441	323,072	139,168	223,485
Total (calc.)	23,743,812	1,660,940	1,235,037	2,895,976	679,774	3,670,034	1,858,996	1,913,777

Table 4. Programme costs included in the CBA model (based on lowest cost implementing partners' cost per beneficiary)

Programme costs (GBP)	Total	Drought tolerant seeds	Conservation agriculture	Seeds+CA (CA only)	PHM	Irrigation	Livestock	VSL
2012 (calc.)	3,063,189	151,352	60,030	211,382	35,522	294,187	113,971	34,747
2013 (calc.)	3,063,189	151,352	60,030	211,382	35,522	294,187	113,971	34,747
2014 (calc.)	3,063,189	151,352	60,030	211,382	35,522	294,187	113,971	34,747
2015 (calc.)	3,063,189	151,352	60,030	211,382	35,522	294,187	113,971	34,747
2016 (calc.)	3,063,189	151,352	60,030	211,382	35,522	294,187	113,971	34,747
2017 (calc.)	3,063,189	151,352	60,030	211,382	35,522	294,187	113,971	34,747
Total	#####	908,115	360,180	1,268,294	213,132	1,765,123	683,828	208,483



Enhancing Community Resilience Programme Final Evaluation: Annex L

A case study of policy influence using process tracing with
Bayesian updating

Submitted to DFID by LTS International and the Centre for Development Management

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Acronyms

CADECOM	Catholic Development Commission Malawi
CC	Creative Commons
CEPA	Centre for Environmental Policy and Advocacy
CISONECC	Civil Society Network on Climate Change
CSO	Civil Society Organisation
DC	District Commissioner
DFID	Department for International Development
DPD	Director of Planning and Development
DRM	Disaster Risk Management
DRP	Disaster Recovery Plan
EAD	Environmental Affairs Department
ECRP	Enhancing Community Resilience Programme
M&E	Monitoring and Evaluation
NAPA	National Adaptation Plan
NCCMP	National Climate Change Management Policy
NGO	Non-Governmental Organisation
OPC	Office of the President and Cabinet
ToR	Terms of Reference
UNDP	United Nations Development Programme

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1 Introduction

The Enhancing Community Resilience Programme (ECRP) was a ~£30m programme funded by DFID, the Royal Norwegian Embassy and Irish Aid which was designed to address the context of chronic climate vulnerability faced by rural people in Malawi. ECRP was implemented in the period 2011 to 2017.

CEPA and ECRP developed a programme advocacy strategy in 2012. This identified five advocacy priorities, covering the climate change, disaster risk management, energy, climate forecasting and agricultural policy areas. The strategy was reviewed in 2013 and an additional two priorities in relation to gender and forestry had been included by 2015, meaning the total range of advocacy effort covered seven priorities as below.

ECRP Advocacy Priorities 2012-2017

Government to enhance **coherence between CC and DRM policy** instruments and implementation

Government to **increase budgetary allocations for CC and DRM** from 0.9% to at least 2% by 2015;

A **revised Energy Policy** by 2015 that reflects an integrated approach to rural energy provision, combining different renewable, efficient and equitable solutions to provide village energy supply systems to meet both domestic and small and medium enterprise resilience-building needs;

An **enhanced climate forecasting service** that supports resilience-building by 2014;

Government to provide significant profile and priority to **conservation agriculture (CA)** the draft National Agricultural Policy (NAP) to provide direction and guidance by 2015;

CC adaptation and DRM plans and interventions at national, district and community level are gender sensitive; and

Forestry governance, sustainable charcoal and harmonising approaches to tackle deforestation/reforestation

In 2016, the programme narrowed its focus from the remaining year of programme implementation, focusing only on lobbying for approval of National Climate Change Policy, lobbying for finalisation of the National Energy Policy, lobbying for finalisation of the Meteorological Policy and providing input into the National Resilience Plan based on ECRP experiences. They also worked on advocacy at district level. A summary of their achievements in relation to these advocacy areas have been shared separately.

As part of the final evaluation of the Enhancing Community Resilience Programme, the M&E Agency commissioned an in-depth contribution analysis case study of one of ECRP's advocacy objectives. Following stakeholder consultation, the case of the ECRP's influence on *National Climate Change Management Policy* was selected.

The present study involved review of existing literature and consultations with stakeholders and was guided by a hybrid of contribution analysis, process tracing and Bayesian updating which facilitates dialogue between theory and evidence. The goal was to assess the degree of confidence in 'contribution claims' of the ECRP advocacy work to influencing the

development of the National Climate Change Management Policy in a transparent and replicable way.

This document presents the findings and guides the reader through the use of the methodology (chapter 3). After some notes on the context and background of the evaluation and the programme (chapter 2), the main contribution claim is presented and each component assessed in terms of robustness, or confidence level about its existence on the basis of the currently available evidence (chapter 4). Chapter 5 presents the conclusions and main lessons learned in terms of the specific role of the ECRP – mostly of CEPA – in the Climate Change policy advocacy process, as well as some general suggestions for the improvement of policy processes. Lessons learned about the methodology and ways to improve the credibility of findings are included and continue in Annex A, which outlines how the assessment of the contribution claim might differ if the evaluation team had been able to access documentation mentioned by the stakeholders in the evaluation.

2 Background and Context

This section provides a brief overview of the Malawian political system to place the remainder of the report into context.

2.1 Government in Malawi

Following independence in 1964 Malawi was ruled by President Dr. Hastings Kamuzu Banda. Dr. Banda initiated a highly personalised political system in which the president holds supreme powers. Declared president for life in 1971, decision-making was vested in him with very little powers of accountability. Parliamentary candidates were handpicked in order to ensure support; and the civil service was highly politicised – executing his choices.

In the early 1990s, after three decades of authoritarian one-party rule, Malawians embraced multiparty democracy as the dominant framework for organizing national politics and governance. This entailed a process of institutional reforms aimed at creating and sustaining democratic governance. However, there are a number of challenges democratic consolidation in Malawi are many, varied and transcend the state-society divide. Some challenges reflect structural dysfunctions and institutional deficiencies, including the co-existence of informal and formal governance systems. Parliamentary elections are held at the same time as the presidential elections, and are subject to the same norms. Parliament does not have a strong role within the government and cannot always hold the president and his cabinet to account. Policy development is the responsibility of Sector Line Ministries, which are headed by a Principal Secretary (PS) and Directors heading various departments, Sections and units. The Government of Malawi has policy formulation guidelines which are contained in the *Guide for Decision Making Processes* which were launched in 2015 by the Office of the President and Cabinet. This guide provides a systematic approach to procedures that govern all policy and decision-making processes of the Malawi Government. Despite the existence of the guide (and the fact that the guides are a relatively new development), practically Policy development processes in Malawi have taken various steps and shapes. Theoretically, policy formulation has followed four main components of the policy-making process, namely: agenda-setting, policy formulation, implementation, and evaluation.

In practice, however, the policy development process has not been a linear process as depicted, moving from agenda setting, formulation, implementation, to evaluation. In Malawi (just like in other contexts), policy development has largely been an iterative process that does not progress neatly from agenda setting to evaluation. The process has not neatly been undertaken as presented in theory but rather the different stages have often been blurred, policy actors moving back and forth between the different stages. It has developed as a complex process involving many actors and factors, often all interacting at the same time to shape policy decisions. Policy development in Malawi is normally initiated by the relevant

Government ministry, department and/or agency. However, experience has shown that policy development has emanated from the following:

1. Government ministries and departments, political leaders, donors and development partners, programme implementers and CSOs.
2. Regional and global development and governance commitments the Government has made
3. Local situations and developments including the political, socio-economic context, and cultural contexts.
4. Available evidence or knowledge on the policy issue.

2.2 Institutional arrangements for climate change

The Ministry of Natural Resources, Energy and Mining (MNREM) comprises a number of departments: including the Environmental Affairs Department (EAD), Forestry Department, and Department of Climate Change and Meteorological Services (DCCMS), Department of Mines, Department of Energy Affairs and Department of Geological Survey. The National Climate Change Programme, which initially spearheaded Malawi's climate change interventions, was initially housed in the then Ministry of Finance, Economic Planning and Development – with the intention that it would be embraced as a key development issue. However, under Joyce Banda's administration (2012 – 2014) it was moved to a new ministry – the Ministry of Environment and Climate Change Management – which was ultimately subsumed within the MNREM.

Both EAD and DCCMS play a key role in coordinating climate change issues, both locally and internationally (through the UNFCCC negotiations). There is also a Climate Change Steering Committee comprising PS representatives, which is chaired by the Ministry of Finance and Economic Planning and Development and meets half-yearly. It is, in turn, advised by a multi-stakeholder Climate Change Technical Committee chaired by DCCMS.

2.3 ECRP and the policy development process

The ECRP advocacy strategy was managed by the Centre for Environmental Policy and Advocacy (CEPA). This non-governmental organisation was established in 2002 and, according to its website *"provides advice and conducts research in environment and natural resources management policies and legislation with a view to designing appropriate interventions for promoting sustainable environment and natural resources management."* It provided two staff to the ECRP team who worked across a range of advocacy issues at national and district level and who could commission supplementary analysis and research where required.

Over the course of the ECRP implementation CEPA used a range of advocacy approaches including policy research, private lobbying, publishing stories in newspaper or paying for radio and TV broadcasts. Not all of CEPA's activities were funded by ECRP but in this case it is considered that CEPA would not have been in position to conduct advocacy on the National Climate Change Management Policy without funds from ECRP. However, ECRP would also not have been in a position to conduct advocacy of this nature without CEPA's prior track record, expertise and relationships, since it was these relationships that allowed CEPA to be invited to advocacy spaces.

CEPA also worked closely with other networks of civil society organisations with complementary objectives. Of particular importance is the Civil Society Network on Climate Change (CISONECC) to which CEPA is a member. Initially, CISONECC was housed under CEPA during its inception stages but it is currently an independent entity as a secretariat for CSOs working on climate change issues. CEPA as an independent organization and also working with CISONECC has been a key player in the formulation of the NCCMP, and has enabled ECRP to coordinate inputs from a broad base of civil society rather than the ECRP agencies alone.

The NCCM policy development process was initiated between 2009 – 2012 with discussions within Government and with development partners on the need for a Policy on climate change in Malawi. During the same period, CSOs also started agitating for the need of a Policy and started lobbying Government and development partners on the Policy. Between the same period, Government undertook a policy and legislation gap analysis on climate change and climate change related initiatives. In the year 2012, the Government initiated the process of developing the NCCMP with support from donors and development partners. The support was channelled through and coordinated by UNDP. In early 2012, CSOs led by CEPA undertook a review of key policies and legislation related to climate change and disaster risk management and prepared a policy brief on *Policy Framework for Climate Change Adaptation and Disaster Risk Management in Malawi: A Review of Key Policies and Legislation*. The policy review informed the formulation of Issues Paper, White Paper and the draft National Climate Change Management Policy which were developed by Government through a team of independent consultants led by LEAD SEA.

In the same year of 2012, CSOs led by CEPA prepared a policy position paper entitled *Towards Development of Climate Change Policy in Malawi* which proposed elements for the draft National Climate Change Management Policy. The contents of this position paper were evidently reflected in the Issues Paper and White Paper that formed the basis for NCCMP development. In the same period, CEPA was nominated to be part of the team of Subject Matter Specialists to work alongside the Government of Malawi consultants to develop the NCCMP. In December 2012, the Government of Malawi through the consultants developed a draft NCCP which was shared for review and inputs from stakeholders. In 2013, there were various versions of the draft NCCMP which were shared for input by stakeholders including

CSOs, and in December 2013, the EAD submitted the draft National Climate Change Management Policy to the Office of the President and Cabinet. After consideration of the draft Policy by National Steering Committee of PSs, the Cabinet Committee on Infrastructure, the Parliamentary Committee on Natural Resources and the Cabinet, the National Climate Change Management Policy was approved in June, 2016 and launched in October 2016.

3 Evaluation Questions and Methodology

This case study has employed a hybrid of Contribution Analysis and Process Tracing, aided by formal Bayesian Updating (Befani et al. 2014, 2016a, 2016b, 2017a and 2017b). The method is well suited to single case studies, where the aim is to describe a process or mechanism that led to an interesting change, and the evaluator's focus is understanding how and why that change happened. In this case the focus was on understanding how the NCCMP Policy had been developed and to identify the contribution of various advocacy actors and initiatives, in particular those driven by the ECRP and CEPA.

The method consists of 4 steps:

1. Developing a testable claim (that is a claim that can be verified and corroborated by empirical evidence); this has been completed during review of available documentation and interviews.
2. Developing expectations and "wishes" of desired evidence that could help increase confidence in the above claim (smoking guns); this has also taken place during interviews and review of documentation, essentially in parallel with the step above. Hoop tests were usually not formalised because when attention was finally focused on a claim component, it usually meant having passed several hoop tests implicitly. Dates and timelines helped a lot in ruling out hypotheses and in selecting the final claim components.
3. Assessing confidence in the claim components (and eventually the claim as a whole) in an as formalised as possible way (see Box 1). This assessment is based on Confusion Matrix cells like Sensitivity and Specificity / Type I error; or the probabilities of observing a given piece of evidence if the claim is true and if the claim not true (under both hypotheses). If the evidence is observed (or not observed), these values are fed into the Bayes formula to update an initial confidence (assumed to be neutral and also known as the "prior"). In general, documents are considered stronger evidence because they rule out the possibility that key informants might have lied or skewed their accounts in specific directions (technically, they have a lower "Type I error"). The same account coming from several independent sources is also stronger evidence than the same account coming from one or two sources, particularly if not independent (because probabilities can be multiplied in that case providing an ever lower Type I error, or lower probability that all that evidence is observed if what they say is not true).

4. Sharing and discussing the findings with stakeholders to identify lessons learned.

**Box 1:
Confidence
Rubrics**

Practically certain that () is true	0.99+
Reasonably certain that () is true	0.95 – 0.99
Highly confident that () is true	0.85 – 0.95
Cautiously confident that () is true	0.70 – 0.85
More confident than not confident that () is true	0.50 – 0.70
Neither confident nor not confident that () is true (or false) – no idea	0.5
More confident than not confident that () is false	0.30 – 0.50
Cautiously confident that () is false	0.15 – 0.30
Highly confident that () is false	0.05 – 0.15
Reasonably certain that () is false	0.01 – 0.05
Practically certain that () is false	Less than 0.01

4 Description of the Process After Review of Currently Available Evidence

After a first review of available documentation (mainly the position paper, policy review, issues paper and white paper), it was immediately noticed:

- a. how the position paper differed quite substantially from the policy review
- b. how the issues paper differed from the white paper
- c. how the white paper and the draft policy shared many substantial similarities.

As a consequence, one of the main goals of the fieldwork in Malawi was to reconstruct the process between the issues paper and the white paper and also to understand the inputs into the position paper that were not related to the policy review. The fieldwork has also enlightened on many other aspects of the process, and this chapter presents the most accurate description of the process that has been possible on the basis of the currently available evidence collected before, during and after the fieldwork.

Below each component of the process, a box describes the level of confidence in the existence of the component and on which basis it can be justified. Notice that – for reasons of brevity – formal Bayesian updating is only described for a handful of claim components, but the posterior confidence level (confidence in the claim after observation of evidence) is always reported for every claim.

Annex A revisits the confidence levels in the various claim components taking account of evidence that could potentially be sourced and estimates the gains in confidence that the availability of additional documentation (and sometimes additional interviews with key informants) could allow. It should provide an idea of how important it is to have access to documentation for confidence in the findings, and how much more robust the latter could be if documentation were available.

1. In **2010** a consortium of donors (including Japanese Government and UNDP) started funding the Malawi National Climate Change Programme.

Interview with UNDP representative. Slight uncertainty about the date, other interview confirming existence of programme. **High confidence that this is true (90%).**

2. One of the issues discussed in the context of the NCCP was whether Malawi needed a stand-alone CC policy or to mainstream CC concerns into existing sectorial policies.

Interviews with UNDP and EAD representatives. Informants possibly not fully independent. Content compatible with existence of next step. **Cautious confidence that this is true (80%).**

3. A policy gap analysis was undertaken by the Government of Malawi (published in **September 2011**, before the first draft of the Policy Review) leading to the recommendation of adopting both above mentioned approaches.

Observation of actual document, in paper form. Copies taken. No additional evidence needed. **Practical certainty (99+%).**

4. The ECRP started its inception phase in **2011**

Terms of Reference for the contract. Final proposals for ECRP. **Reasonable certainty that it is true (97%).**

5. A Policy Review conducted by CEPA for ECRP and Discover was developed between **November 2011 and March 2012**

Observation of actual document, in electronic form. Multiple mentions during interviews and on other documents. No additional evidence needed. **Practical certainty (99+%).**

6. A three-year (2012-2014) advocacy strategy for ECRP and Discover was formulated between **2011 and 2012**.

Observation of actual document, in electronic form. Multiple mentions during interviews. No additional evidence needed. **Practical certainty (99+%).**

7. A team of academic consultants from three Universities was hired by the EAD (Govt of Malawi) to write the CC policy between **2011 and 2012**.

Multiple mentions during interviews and on other documents. ToR and admin documents withheld. **Reasonable certainty (98%).**

8. During the inception phase (**probably early 2012**) the team prepared a checklist of questions they wanted to ask stakeholders during future consultations, which was reviewed by CEPA on the basis of inputs from ECRP implementing partners (**July to October 2012**).

Observation of document, with comments by CEPA dated 31 October and 1st November 2012. Document (original author Asyati Chiweza) modified at the time of submission though. No trace of inputs from implementing partners, though CEPA's modus operandi has been mentioned in at least three interviews of non CEPA representatives. **Cautious confidence that this is true (75%)**.

9. The inception report was also reviewed by the Task Team or Expert Group or Subject Matter Specialists Group, comprising different sectoral experts including CEPA, which was set up by the NCPP / EAD and tasked with reviewing all the deliverables connected with the consultancy. (Possibly also by the National Technical Committee on CC?)

The existence of the Task Team and what its roles were has been mentioned in several interviews, there is **reasonable certainty (97%)** about its existence. However there has been only one specific mention of CEPA reviewing the Inception Report and no documents have been made available. Given CEPA's overall reputation (see "the role of ECRP") and overall claims about the complexity and redundancy of the process, we are **more confident than not that the claim is true (65%)**.

10. A position paper was developed by CEPA between **May and November 2012**, taking the policy review findings into account but also the advocacy strategy priorities. There seems to be other issues in the position paper not necessarily included in either the policy review or the advocacy strategy but the origin is unclear.

Observation and comparison of actual documents, in electronic form. **Reasonable certainty that it is true (97%)**.

11. The team of academic consultants developed an Issues Paper between **June and September 2012**. It was essentially a literature review, guided by the question "what key issues are [various relevant documents] covering?" The review was influenced by the following main documents:

- At the national level, the Malawi growth development strategy, one and two
- The National Communication on CC to the UNFCCC (one and two)
- The national adaptation plan (the NAPA)
- The CC policies of South Africa, Botswana and Namibia (especially South Africa)

Observation of actual documents plus account of one of the authors. **Reasonable certainty that it is true (97%)** (not absolute or practical because he might have forgotten key documents)

12. Three CEPA documents are cited: the Policy Review (CEPA 2012a), the Position Paper (CEPA 2012b), and CEPA 2012c.

Observation of actual document. **Practical certainty (99+%)**.

13. Out of the above mentioned three documents, at least two were extensively used and were (very) helpful (the Policy Review (CEPA 2012a) and the Position Paper (CEPA 2012b)).

Written acknowledgement on the document PLUS account from one of the authors. The chance of the authors acknowledging CEPA if not influenced is low. There is a culture of tending to avoid conflict in Malawi but it tends to show more as indifference than false claims. So the Type I error is set at around 10% (high confidence that it wouldn't happen). In academia there is also a tendency to give credit when due so we expect CEPA's role to be acknowledged if so deserving (sensitivity set at 90%, high confidence that it would be credited).

As for the oral account, the informant had no particular stake in claiming to be influenced by CEPA, but he had to be slightly prompted to recognise it and didn't include these documents in the main list of influences indicated at the beginning. Courtesy bias towards CEPA not very likely and what he says later confirms / describes influence in detail so Type I Error is still relatively low: high confidence that he would not say what he said if not influenced (12%). Also, high confidence that he would say, if influenced, especially when prompted, (87%).

The two pieces of evidence cannot be considered independent and you would expect the consultant to be coherent with what his team had written on the document. Taken together, they reinforce each other all the same (though not as much as they would if they were independent). The chance of observing both under the hypothesis of influence can be slightly raised to 93% (sensitivity, high confidence) and the Type I Error can be lowered to maybe 6% (high confidence).

From a neutral prior of 50%, that gives us a posterior of 94% (High Confidence that the claim is true)

14. It mattered that the CEPA documents were available in advance, just as the literature review was starting, which allowed them to play a guiding role for the consultants.

Consistent accounts from two key informants. One of the authors and CEPA. The author had no particular stake in explaining how and why they were influenced by CEPA, if not academic intellectual honesty, which could account for high confidence that he would (90%, sensitivity). The chance of him coming up with this compelling explanation if not influenced in such a way is very low (4%, Type I Error, reasonable certainty that he wouldn't).

CEPA had obviously an interest in claiming to have influenced the process but this account emerged as one of the key moments of the process and in theory they could have picked any other. So, the chance of them picking this particular moment if it wasn't true is lower than 50%, say 40% (more confident than not that they wouldn't, Type I error). And if this was true the chance of them mentioning it as one key moment is high, but not very high because there seems to have been other key moments they could have picked. So, sensitivity could be set at around 65% (more confident than not).

In this case the two pieces of evidence are independent and can be combined in the Bayesian update, yielding a posterior of 97% (reasonable certainty that the claim is true).

15. A technical review of the issues paper was commissioned by CEPA on behalf of CISON ECC and delivered in **October 2012**.

Observation and analysis of document. Practical certainty that claim is true (99+%).

NOTE: at the time of writing, a systematic comparison of this document (or different versions of it) with different versions of the issue paper and the white paper has not been possible. If conducted though it could potentially establish influence of this review on the White Paper and Draft Policy.

16. The review was discussed in a CISON ECC meeting in **October 2012**, where the consultant (Gracian Banda) presumably collected the view of CISON ECC members. However, no details of what these views were are available.

Observation and analysis of meeting agenda, in electronic form. Mention of the meeting during an interview with CEPA. Reasonable certainty that the meeting took place (96%). No evidence of whether views were considered and incorporated (which could be potentially obtainable by sourcing documentation).

17. The issues paper was reviewed by:
- a. CEPA, who gathered comments on the issues paper from ECRP consortium members and implementing partners (**2012**)
 - b. National Technical Committee on CC (a committee of directors from different government agencies related to CC, govt depts., civil society including CEPA and academia)

Various interviews with key informants. **More confidence than not overall that the claim is true (perhaps 65%)** but there is no documental evidence that CEPA's comments reflect the views of ECRP consortium members, nor that the two national committees reviewed the paper. **We only know with certainty that the issues paper was reviewed by a subject matter expert, Gracian Banda, on behalf of CEPA after observation and analysis of document.**

18. A consultation process was started by the consulting team at the district level. The consultations included Community chiefs, DCs (District Commissioners), and DPDs (Directors of Planning and Development). This **probably started around mid-2012** and **might have lasted until December 2012.**

This information comes from multiple interviews which can be considered to some extent independent. The only document observed related to these consultations is a checklist provided by the team of consultants, reviewed by CEPA. The checklist was supposed to be used during consultations. We are **more confident than not (60%)** that this is actually the case but observation of available documentation could raise confidence much higher.

19. This process was halted by internal problems with the team, with the team leader being transferred to another university and two universities withdrawing. The team had to be re-contracted under LEAD (**probably second half of 2012**). Consultations might have resumed after team restructuring and before the WP & Draft Policy but there is very weak evidence of this.

This account has been provided by two possibly independent key informants, not always as an explanation for the delay, so we are **cautiously confident that it is true (75%)**. It would not explain the delay completely and it created administrative problems so the administration would probably not have an incentive to say that this was the case if it wasn't.

20. A parallel consultation process was launched by CISON ECC, led by CADECOM. The EAD consultants carried out consultations at (up to) district level (see #17), while CADECOM engaged a consultant to visit communities on ground, the farmers (**probably second half of 2012**).

This account has been provided by several key informants, some of them most likely independent. There is no documentation but the details provided about the process and the number of times it's been repeated make us **highly confident that this is true (87%)**.

This value could be highly increased by observation of documentation which has been said to exist.

21. As the team is able to work again, the first draft of the White Paper and the first draft of the Policy appear at the same time (**December 2012 / January 2013**) (no evidence that district consultations are resumed).

Observation of documents and multiple accounts from key (independent) informants. Reasonable certainty (98%) that this is true.

22. The White Paper was not based on literature like the Issues Paper. It was based on findings from district level consultations, national level consultations, expert consultations, and NGO feedback. It was empirical information.

This seems to be the case on the basis of observation of documents. However, since the reports from consultations are missing, it is currently not possible to establish if and to what extent the White Paper reflects the content of the above-mentioned consultations. We are only more confident than not that it does (60%), on the basis of accounts acknowledging the contribution of consultations to the policy, and on the basis of the similarity between the White Paper and the Draft Policy (both observed on documentation and acknowledged by key informants).

23. CISON ECC provided comments on the White Paper, taking account the findings from the community consultations led by CADECOM and the view of other members.

This is based on oral account of the CISON ECC representative. No document is available. There is no particular reason to believe the representative might have skewed the comment in this direction but the lack of documentation prevents confidence from exceeding 60% (more confidence than not that it is true).

24. The Draft Policy is shared with partners (**2013**). Comments are received from:
- CEPA (taking the view of ECRP consortium members and implementing partners into account, thus representing ECRP as a whole)

Only anecdotal evidence from key informants is available, except that a document has been observed and analysed, proving that CEPA has provided comments on the draft policy. Since there is no evidence of members having particular views,

confidence that CEPA has incorporated these comments can only be cautious, and based on claims from various key informants (73%).

- b. the *Task Team or Expert Group or Subject Matter Specialists Group*
- c. CISON ECC (incorporating views of members) (a double or triple back-and-forth)
- d. District level authorities and community chiefs? (uncertain) during workshops?

Only anecdotal evidence from key informants is available. Since the accounts have been provided by multiple key informants, we are more confident than not that this is the case (55%), but the informants might not have been entirely independent.

25. In **the second half of 2013**, an external consultant is hired to peer review the draft policy. It was felt that additional technical input was needed because climate change is a new phenomenon and it was felt that there was a need to better document the impacts that the policy would have on the economy. The consultants incorporate their comments (and I think also review the White Paper), adding an investment plan.

Observation of ToR (available on the Internet). There is high confidence (90%) the review was carried out, but the report was not made available to the evaluator and it's uncertain what content was incorporated by the consultants. *The implementation plan seems to have been present also before the peer review* which would reject that part of the claim. The comments on the reasons why the review was carried out are anecdotal, so more uncertain.

26. In **2014**, the final draft of the policy is reviewed by *Task Team or Expert Group or Subject Matter Specialists Group*, the *National Technical Committee on CC* and the *National Steering Committee of PS*.

We only have (multiple) oral accounts indicating the above, but no documentation showing the existence of these reviews. The draft policy was the main deliverable so it would be particularly unexpected for these committees not to have reviewed this document. These considerations make us cautiously confident that the above is true (75%).

27. The latter require an implementation strategy and a M&E strategy, which is added by the consultants. CISON ECC tried to influence the M&E strategy.

The implementation and M&E strategy document has been observed and analysed; however there are no reports indicating when it was requested and the above-mentioned reviews have not been made available as documents. The claim is based purely on oral accounts of key informants, with little repetition. We can only be more confident than not that the above happened (60%).

28. **In 2014**, the final draft of policy is submitted by the consultants to the government and uploaded on the website to seek feedback

Multiple accounts from key informants. **Cautious confidence that this is true (75%).**

29. In **2014**, different stakeholders are invited to a series of meetings scheduled by the government (EAD) with stakeholders from districts such as District Commissioners, traditional authorities, Directors of Planning and Development; officials from relevant Government ministries, departments and agencies (MDAs); representatives from the academia; CSOs; donors and development partners. The meetings were aimed at gathering feedback and discuss the draft policy. In addition, farmers and community representatives were mobilized by CSOs working under CISONICC from their project areas to engage their MPs on the need for the Policy and call for their support for the development and approval of the NCCMP. The dates are unclear though as key informants didn't remember and no documents were available.

Multiple accounts indicate that this has taken place, although it's difficult to get more details. The key issue standing out is that representatives of communities were invited to share their experience of the consequences of climate change "on the ground" with a broad group of stakeholders, including MPs. It sounded like a highlight of the "bottom-up" approach, so sensitivity should be high from certain key informants associated with the approach (say, 90%). At the same time, quite a few details matched from accounts of different key informants, so Type I error should not be higher than 50% (say 20%). This would return a posterior **cautious confidence in the claim (82%)**.

30. **Between 2014 and 2015**, the political side of the approval process begins. A revised draft is sent to the Office of the President and Cabinet (OPC), who sends it to the National Steering Committee of Principal Secretaries. The Principal Secretaries review the draft and require formal changes to comply with the newly adopted policy documents format (relatively long back and forth).

Multiple accounts from key informants. **Cautious confidence that this is true (80%).**

31. **In 2015?** The National Steering Committee of Principal Secretaries recommend the draft for approval to the Parliamentary Committee on Natural Resources and then to the Cabinet Committee for Infrastructural Development (with CC related ministers, UNDP was invited).

Multiple accounts from key informants (but not as many as above). **Cautious confidence that this is true (75%).**

32. The long wait for approval of the policy depends mainly on two factors:
a. Administrative issues
b. Relatively low priority of this policy for the government.

The above comes from considerations offered mainly by two key informants, one offering (a) and one offering (b), with some light reinforcement from others. Considering that there could be several other reasons that could delay policy adoption (see quote below), and the low number of informants (in addition to the fact that those involved in the process have an incentive to attribute the delay to external factors because of the attribution bias), we can only be **more confident than not that these were the key factors (60%)**.

"In general the government prioritises policies that they understand or that they think have a direct bearing on the economy. I remember I was told one day that the CC policy would go to Cabinet on a given day, but then there was pressure to replace it with another higher-priority item (policy). This one doesn't touch the immediately daily lives, it's more of a long term change [...] there are also power dynamics involved, if one (powerful) minister says, I want my policy to be discussed... it's no longer in our hands. At that point we just wait. We tried to sensitise but there's not much we can do".

33. During this time, CEPA and CISONNECC lobbied MPs and government officials, and collected information on the state of the process that they could feed to NGOs and other stakeholders. Through working lunches, dinners and similar what, they tried to accelerate adoption.

"We had to make a lot of noise: we participated to a lot of lobby sessions with government, dinner, lunches, workshops, everything, we invited the Minister just to discuss on this issue when we were in Paris COP21".

There is no documental evidence of this process, only account from CEPA, CISONNECC and a CISONNECC member. Overall there is **more confidence than not that it happened (65%)** but more details would be appreciated, even just emails showing interaction between the meeting participants.

34. CEPA also met with EAD director for the same purpose. They were told that it was an issue of prioritisation (confirmed by EAD).

Again, no documental evidence, but more details on the outcomes of the meetings, which were confirmed by an independent source. **Cautious confidence that it's true (80%)**.

35. They worked with the media to sensitise public views in an attempt to accelerate adoption.

The account was confirmed by two independent sources plus observed in some documentation. **High confidence that it's true (90%)** .

36. CEPA also worked directly with the chairperson of a Parliamentary Committee responsible for Natural Resources (which includes environmental issues and CC), feeding him key talking points in advance of meetings with the President. One key point CEPA fed him was the adoption of the CC policy.

Observation of document confirming the account. Reasonable certainty that the claim is true (96%).

37. **Between 2015 and 2016** the policy is sent to the Cabinet (just government ministers) and approved. The document available on the website dates June 2016.

No documentation demonstrating approval or dates but it makes sense that this was the last step of the process, as indicated by two sources. High confidence that this is the case (90%).

38. **In November 2016**, the CC policy is launched. CEPA was asked to represent CSOs and took part in a panel discussion taking place on that day. They also received the policy document on behalf of civil society from the Minister during a ceremony. The final ECRP input was the translation of the policy in one of the local languages (Chichewa), which marked the end of the programme.

This is based on several retrieved documents. The documents should not have necessary be available, let's they were with 60% probability (sensitivity). At the same time the chance of the documents not being authentic is very small, maybe 2% (Type I error). These values yield a posterior reasonable certainty of 97% that the account is true.

5 Lessons Learned

This section synthesises the main findings of the evaluation, starting from attempting to isolate the role of the ECRP / CEPA within the overall process of CC policy development. It should provide a quick overview of the different entry points CEPA had in the process and how it tried to create synergies and interactions among them.

The advocacy approach adopted by CEPA and the ECRP for this policy seems to have been considerably inclusive and “bottom-up”, informed by views “on the ground” as well as those of several NGOs. Which is not something that happens for every policy. Some reflections are offered on whether this kind of inclusiveness works and is more effective than other advocacy approaches.

Finally, some suggestions on how to improve advocacy and policy processes are included, as well as an assessment of the limitations and robustness of the findings

5.1 The role of ECRP

CEPA was leading on the implementation of the ECRP advocacy strategy (at least for this policy) so essentially assessing the advocacy contribution of ECRP for this policy is the same as assessing CEPA’s advocacy contribution for this policy. Except that not everything CEPA did was supported by ECRP, either financially and technically. At the moment, detailed information about what was funded by the ECRP (within CEPA’s activities) and what wasn’t is not available so it’s difficult to isolate the contribution of the ECRP within CEPA’s advocacy activities for this policy.

Some key facts and reflections concerning CEPA’s role are summarised below. Notice that each statement has a difference confidence level, depending on the strength / quality of the evidence that is currently available to support it (see section 4 for details):

1. CEPA was sitting in the Task Team / Experts Group / Subject Matter Specialists Group (**high confidence**)
2. CEPA was usually invited to the National Technical Committee (**more confident than not**)
3. At the time CISONTECC was considered part of CEPA (they were the Secretariat) and CISONTECC is a permanent member of the National Technical Committee. (**cautious confidence**)
4. Despite the EAD having published a gap analysis which mirrored CEPA’s policy review, the consultants do not seem to have used EAD’s study while they claim to have greatly benefited from CEPA’s what (both in the written acknowledgements and

- in the interview). This might have created some tension in the EAD which might be a sign of (undesired) influence. (cautious confidence)
5. CEPA was managing information and knowledge in relation to this process of policy development, sharing drafts, newsletters and reports with, and collecting views and feedback from, other ECRP consortium members, ECRP implementing partners, CISONNECC members (NGOs), and even farmers and community leaders on the ground (they selected participants to events where farmers interacted with MPs). They covered the whole spectrum, linking the social “base” with the policy making platform. (cautious confidence)
 6. Their leadership role has been praised unanimously by the interviewees, except EAD and UNDP staff working at EAD. The latter still did not criticise CEPA but tried to downplay the role of NGOs in general (while admitting that the consultants “might have benefited from documents and position papers produced by NGOs”)
 7. CEPA not only communicated CC policy relevant information to the above mentioned stakeholders, but – once a position paper had been agreed at CISONNECC level – they would push it with the government, trying to affect political will, through a number of channels. Not just their participation in the Technical Committee and the National Experts Committee, but also liaising directly with the Cabinet and MPs. They also liaised directly with the EAD director (deceased at the time of the consultations). “They had an engagement at different levels”. (High confidence about the last general statement, cautious confidence on the details).
 8. CEPA worked with the media, publishing articles, newsletters and case studies. (cautious confidence)
 9. Their involvement at the launch ceremony for the policy is symbolic of the prominent role they played on behalf of NGOs.
 10. At the same time, CEPA might not have “necessary” for the process to happen. It might have influenced the content of the policy and the timing of approval, but a CCMP of some kind would probably still have been approved at some point. One informant has argued that the differences would not have been gigantic if CEPA had not been involved, because an essential factor that helped CEPA shape its input was its convening power which lies in CISONNECC. CEPA “could not have done it alone” and it would be unfair for CEPA or anyone else to claim sole responsibility or credit for NGO influence on the policy. (more confident than not)
 11. However, even when seen through the CISONNECC lens, CEPA has been described as an extremely active member of CISONNECC, in one or two cases identifying community leaders or farmers to invite to meetings with MPs and making sure they attended the meeting (because of their presence on the ground, as well). (cautious confidence)

5.2 Does NGO advocacy work add a unique value to policy processes?

The adoption of the policy took three years from first draft to launch. Some have said it is a relatively short time for a policy to be approved, especially as this was considered a relatively low priority within Government (see chapter 4). It has been discussed whether the *El Nino-influenced* flood event in 2015 could have accelerated adoption, but this view is mostly not supported by interviewees.

In the absence of other accelerating factors, the hypothesis that NGO advocacy sped up the process is worthy of consideration. However, NGOs involvement usually implies broad inclusion of different groups, multiplying the layers of approval and feedback incorporation, which might potentially slow down the process. It can be argued that there's a trade-off between policies representing a broad range of views and concerns, and speed of adoption, because of the additional steps in the process.

For this particular case, absence of documentation makes it hard to claim that NGO advocacy has influenced the content of the policy, but after fieldwork this is definitely still an option worth exploring (see details in Chapter 4 about the ground consultation led by CADECOM). The available documentation allows us to claim with cautious confidence that TIMING seems to have been crucial, at least in this case, to influence the content: at least in two moments.

First, CEPA's policy review, which was already available and accessible by the consultants by the time they started working on the issues paper. Second, the opportunity for NGOs to input into the draft policy before the political side of approval started, which essentially closes the space for influence, at least by NGOs.

In other words, both acceleration of adoption and influence on the content are more likely than not on the basis of current evidence.

To answer the question in the title more conclusively, more evidence would be needed, like comparison with similar advocacy processes which have taken a longer to result in policy adoption, and some which have not managed to influence the content.

5.3 Credibility and robustness of the findings

The existence of several documents (dozens) was mentioned during interviews that would greatly increase confidence in the statements made in this chapter and in most of the statements made in chapter 4. Unfortunately, while the interviewees seemed to be very willing to share such documentation, the EAD prevented them from doing so, because the process was funded by a different donor than the one funding the evaluation (UNDP vs

DfID). As we hope is clear from Annex A, failure to share such documentation is of great damage to the validity of the claims made here and perhaps to the utility of the whole exercise. It also hints at wider challenges with donor coordination.

In order to assess the influence of NGOs and other stakeholders on the policy formation process and eventually on the content of the policy, it is imperative that as many documents as possible are sourced and that different versions of the same document are compared over time. Details of the missing documentation or “love-to-see” evidence are provided in Annex A.

6 Conclusions

This section summarises the main insight obtained during the course of this evaluation in a short series of bullet points.

1. The only form of ECRP influence on the policy content that we find evidenced with some confidence is the influence of CEPA's policy review on the Issues Paper. Access to existing documentation would potentially allow us to evidence many more instances of influence on the content.
2. We are highly confident that CEPA was managing information and knowledge in relation to this process of policy development, covering a wide spectrum of stakeholders, and even linking the social "base" with the policy making platform. "They had an engagement at different levels", even including the media.
3. This role might not be unique to CEPA: anyone with the same convening power and ability to link different sectors of society might potentially play a similar role in the future. However, at the time where this policy process was unfolding, their role was unique.
4. NGO advocacy and a process structured in the same way as it was structured for this policy can potentially influence the content of policies without slowing down the speed of adoption. The major delays connected with policy drafting were due to administrative problems with the team of consultants, and with format issues and political priority issues at the approval stage. Multiple stakeholders involved in the process does not mean only multiple rounds of feedback collection and incorporation; it also means multiple sides from which lobbying and pressure for adoption comes at the approval stage.

7 Annexes

Annex A: What the claim would look like IF the stakeholders shared more documentation

This section shows how access to existing documentation that the stakeholders said they could potentially share (and in some cases additional interviews) would increase confidence levels in different claim components.

1. In **2010** a consortium of donors (including Japanese Government and UNDP) started funding the Malawi National Climate Change Programme.

Documentation related to the programme inception. Practical certainty (99+%).

2. One of the issues discussed in the context of the NCCP was whether Malawi needed a stand-alone CC policy or to mainstream CC concerns into existing sectorial policies.

Minutes from relevant meetings. Practical certainty (99+%).

3. A policy gap analysis was undertaken by the Government of Malawi (published in **September 2011**, before the first draft of the Policy Review) leading to the recommendation of adopting both above mentioned approaches.

Observation of actual document, in paper form. Copies taken. No further evidence needed. *Practical certainty (99+%).*

4. The ECRP started in **2011 (month?)**.

Documentation related to the inception of the ECRP. *Practical certainty (99+%).*

5. A Policy Review conducted by CEPA for ECRP and Discover was developed between **November 2011 and March 2012** (in preparation for the advocacy strategy?)

Observation of actual document, in electronic form. Multiple mentions during interviews and on other documents. No further evidence needed. *Practical certainty (99+%).*

6. A three-year (2012-2014) advocacy strategy for ECRP and Discover was formulated between **2011 and 2012**.

Observation of actual document, in electronic form. Multiple mentions during interviews. No additional evidence needed. **Practical certainty (99+%)**.

7. A team of academic consultants from three Universities was hired by the EAD (Govt of Malawi) to write the CC policy between **2011 and 2012**.

ToR and admin documents. **Practical certainty (99+%)**.

8. During the inception phase (**probably early 2012**) the team prepared a checklist of questions they wanted to ask stakeholders during future consultations, which was reviewed by CEPA on the basis of inputs from ECRP implementing partners (**July to October 2012**).

In addition to the evidence observed (document, with comments by CEPA dated 31 October and 1st November 2012, modified at the time of submission), evidence of stakeholder input into the checklist would help strengthen confidence that CEPA's inputs were based on consultations with stakeholders (in a smoking gun, confirmatory direction). It's difficult to estimate how much confidence could potentially increase, but evidence of conversations or written comments of ECRP partners into the checklist and observation of matching with CEPA's comments could achieve **reasonable certainty (95-99%)** about the claim.

9. The inception report was also reviewed by the Task Team or Expert Group or Subject Matter Specialists Group, comprising different sectoral experts including CEPA, which was set up by the NCPP / EAD and tasked with reviewing all the deliverables connected with the consultancy. (Possibly also by the National Technical Committee on CC and the National Steering Committee of PS?)

Observation of documents showing reviews by the team and composition of the team could lead to **Practical certainty (99+%)** about the claim.

10. A position paper was developed by CEPA between **May and November 2012**, taking the policy review findings into account but also the advocacy strategy priorities. There seems to be other issues in the position paper not necessarily included in either the policy review or the advocacy strategy but the origin is unclear.

Observation and comparison of actual documents, in electronic form. **Reasonable certainty that it is true (97%)**. A more thorough observation and comparison of actual documents could lead to a refined claim, specifying the extent of similarity between these documents; however the confidence would most likely not increase because there's always a chance that the content was included for other reasons, unrelated to the two documents.

11. The team of academic consultants developed an Issues Paper between **June and September 2012**. It was essentially a literature review, guided by the question "what key issues are [various relevant documents] covering?" The review was influenced by the following main documents:

- At the national level, the Malawi growth development strategy, one and two
- The National Communication on CC to the UNFCCC (one and two)
- The national adaptation plan (the NAPA)
- The CC policies of South Africa, Botswana and Namibia (esp South Africa)

Observation of actual documents plus account of one of the authors. **Reasonable certainty that it is true (97%)** (not absolute or practical because he might have forgotten key documents). The documents have not been provided nor sourced (some might be publicly available). It's unlikely that their assessment and comparison could increase confidence, but it could have a disconfirmation / hoop test value if the content of those documents is found to be very different from the Issues Paper.

12. Three CEPA documents are cited.

Observation of actual document. **Absolute certainty (100%)**.

13. Out of the above mentioned three documents, at least two were extensively used and were (very) helpful.

Written acknowledgement on the document PLUS account from one of the authors. The chance of them acknowledging CEPA if not influenced is low. There is a culture of tending to avoid conflict in Malawi but it tends to show more as indifference than false claims. So the Type I error is set at around 10% (high confidence that it wouldn't happen). In academia there is also a tendency to give credit when due so we expect CEPA's role to be acknowledged if so deserving (sensitivity set at 90%, high confidence that it would be credited).

As for the oral account, he had no particular stake in claiming to be influenced by CEPA, but he had to be slightly prompted to recognise it and didn't include these documents in the main list of influences. Courtesy bias towards CEPA not very likely and what he says later confirms / describes influence in detail so Type I Error is still relatively low: high

confidence that he would not say what he said if not influenced (12%). Also high confidence that he would say, if influenced, especially when prompted, (87%).

The two pieces of evidence cannot be considered independent and you would expect the consultant to be coherent with what his team had written on the document. Taken together, they reinforce each other all the same (though not as much as they would if they were independent). The chance of observing both under the hypothesis of influence can be slightly lowered to 80% (sensitivity, cautious confidence) and the Type I Error can be lowered to maybe 8% (high confidence).

From a neutral prior of 50%, that gives us a posterior of 91% (High Confidence that the claim is true). No additional document would alter this level of confidence. However, confidence could be increased if other team members provided the same account, but interviewing them was not possible within the timeframe of this evaluation. Say, if all team members agreed and they didn't have time to talk extensively before being interviewed or they were all interviewed in 2-3 consecutive days. In that case Sensitivity for the entire evidence package could be slightly lowered (but still around 55%) and most importantly the Type I error could be around 4% or lower, bringing the posterior to 93% (still high confidence that the claim is true).

14. It mattered that these documents were available in advance, just as the literature review was starting, which allowed them to play a guiding role for the consultants.

Consistent accounts from two key informants. One of the authors and CEPA. The author had no particular stake in explaining how and why they were influenced by CEPA, if not academic intellectual honesty, which could account for high confidence that he would (90%, sensitivity). The chance of him coming up with this compelling explanation if not influenced in such a way is very low (4%, Type I Error, reasonable certainty that he wouldn't).

CEPA had obviously an interest in claiming to be influenced but this account emerged as one of the key moments of the process and in theory they could have picked any other. So the chance of them picking this particular moment if it wasn't true is lower than 50%, say 40% (more confident than not that they wouldn't, Type I error). And if this was true the chance of them mentioning it as one key moment is high, but not very high because there seems to have been other key moments they could have picked.... So sensitivity could be set at around 65% (more confident than not).

In this case the two pieces of evidence are independent and can be combined in the Bayesian update, yielding a posterior of 97% (reasonable certainty that the claim is true). Confidence could be increased if other team members provided the same account, but interviewing them was not possible within the timeframe of this evaluation. Sensitivity

would be lowered to about 70% but Type I error to about 2%, yielding a posterior of about 98% (still reasonable certainty).

15. A technical review of the issues paper was commissioned by CEPA on behalf of CISONECC and delivered in **October 2012**.

Observation and analysis of document. **Practical certainty that claim is true (99+%)**.

NOTE: at the time of writing, a systematic comparison of this document (or different versions of it) with different versions of the issue paper and the white paper has not been possible. If conducted though it could potentially establish influence of this review on the White Paper and Draft Policy.

16. The review was discussed in a CISONECC meeting in **October 2012**, where the consultant (Gracian Banda) presumably collected the view of CISONECC members. However no details of what these views were are available.

Observation and analysis of meeting agenda, in electronic form. Mention of the meeting during an interview with CEPA. **Reasonable certainty that the meeting took place (96%)**. No evidence of whether views were considered and incorporated. If the relevant documentation were available, these views could be incorporated in the claim.

17. The issues paper was reviewed by:

- a. CEPA, who gathered comments on the issues paper from ECRP consortium members and implementing partners (**2012**)
- b. National Technical Committee on CC (a committee of directors from different government agencies related to CC, govt depts., civil society including CEPA and academia)
- c. (Possibly also the National Steering Committee of PS, a collaboration between OPC and EAD)

Documents showing comments by ECRP partners in the issues paper could establish to what extent these were reflected in CEPA's comments and increase confidence in that part of the claim up to **reasonable certainty** or **high confidence**. Besides, documents showing comments on behalf of those technical committees on the Issues Paper could raise confidence about those parts of the claim up to **practical certainty**.

18. A consultation process was started by the consulting team at the district level. The consultations included Community chiefs, DCs (District Commissioners), and DPDs (Directors of Planning and Development). This **probably started around mid 2012** and **might have lasted until December 2012**.

Evidence documenting the consultation process and the stakeholders consulted would greatly increase confidence in this claim, potentially up to **practical certainty**. Reports, meeting notes and minutes from the field, power point presentations, etc.

19. This process was halted by internal problems with the team, with the team leader being transferred to another university and two universities withdrawing. The team had to be re-contracted under LEAD (**probably second half of 2012**). Consultations might have resumed after team restructuring and before the WP & Draft Policy but there is very weak evidence of this.

Observation of the new ToR or the new contract would raise confidence to **reasonable certainty**. For the consultations, the same goes as for the claim above.

20. A parallel consultation process was launched by CISON ECC, led by CADECOM. The EAD consultants carried out consultations at (up to) district level (see #17), while CADECOM engaged a consultant to visit communities on ground, the farmers (**probably second half of 2012**).

Confidence could be highly increased by observation of documentation which has been said to exist. The report would achieve **reasonable or even practical certainty** that the consultation has taken place and when so, provided it was believed to be authentic.

21. As the team is able to work again, the first draft of the White Paper and the first draft of the Policy appear at the same time (**December 2012 / January 2013**) (no evidence that district consultations are resumed).

Observation of documents and multiple accounts from key (independent) informants. **Reasonable certainty (98%) that this is true**. No additional evidence needed, except for dates of when the team stopped or resumed work which could strengthen confidence in that part of the claim.

22. The White Paper was not based on literature like the Issues Paper. It was based on findings from district level consultations, national level consultations, expert consultations, and NGO feedback. It was empirical information.

IF reports from consultations were available, confidence could potentially be raised up to **reasonable certainty**, depending on which documents are available for which consultations.

23. CISONCEC provided comments on the White Paper, taking account the findings from the community consultations led by CADECOM and the view of other members.

Availability of either comments on the White Paper or the report from community consultations would increase confidence from current levels, and availability of both could achieve up to **reasonable certainty**.

24. The Draft Policy is shared with partners (**2013**). Comments are received from:
- CEPA (taking the view of ECRP consortium members and implementing partners into account, thus representing ECRP as a whole)

If documentation showing views of the ECRP members and partners were available, it could be linked with CEPA's comments on the draft policy, potentially achieving **reasonable certainty** that the comments took into account those views.

- the Task Team or Expert Group or Subject Matter Specialists Group
- CISONCEC (incorporating views of members) (a double or triple back-and-forth)
- District level authorities and community chiefs? (uncertain) during workshops?

Documents have said to be available which could show the Task Team and CISONCEC reviewing the draft policy, which could raise confidence for these parts to **reasonable or practical certainty**. Workshop agendas and reports could raise confidence in d at least until high, ideally combined with a comparison of the various stages of the draft to locate dates of when that feedback was incorporated. This would most likely be more indirect but could raise confidence to **cautious** or possibly **high**.

25. In **the second half of 2013**, an external consultant is hired to peer review the draft policy (it was felt that additional technical input was needed because CC is a new phenomenon... and in an attempt to strengthen the impacts that the policy would have on the economy). The consultants incorporate their comments (and I think also review the White Paper), adding an investment plan.

Observation of ToR (available on the Internet). There is **high confidence (90%) the review was carried out**, but the report was not made available to the evaluator and it's uncertain what content was incorporated by the consultants. *The implementation plan seems to have been present also before the peer review* which would reject that part of the claim. The comments on the reasons why the review was carried out are anecdotal, so more uncertain.

26. In **2014**, the final draft of the policy is reviewed by Task Team or Expert Group or Subject Matter Specialists Group, the National Technical Committee on CC and the National Steering Committee of PS.

Documents showing comments and track changes by these groups could raise confidence to **reasonable or practical certainty**. Mentions of specific comments by stakeholders during interviews could raise confidence to **high**.

27. The latter require an implementation strategy and a M&E strategy, which is added by the consultants. CISONECC tried to influence the M&E strategy.

Evidence of CISONECC sharing their M&E strategy with the relevant authorities would strengthen confidence in the second part of the claim (e.g. meeting agendas and minutes). As for the first part, precise dates and possibly more intermediate drafts are needed to show that the addition of the implementation and M&E strategy has followed the above rounds of feedback. Depending on how many of these become available, confidence could change much or very little.

28. In **2014**, the final draft of policy is submitted by the consultants to the government and uploaded on the website to seek feedback

Currently the document does not seem to be available on the website. A screenshot with the document, ideally with a draft number and the dates, would raise confidence to **reasonable and even practical certainty**.

29. In **2014**, different stakeholders are invited to a series of meetings scheduled by the government (EAD) (with the districts? Government officials? Representatives of civil society? Academia? NGOs? Experts from development partners? Donors?) to gather feedback and discuss the draft policy. Including farmers and community representatives invited to take part in workshops with MPs (or was this before?).

More details are needed from different sources for this claim, in particular from sources that were not necessarily associated with a “bottom-up” approach like consultants and the EAD for the last part of the claim, and from the latter sources for the first part of the claim. Ideally, minutes and agendas or other evidence of these meetings taking place could potentially raise our confidence that specific meetings have taken place up to **reasonable certainty**.

30. **Between 2014 and 2015**, the political side of the approval process begins. A revised draft is sent to the Office of the President and Cabinet (OPC), who sends it to the National Steering Committee of Principal Secretaries. The Principal Secretaries review the draft and require formal changes to comply with the newly adopted policy documents format (relatively long back and forth).

Documents showing the content and dates of these requests, along with additional intermediate versions of the policy, would raise confidence to **reasonable or practical certainty**.

31. **In 2015**, The National Steering Committee of Principal Secretaries recommend the draft for approval to the Parliamentary Committee on Natural Resources and then to the Cabinet Committee for Infrastructural Development (with CC related ministers, UNDP was invited).

Official documents showing exchanges among these bodies and the dates they took place would raise confidence to **practical certainty**.

32. The long wait for approval of the policy depends mainly on two factors:
a. Administrative issues
b. Relatively low priority of this policy for the government.

In order to strengthen confidence about this claim, a comparison of similar policy processes would be needed, checking their length, sector, and administrative history. It is difficult to predict in advance what kind of confidence could be achieved, as it depends strongly on the number and type of processes compared.

"In general the government prioritises policies that they understand or that they think have a direct bearing on the economy. I remember I was told one day that the CC policy would go to Cabinet on a given day, but then there was pressure to replace it with another higher-priority item (policy). This one doesn't touch the immediately daily lives, it's more of a long term change [...] there are also power dynamics involved, if one (powerful) minister says, I want my policy to be discussed... it's no longer in our hands. At that point we just wait. We tried to sensitise but there's not much we can do".

33. During this time (mostly in 2015), CEPA and CISON ECC lobbied MPs and government officials, and collected information on the state of the process that they could feed to NGOs and other stakeholders. Working lunches, dinners. They tried to accelerate adoption.

"We had to make a lot of noise: we participated to a lot of lobby sessions with government, dinner, lunches, workshops, everything, we invited the Minister just to discuss on this issue when we were in Paris COP21".

Emails or texts showing interaction between the meeting participants would strengthen this claim, potentially until **high confidence** at least.

34. CEPA also met with EAD director for the same purpose. They were told that it was an issue of prioritisation (confirmed by EAD).

For this claim we are already cautiously confident and emails or texts showing interaction between the meeting participants would strengthen this claim, potentially until **high confidence** or even **reasonable certainty**.

35. They worked with the media to sensitise public views in an attempt to accelerate adoption.

Additional specific media content could increase confidence to **reasonable or practical certainty**.

36. CEPA also worked directly with the chair person of a Parliamentary Committee responsible for Natural resources and CC, feeding him key talking points in advance of meetings with the President. One key point CEPA fed him was the adoption of the CC policy.

Observation of document confirming the account. Reasonable certainty that the claim is true (96%). Accounts from the MP using the talk points could potentially raise confidence even higher, to practical certainty.

37. **Between 2015 and 2016** the policy is sent to the Cabinet (just government ministers and perhaps the EAD director) and approved. The document available on the website dates June 2016.

Documentation demonstrating approval or discussion, with dates, might raise confidence to practical certainty.

38. **In November 2016**, the CC policy is launched. CEPA was asked to represent CSOs and took part in a panel discussion taking place on that day. They also received the policy document on behalf of civil society from the Minister during a ceremony. The final ECRP input was the translation of the policy in one of the local languages, which marked the end of the programme.

Additional documentation and one or two additional accounts from key informants (ideally independent) could raise confidence to practical certainty.

Annex B List of People Consulted

Name	Position	Organisation
Dorothy Tembo-Nhlema	ECRP Advocacy Coordinator	CEPA
Dr. David Mkwambisi	Associate Professor/Consultant	LUANAR
Herbert Mwalukomo	Programme Manager	CEPA
Jane Swira	Programme Officer	UNDP/EAD
Julius Ng'oma	National Coordinator	CISONECC
Martino Mazinga	National Coordinator	CADECOM
Professor Sosten Chiotha	Executive Director	LEAD SEA
Shamiso Najira	Assistant Director	Environmental Affairs Department
Stevie Kulyazi	Former ECRP M&E and Advocacy Manager	FHI (Former ECRP M & E and Advocacy)
William Chadza	Executive Director	CEPA

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