Community Eco-Credit

Whitepaper

A Description of the Community Eco-Credit Methodology and an Analysis of its Potential as a Natural Resource Management Tool

June 2024

Executive Summary

1. Introduction

1.1 The "community eco-credit" methodology ("the methodology") combines existing natural resource management approaches and simple economic concepts to create an innovative financial and behavioural incentive for individuals and groups to participate in activities that protect or restore essential ecosystems.

1.2 The methodology is targeted at natural resource dependent small-scale farmers, fishers and livestock keepers and was initially designed to address an economic challenge: economic costs incurred by individuals act as a barrier to participation in ecosystem management activities. Further, incentives which compensate or offset this cost must be financially sustainable so that the source of the incentive is not exhausted over time.

1.3 Pilot implementation of the methodology suggests it may address other problems faced by organisations undertaking natural resource management work. The approach necessitates dialogue, consultation, and close cooperation, potentially rebalancing one-sided obligations associated with ecological restoration into a process with mutual obligation and reciprocation. This change promotes collaboration on various sustainability issues and provides natural resource management field officers with a welcome tool, boosting their morale.

1.4 The purpose of this document is to introduce and elaborate the community eco-credit methodology, and informed by pilots, analyse the methodology's performance as an effective natural resource management approach.

1.5 This information is placed in the public domain in order to invite third party practitioners, researchers and tool builders to identify weaknesses, use, iterate on, improve and adapt the methodology as fits the context in which they work.

1.6 The first steps in establishing and proving the efficacy of the community eco-credit methodology, and building supporting tools, have been undertaken with a mix of private, donor and philanthropic funding.

1.7 The methodology and related know-how and tools is available free-of-charge under open-source licence.

2. Core Methodology

2.1 The methodology consists of four primary components:

- **A revolving credit facility:** Initiated through grant capitalisation, the facility and its funds are managed by eco-credit groups of 20-30 members.
- **Loan issuance and environmental covenants:** Loans are issued to group members, with the stipulation that recipients participate in certain self-determined activities which contribute to restoration, protection and management of local ecosystems.
- **Loan repayment:** Loans, along with interest or a fee, are paid back to the group fund, allowing the incentive to be reused in the future.
- **Transparency and reporting:** Tracking and reporting on loan issuance, repayment, and participation in environmental actions to create transparency for funders which track impact.

2.2 The methodology is a combination of existing methodologies rather than a radically different framework. In this, the approach represents evolution rather than revolution, but given its new features requires full-testing to prove out its core assumptions.

2.3 Given landscape variability, prospective users of the methodology should seek to prove out these assumptions in new contexts and adopt governance mechanisms that enhance group durability and coordination, such as those developed by Greenfi partners in pilots of the community eco-credit approach.

3. Objective and Benefits

3.1 The objective of the community eco-credit approach is increased participation by targeted individuals in either individual or group activities which restore and protect targeted ecosystems.

3.2 Beyond this objective, use of the methodology is intended to generate three further benefits:

- **Enhanced supply of ecosystem goods and services**: by incentivising group members to participate in ecological restoration and protection activities, supply of ecosystem goods and services is improved.
- **Group members gain ownership of, and access to, a financial asset that increases in value over time:** a two-stage grant which vests with eco-credit groups creates a group owned financial asset which increases in size when loans are repaid with interest, loan fee or Sharia-compliant fee.
- **Group members gain improved financial and environmental management skills**: group members acquire skills in financial management, both with regards to the group asset and with regards to their own loan. Additionally, participation in natural resource management planning and activities also creates valuable experience for the individual and groups and communities to which they belong.

3.3 Additional and unanticipated benefits created by the methodology, are fully set out in in the report, alongside costs and risks.

3.4 Elaboration of the objective and benefits is set out in a language consistent with a logical framework approach (LFA) in the document.

4. Setup and Costs

4.1 Community eco-credit groups are set up through two distinct phases: (1) a land or seascape demonstration phase, possibly targeting 5-10 groups, used to assess whether the methodology is appropriate to a new local context and adjusting if necessary, and (2) a replication phase where the validated approach is rolled-out within a landscape.

4.2 Current data taken from several implementation sites suggests a set-up cost of USD 170/participant over three years during a landscape pilot or demonstration phase, and USD 90/participant at a replication stage or USD 10 annually over 10 years.

5. Pilot Results

5.1 Implemented in three distinct landscapes, descriptive evidence provided by partners validates preliminary assumptions about the methodology's efficacy in its core objective: creating a sustainable motivation for involvement in ecological protection and restoration.

5.2 However, the intricate relationship between this intervention and resulting behaviours, within complex social and environmental systems, remains only partially understood. Community eco-credit is not a panacea and should be implemented within programmes which address all drivers of degradation.

5.3 Additionally, limited resources available to the organisations testing the methodology mean that a randomised controlled trial is yet to be undertaken and conclusions beyond descriptive evidence and presumptions about the impacts of the tool are still to be achieved.

5.4 Investment in this further investigation by way of randomised controlled trials appears to be justified by results to date.

6. White Paper Overview

6.1 This document offers a comprehensive insight into:

- The development, target, and objectives of the community eco-credit methodology.
- Details of the methodology, principles, and underlying stakeholder analysis.
- Governance, financing and legal issues.
- Results from pilot implementations.
- Assessment of the approach's benefits, costs, risks and technology needs.
- Monitoring, impact evaluation, scale-up approaches, ethical considerations, and conclusions.

7. Origin and Collaboration

7.1 The community eco-credit approach has been developed through several phases. The most recent pilot phase was undertaken by Greenfi Systems Limited and conducted in partnership with MCCC Ltd and COMRED in Zanzibar and Kenya respectively.

7.2 Following a pilot phase which included looking for a business model for the venture, the project has been restructured, as an open-source initiative, which makes the community eco-credit methodology and tools freely accessible under open-source licence via www.greenfi.org.

8. Continuous Improvement

8.1 With its experimental status, Greenfi will provide periodic updates, aiming to ensure lessons are circulated, particularly with regards to methodological limitations, challenges, and ethical considerations.

Acknowledgements

Greenfi would like to acknowledge and thank the following:

Individuals and organisations who contributed to the development of the community eco-credit methodology and tools

ClimateKIC, Climate Policy Initiative, Conservation Finance Alliance, Ecosystem Equity, Dr Obadiah Ngigi, Jules Roberts, Robert Wild, Andrew Williams

Organisations which partnered with Greenfi in first field tests of the community eco-credit model

Blue Ventures, COMRED and MCCC Ltd/Mwambao

Funders

Blue Ventures, ClimateKIC, Conservation Finance Alliance, Ecosystem Equity, Stefano Mazzilli, Tom Blomley, Dr Obadiah Ngigi & Robert Wild

Greenfi is solely responsible for the final contents of this white paper.

Contents

Executive Summary 2
Acknowledgements 5
List of Tables 8
List of Figures 9
1. Introduction 10
2. White Paper Purpose 12
3. Problem Statement 12
4. Objective 14
5. Benefits 15
6. Logical Framework 15
7. Target 16
8. Methodology 17
9. Development and Evolution of Community Eco-Credit 18
10. Methodology Design Choices 19
11. Guiding Principles 20
12. Eco-credit Groups 22
13. Justification for Grant Funding of Community Eco-Credit Groups 22
14. Comparison with Existing Approaches 23
15. Replication and Scaling 26
16. Eco-credit Loan Agreement and Accounting Treatment 27
17. Stakeholders 29
18. Governance 29
19. Financing Options 31
20. Financing Structure 31
21. Sustainability and Longevity 32
22. Legal context 32
23. Monitoring 33
24. Technology Needs 34
25. Case Studies / Pilot Programmes & Results 39
26. Lessons Learned about Benefits, Costs and Risks 43
27. Implementation Roadmap & Indicative Costs 48
28. Lessons Learned about Ethical Considerations 48
29. Barriers and Challenges 53
30. What We Don't Know 56

31. Indicative Costs 57
32. Artificial Intelligence 58
33. Conclusion & Vision 59
Glossary 60

List of Tables

Table 1: Template logical framework for set-up of a community eco-credit project 16
Table 2: Elaboration of the set-up of community eco-credit groups 17
Table 3: Community eco-credit elements and their origin 19
Table 4: Design choices and justification in development of the methodology 20
Table 5: Principles guiding set-up of eco-credit groups 21
Table 6: Comparison of community eco-credit to other performance-based approaches 23
Table 7: Comparison of community eco-credit to other finance-based approaches 24
Table 8: Comparison of community eco-credit to the ASCA methodology 25
Table 9: Assessment of the methodology's ability to replicate and scale 26
Table 10: Hypothetical group loan ledger incorporating environmental liabilities and assets 28
Table 11: Hypothetical individual loan ledger incorporating environmental liabilities and assets 28
Table 12: Hypothetical community environmental balance sheet 28
Table 13: List of potential stakeholders in a community eco-credit project 29
Table 14: Legal issues relevant to community eco-credit 33
Table 15: Monitoring approaches 34
Table 16: Monitoring technology options 38
Table 17: Summary pilot results 39
Table 18: Greenfi hypothesis, assumptions and findings about the model 40
Table 19: Benefits, costs and risks of community eco-credit 44
Table 20: Elaboration of steps in the implementation roadmap 48
Table 21: Indicative costs through landscape demonstration and replication phases 48
Table 22: Ethical considerations and possible responses 50
Table 23: Challenges ad possible responses 53
Table 24: Unknown issues regarding the approach 56
Table 25: Indicative costs 57
Table 26: Potential for artificial intelligence to improve methodology function 58

List of Figures

Figure 1: Process of set-up of eco-credit groups 17
Figure 2: Governance mechanism in a CBNRM framework 30
Figure 3: Governance within an agricultural commodity-based framework 31
Figure 4: Financing mechanism during landscape demonstration and replication phases 32
Figure 5: Data flows within a community eco-credit model 35
Figure 6: Screenshot of a web app built to facilitate remote monitoring of eco-credit groups (a) 36
Figure 7: Screenshot of a web app built to facilitate remote monitoring of eco-credit groups (b) 37
Figure 8: Screenshot of community eco-credit beta login, which mirrors web app data 37

1. Introduction

1.1 "Community eco-credit" is an experimental, interdisciplinary methodology designed to create economic and behavioural incentives for individuals to participate in voluntary and self-determined actions which protect or restore vital ecosystems. Since 2018, the methodology has been tested at three pilot sites. This white paper discusses the methodology in detail and analyses its effectiveness as a natural resource management tool, based on initial results and lessons.

1.2 Community eco-credit was initially designed to address an economic challenge: economic costs incurred by individuals act as a barrier to participation in ecosystem management activities. Additionally, incentives which compensate or offset this cost must be financially sustainable so that the source of the incentive is not exhausted over time.

1.3 The community eco-credit methodology addresses this challenge by seeking to provide a meaningful and sustainable incentive for participation in activities which protect or restore vital ecosystems. The methodology consists of the following components:

- Grant capitalisation of a small revolving credit facility owned, controlled and managed by groups consisting of 20-30 people, termed "eco-credit groups".
- Issue of loans to group members where loan terms include a requirement for participation in specified environmental actions.
- Repayment of loans together with interest or a fee to the group revolving credit facility such that the fund is replenished, and the incentive can be used again in the future.
- Tracking and reporting on loan issuance, repayment, and participation in environmental actions to create transparency for funders which track impact.

1.4 During pilots, it appeared that the eco-credit approach may also address problems of a behavioural or organisational nature which are non-economic, and which are detailed in this paper, including its ability to create a basis for dialogue and cooperation between participating communities and external agents which process itself contributes to increased participation in environmental management activities.

1.5 This approach is intentionally a "skeleton methodology", anchored by guiding principles. The core elements of the methodology are designed to be replicable across landscapes and contexts. However, beyond the basic framework, specifics such as governance, eco-credit group fund and loan terms, environmental objectives and activities should be determined by eco-credit groups themselves, with input from the stakeholders who support them.

1.6 The objective of the methodology is to boost participation in activities which restore and protect targeted ecosystems. The benefits which arise from this approach are (1) the improved supply of ecosystem goods and services, (2) access by community members to a financial asset which slowly increases in size, and (3) increased understanding by participants in financial and environmental management.

1.7 The costs of setting-up eco-credit groups include (1) fund capitalisation, (2) material and equipment costs, (3) eco-credit group management and support, and (4) overhead charged by a supporting organisation, typically a non-governmental institution, but potentially also other civil society organisations or businesses. Current data suggests a set-up cost of USD 170/participant over three years during a landscape pilot or demonstration phase, and USD 90/participant at a replication stage or USD 10 annually over 10 years.

1.8 Based on self-reported evidence from groups and partners, our approach demonstrates progress towards achieving its main goal: incentivising participation in ecological protection and restoration, with benefits seen at the group level. With sufficient support to groups, reports demonstrate preliminary proof of concept: loans are repaid, there is participation in specified ecological restoration and protection activities, and there is growth in eco-credit funds through

small fees or interest. Partner organisations are adapting this model to their local contexts and are starting to replicate groups.

1.9 Whilst good initial descriptive results support our assumptions and expected benefits, we haven't yet firmly established a cause-and-effect relationship between our intervention and changes in behaviour. The complexity of social-environmental systems and multiple influencing factors make it difficult to isolate the impact of our eco-credit intervention. We recognise the need for more robust monitoring and are cautious in interpreting these initial findings, especially as other interventions could also be influencing the outcomes observed in our target areas.

1.10 Consequently, we see the methodology as remaining at an experimental stage. Furthermore, the white paper makes the case that the approach will always be experimental within novel landscapes where different contexts arise and in which the approach may not be effective.

1.11 This white paper elaborates:

- The primary and secondary purposes of this white paper
- The problem addressed by community eco-credit
- The objective of the approach
- Targeted benefits of the approach
- The logical framework underpinning the approach
- The demographic targeted by the approach
- The methodology itself
- The reasons for the design choices in constructing the methodology
- Guiding principles for set-up and operation of eco-credit groups
- A description of eco-credit groups
- A comparison of community eco-credit to other natural resource management approaches
- How the approach is replicated and scaled
- A suggested accounting treatment for eco-credit financial and environmental assets and liabilities
- The background to the development of the community eco-credit methodology
- A generic stakeholder analysis for community eco-credit projects
- Governance of eco-credit groups
- Financing options for eco-credit groups
- The financing structure for eco-credit projects
- Sustainability and longevity of groups
- Legal issues which surround set-up of groups
- Approaches to monitoring eco-credit groups
- Case studies and the results of pilots of the approach conducted to date
- Detailed cataloguing of lessons learned about the benefits, costs and risks of the approach
- An implementation roadmap for the approach and high-level costs indication
- Lessons learned about ethical considerations
- What we don’t know
- Financial costs of eco-credit group set-up
- Conclusions and vision

1.12 The community eco-credit methodology was developed and tested by Greenfi Systems Limited, an Irish Limited Company specifically established for this purpose. The initiative received financial and managerial support from Ecosystem Equity, Climate KIC, Conservation Finance Alliance, and Blue Ventures. Pilot implementations of the tool were carried out in collaboration with MCCC Limited in Zanzibar, COMRED in Kenya, and EcoFinance in Kenya .

1.13 After the testing and development of tools to facilitate the methodology's deployment, Greenfi Systems Limited transitioned into an open-source organisation. The methodology and associated tools are now in the public domain and accessible via Greenfi's website at www.greenfi.org. Insights from the pilot are addressed in this document, specifically in sections detailing the benefits, costs, risks, ethical considerations, barriers, challenges, and the segment on what remains unknown.

1.14 Reflecting the experimental status of the community eco-credit tool, this white paper will receive periodic updates to incorporate the latest learnings and insights. The goal is to be transparent, in particular with regards to methodological weaknesses, barriers to implementation and ethical considerations.

2. White Paper Purpose

2.1 The primary purpose of this white paper is to provide a comprehensive explanation of the community eco-credit methodology. This is intended for:

- **Project managers:** who wish to understand the methodology in order to evaluate its use as a tool within their projects.
- **Funders:** wishing to understand the community eco-credit methodology in greater detail than is typically possible through funding applications and in order to ensure project applications make use of lessons acquired by Greenfi.
- **Researchers:** who may wish to critique or contribute to validating the efficacy of the methodology as a natural resource management tool, identifying its weaknesses, or improving its effectiveness.
- **Policy-makers or advisors:** who may wish to enable policy which enhances the methodology's utility.

2.2 A secondary objective is to provide content which can be fed into ChatGPT or other language model interfaces for adaptation for the purpose of developing new landscape-specific concepts using the community eco-credit guidelines and assist in writing funding applications. The community eco-credit GPT can be found via the greenfi.org website.

2.3 Additionally, this paper provides initial analysis grounded in field insights about barriers and challenges to successful tool implementation, ethical considerations, and costs. This is intended to help practitioners seeking to develop iterate or develop analogous tools.

3. Problem Statement

3.1 Community eco-credit emerged from the realisation that communities often lack tools and incentives for effective self-management of natural resources. Within this context, community eco-credit was initially designed to address a three-level economic challenge, elaborated below:

Level 1 Problem

3.2 Individuals make natural resource-use decisions within intricate frameworks of incentives. These frameworks often favour overuse of natural resources rather than their protection or restoration. A significant barrier to protection and restoration arises because (i) individuals face near term costs in participating in individual or group-based natural resource management activities, and (ii) the benefits of these activities accrue either beyond the individual's discount horizon (the time beyond which a benefit no longer holds value for the individual), or accrue to others not involved in the effort, meaning those reaping the benefits are not the ones shouldering the costs. In simple terms: costs are real and immediate, whilst the benefits are uncertain and might benefit individuals other than those bearing the costs.

3.3 For example, an investment in soil conservation will only start showing returns to the farmer over a period of four or five years. This delay often makes the initial time and material costs hard to justify for the farmer.

Level 1 Response

3.4 In response to the identified problem, an intervention is needed to shift economic incentives toward restoration and protection, rather than degradation. The immediate costs faced by individuals or groups need to be compensated in a manner that is tangible and meaningful to them, thereby encouraging the investment of resources in actions geared towards protection and restoration.

3.5 One such intervention can be observed through in-kind payments. For instance, farmers in the Naivasha catchment in Kenya were given payments valued at approximately USD 20 to adopt soil conservation practices. This initiative led to over 4,000 farmers altering their soil management methods[1].

Level 2 Problem:

3.6 Although the Level 1 Challenge can be overcome by payments in cash or kind to such individuals, the source of payments often prove inadequate to consistently provide the needed incentives for natural resources protection.

3.7 In the case of the Lake Naivasha catchment example above, private payments were insufficient to replenish the fund and allow payment of incentives on a recurring basis.

Level 2 Response:

3.8 To address the need for a sustainable source of funding that generates necessary incentives, a mechanism is required which can sustain itself. The solution to this is to attach the incentive to credit issuance. By enhancing credit terms (for example reducing interest, increasing principal or extending loan tenor) practices which simultaneously promote improved natural resource management and mitigate credit risk can be encouraged.

3.9 As an illustration, a number of banks globally provide an improvement in credit terms for credit clients adopting sustainable practices or technologies.

Level 3 Problem:

3.10 Whilst the credit-linked solution might be viable for producers who can access formal credit systems, such producers represent only 15% or less of producers in total in developing countries[2] where the majority of landscapes are dominated by small-scale producers who, due to various reasons, are unable to qualify for formal financial access and for whom this type of incentive would not be possible.

Level 3 Response:

3.11 To address the lack of access for small-scale producers, one solution is to provide grants to groups of community members. These groups can use the grant to capitalise a revolving credit facility from which loans are issued to members. This can be achieved with public or philanthropic funds on the argument that market failure means a market-driven solution is not appropriate for the targeted demographic.

[1] WWF Lake Naivasha Programme (*pers comm.* 2021)

[2] CGAP. Segmentation of Smallholder Households. 2013

Non-economic Problems

3.12 While the primary impetus behind the community eco-credit tool was economic, pilot programmes revealed it might also address several unforeseen challenges.

3.13 Firstly, within traditional environmental or agri-environmental projects, participating individuals may not be able to self-determine all elements of the approach, from constitutions (which govern fund use) to natural resource management plans and supporting activities. Although some projects comply with FPIC (Free, Prior, and Informed Consent) standards, they sometimes lean towards superficial community approval rather than genuine self-determination. The community eco-credit approach emphasises (or should emphasise) deep-rooted thinking and individual agency which theoretically enhances compliance[3].

3.14 Secondly, when conservation organisations approach resource dependent communities with a view to changing resource-use practices, a low-level conflict can inadvertently be created between external agents advocating change and local communities and individuals that bear the costs of change. Community eco-credit enables a more cooperative relationship by emphasising meaningful partnership.

3.15 Thirdly, historically communities asked to participate in conservation activities by third party NGOs may have felt undervalued and underserved by the partnerships with NGOs they entered into. Feedback from pilot programs indicated that communities appreciated the unique, meaningful offering of community eco-credit, which set it apart from other initiatives.

3.16 Fourthly, some feedback highlighted that community eco-credit could serve as a reward for communities' previous environmental contributions.

3.17 Fifthly, NGOs face the perpetual challenge of fundraising. The community eco-credit model offers a powerful narrative to leverage grant funds. Therefore, whilst not explicitly stated, the model solves a key problem for NGOs, of unlocking funding on the back of its varied benefits and market-like, performance-based mechanism.

3.18 Finally, recognising the emergent nature of many aspects of environmental degradation from complex environmental and human systems, Greenfi emphasises that the community eco-credit tool is not a “cure-all”. However, the structure of the approach allows for the introduction and implementation of other solutions to tackle resource management issues within a new platform for cooperation and the non-economic benefits of the community eco-credit approach warrant more in-depth research to be fully understood.

4. Objective

4.1 The objective of the community eco-credit approach is increased participation by targeted individuals in either individual or group activities which restore and protect targeted ecosystems.

4.2 Participation in these activities creates costs to individuals in terms of time, materials and opportunity costs, which need to be meaningfully compensated in order to incentivise action.

4.3 Whilst the objective of community eco-credit is not improved formal or informal financial inclusion or capacity-building, the approach does lead to improved informal financial inclusion and enhanced capacity. However, more cost-effective tools like ASCAs and merry-go-rounds exist for the purpose of financial inclusion.

4.4 Additionally, the intent is not to stimulate enterprise growth. While community eco-credits aid in cash flow management and agricultural input purchases for smallholders, claims that microfinance spurs economic growth are viewed sceptically. Although individual examples might

[3] See studies on “self-determination theory”.

show enterprise creation, on a broader scale, new businesses often compete in a finite market, potentially negating any net benefit.

5. Benefits

5.1 The community eco-credit approach offers a variety of benefits, which, if presented in a log-frame methodology, might be articulated as outcomes:

- **Ecological/Environmental:** The approach promotes enhanced provision of ecosystem services including improved water quality, enriched soil health, and augmented biodiversity through the protection and restoration of nature.
- **Financial:** Over time, the approach fosters the growth of the community's financial assets, contributing to a steady and accessible financial resource for their needs.
- **Participant capacity:** Participating group members gain skills and knowledge to more efficiently manage both environmental and financial resources, fostering a sense of ownership and responsibility in community initiatives.

5.2 The pilot programme revealed a wide variety of other non-intended benefits that emerged as a by-product of the approach. These are articulated at section 25 (“Benefits, Costs & Risks”).

6. Logical Framework

6.1 Greenfi has developed a logical framework, presented below, and which adheres to the Logical Framework Approach (LFA) model.

6.2 It is constructed so:

- the project result or project immediate outcome contributes via the project purpose to the project goal, which is an organisational objective of the implementing organisation, which is shared with the funding organisation. All these outcomes are outside of the full control of the project, but to which the project can only contribute,
- the immediate outcome is the behavioural change delivered by the project,
- the output is the project “product” – i.e., the service delivered which enables the behavioural change, and
- the activities, through the activity results, cohere to form the output.

6.3 Below is a generic outline of this logframe, meant for adaptation by organisations using the approach (overleaf).

Table 1: Template logical framework for set-up of a community eco-credit project

#	Objectives	Indicator/s	Assumption
1	**Long term outcome (project goal)** [[Implementing] organisational objective, aligns with funder objective]	To be set by implementing organisation	
2	**Intermediate outcome (proiect purpose)** Increase in participating communities of:		
	(i) ecosystem health of targeted ecosystems	[x ecosystem productivity increase over baseline]	Ecosystem will not be otherwise disrupted
	(ii) financial assets held by eco-credit groups	Size of funds managed by eco-credit groups	Group members will continue to repay loans
	(iii) human capacity for environmental and financial management	Number of people actively participating in eco-credit groups	Group membership is stable/member churn is low
3	**Immediate outcome (project result)**		
	Eco-credit groups establish operational eco-credit funds and credit systems and members participate in self-determined ecological restoration and protection activities.	(i) number of groups established	Groups are stable, grow in number and encompass a majority of users of targeted ecosystems.
		(ii) number of years groups established for	
		(iii) number of participants	
		(iv) participant churn	
		(v) participant participation in ecosystem restoration exercises	
4	**Output**		
4.1	Eco-credit groups are supported to operate eco-credit funds according to eco-credit guidelines and self-determined rules	Number of groups trained in use of the community eco-credit methodology	The methodology has been adequately understood and implemented by [implementing organisation] management
5	**Activity Heads**		
5.1	[Implementing organisation] completes a preliminary feasibility assessment [and scoping study] with feedback informing a decision to proceed with activities associated with Activities 2-5	Completed preliminary feasibility assessment & management decision to proceed	
5.2	[Implementing organisation] management are trained and supported in the use of community eco-credit tools	Completion of community eco-credit training course by [defined] management	
5.3	Stakeholders and communities input into project preparation & social harms & mitigation assessment	Completion of required stakeholder and community consulation exercise by [n] stakeholder and communities	All activities are delivered with sufficient quality
5.4	Community leaders and community-based trainers [CBTs] are trained and experienced in the use of community eco-credit tools	Completion of required training course by [n] community leaders and CBTs	
5.5	Eco-credit groups are set-up, trained capitalised & supported to run effectively and meet their objectives	Completion of community eco-credit set-up activities for [n] groups	

7. Target

7.1 The community eco-credit methodology targets small-scale producers who rely on healthy ecosystems for their livelihoods and wellbeing. These individuals often fall beyond the reach of (i) conventional financial systems and/or (ii) value chains that could provide the necessary technical advice and financial incentives for transitioning to sustainable natural resource management practices.

7.2 Available data suggests that this demographic comprises approximately 85% of producers within the agricultural sector. For the artisanal fisheries sector, this proportion might be higher, largely because lenders are wary of this group.

7.3 Importantly, despite their limited financial means, this group significantly impacts landscapes, affecting the quality of ecosystem goods and services, and contributes to national food security. Their collective practices influence ecosystem services like biodiversity, soil condition, and water quality.

7.4 The community eco-credit methodology can be adapted to specifically target marginalised groups, including women, youth and minorities, according to project objectives.

8. Methodology

8.1 The methodology is summarised in the diagram and table below. The full and detailed methodology is available via the Greenfi.org website. No payments are required, but access requires acknowledgement of the principles by which eco-credit should be used.

8.2 Greenfi believes the methodology is unique in its combination of revolving credit facilities, group-managed funds, and loans contingent upon pre-specified and agreed environmental actions. However, in this mix, it is a combination of existing methodologies rather than offering a radically different framework.

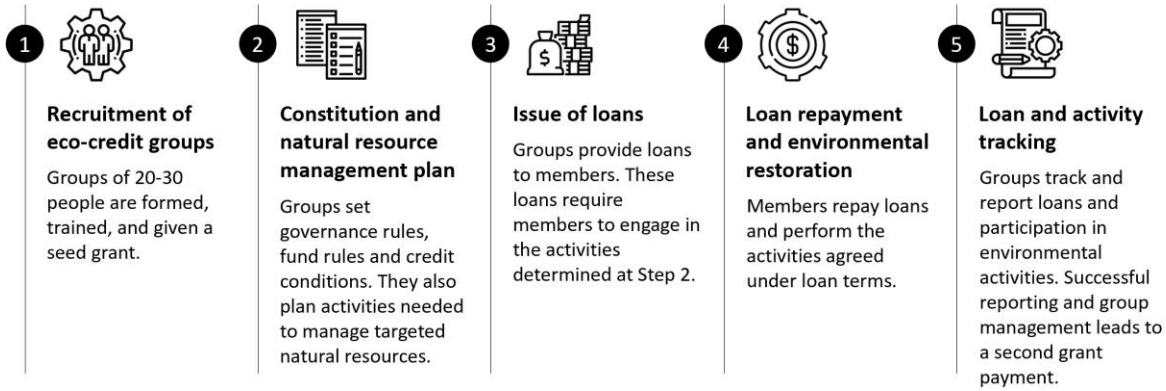

Figure 1: Process of set-up of eco-credit groups

8.3 From a group-level perspective, the series of events are:

- Group formation
- Agreement of the norms and terms which will govern group operation, fund management and loans
- Receipt of the first tranche of the grant
- Start issuing loans and undertaking agreed ecosystem restoration or protection actions
- If successful, receive a second milestone after one year

8.4 From the perspective of an organisation supporting the implementation of the methodology, the steps are summarised below.

Table 2: Elaboration of the set-up of community eco-credit groups

#	Step	Description
1	Recruitment, training and capitalisation of groups	The standard eco-credit methodology assumes new groups will be recruited, trained and capitalised with an initial seed grant upon completion of training and agreement of terms under which the scheme will operate both within groups and between groups and funders. Further grants are provided to groups upon meeting of pre-agreed group management and environmental targets. The methodology does not stipulate how groups should be recruited, but it is assumed this will be achieved by contacting existing groups concerned with the management of natural resources, such as farmers' groups, community-based natural resource management institutions or other groups.

		A new project recruiting existing community “savings groups”, which offers both benefits and costs, but pilots of the approach are not yet conclusive.
2	Groups agree a constitution and group-level natural resource management plan	Groups establish a (i) constitution which governs group governance, management of the group “eco-credit fund”, a revolving credit facility, and terms on which credit is issued, and (ii) a group-level natural resource management plan for management of targeted natural resources and the activities necessary to fulfil the plan, which are linked to loan terms. Where groups are formed based on livelihoods or geographical proximity, their natural resource plans should address the resources relevant to member livelihoods and wellbeing. The community eco-credit methodology does not stipulate whether the constitution and group-level natural resource management plan should be stand-alone or linked to higher order plans, for example the constitutions and natural resource management plans of community-based natural resource management institutions. This is of course a possibility where principles of self-determination are not overlooked.
3	Groups issue loans including requirements for participation in environmental actions	Groups issue loans to group members from their eco-credit fund. Loan terms require participation in activities agreed by the group at step 2. Where members do not participate in environmental activities, they will not be able to have credit access until those activities are completed. In this way, the satisfaction of these environmental requirements becomes part of the credit scoring mechanism operated by the group.
4	Loan repayment and environmental restoration	Group members who borrow money repay loans in accordance with the requirements of their constitution, as well as carrying out activities agreed as loan terms. Groups decide on interest, Sharia-compliant fees, and other loan terms like tenor, grace period, and collateral.
5	Impact reporting	Groups, as per grant terms, maintain records of loans, repayments, and participation in ecological activities. These records, aside from group use, cater to funder impact tracking needs. The sense that there is an external audit of compliance may contribute to successful performance.

9. Development and Evolution of Community Eco-Credit

9.1 The community eco-credit model was shaped by iterative real-world observations and analytical evaluation leading to the development of the approach. Firstly, Ecosystem Equity during the period to 2015 generated evidence that small-scale producers were willing to accept sustainability requirements as loan terms and that issue of commercial green credit in this way could be an effective and financially sustainable mechanism for creation of incentives for improved management of natural resources.

9.2 Secondly, and despite the potential offered by this mechanism, incorporating sustainability criteria into the loan terms for small-scale producers has faced several hurdles, including:

- Market failure in meeting credit needs of small-scale producers, meaning a large segment manages their financial needs outside formal banking systems, and which are now central to distributing climate-focused finance, unintentionally excluding many vulnerable players.
- Financial institutions express concerns about potentially compromising their competitive edge by adding indirect costs to their loans.
- Regulatory bodies, such as central banks, are cautious about indirectly integrating climate objectives into banking regulations without explicit democratically-mandated regulatory change.

9.3 Additionally, market research conducted ahead of development of the methodology demonstrated:

- ASCA participants are dissatisfied with the ASCA model's limited loan funds due to restricted individual savings.
- There is a widespread belief that savings groups often struggle to repay external debt. This suggests that these groups might benefit more from grants which create group equity rather than debt.
- IUCN proof that where grants are used to finance loans managed by CBNRMIs, loans are repaid - although this model is unlawful without licence in countries where credit is regulated.

9.4 With these experiences and insights, Ecosystem Equity drew up the community eco-credit model, methodology and assumption testing framework at a workshop in Cape Town in December 2017. This core model, explained below, was then piloted in partnership with MCCC Ltd starting in 2018 with seed capital provided by Ecosystem Equity, later augmented and scaled via MCCC Ltd and its partners. MCCC Ltd adapted the core model according to a specific CBNRM governance context used in Tanzanian coastal management.

9.5 The core model was developed from pre-existing methodologies (detailed below). Whilst drawing from these, the community eco-credit approach is itself novel in how prior practices are combined together, and in the vesting of funds within small groups. The purpose of making this novelty clear is to explain why the model is regarded as experimental and why extensive testing was undertaken and remains to be undertaken to determine the efficacy of the approach.

Table 3: Community eco-credit elements and their origin

#	Element	Source
1	Loan terms include requirements for participation in specified environmental actions	Ecosystem Equity
2	Groups of 20 to 30 people are the principal organising unit	Grameen Microfinance Groups or Savings Groups
3	Revolving credit facilities are capitalised with grants	IUCN's CECF approach
4	Grants vest with the group	Community Eco-Credit
5	Tracking of loans and environmental activities	Widespread practice

10. Methodology Design Choices

10.1 The community eco-credit methodology combines existing approaches and therefore represents "evolution rather than revolution". Specific reasons drive the methodology's design choices. New implementations might adapt the methodology to suit different scenarios. However, the

below reasons are stated in order that it is understood that the design choices were made with good reason and should only be modified with reflection as to the likely benefits, costs and risks of change.

Table 4: Design choices and justification in development of the methodology

#	Methodological Component	Reason for Design Choice
1	Groups of 20 to 30 people, termed eco-credit groups, function as the primary operating entities.	Smaller group sizes foster genuine individual participation and autonomy in setting fund and environmental goals. Small group size mitigates the influence of dominant community factions seen in larger entities. Also, members in smaller groups are more familiar with each other's credit-worthiness, increasing the probability that funds are well-managed. Larger self-managed entities are at greater risk of control fraud.
2	Eco-credit groups are provided with a grant to capitalise a revolving credit mechanism.	Based on sectoral insights, debt funding to groups can lead to repayment challenges. External debts are often deprioritised ahead of community-level obligations. The grant is disbursed to groups in two tranches as an incentive for good management through the first year.
3	Ownership and management of credit facilities are vested in eco-credit groups.	Increased regulation of credit issuance mean that larger entities might face licensing and compliance obligations and costs. Smaller groups usually sidestep licensing requirements (subject to local verification). Additionally, the sense of fund ownership is more tangible in smaller groups. Moreover, it does not disturb community balance of power by placing relatively large sums of money with institutions which were not intended or structured to operate as credit institutions.
4	Issue of loans to group members include requirements for participation in specified environmental actions as a loan term.	This is the incentive and designed to overcome or at least partially offset upfront costs of participation in environmental activities. The incentive is attached to the loan (rather than group membership) for two reasons. Firstly, it follows the rule to attach incentives to actions as directly as possible. Secondly, it ensures equity – no loan means no cost expenditure or participation in environmental activities, which occurs where the environmental requirement is attached to group membership.
5	Loan repayments entail an added interest or group fee.	The fee ensures the fund is not reduced in time by inflation, and if at a higher rate than inflation, provides the incentive of a growing financial asset.
6	Emphasis is placed on tracking and reporting loan transactions and environmental participation.	This is for three reasons: (1) external accountability can enhance participation, (2) transparent operations may boost funding prospects, and (3) prompt support can be provided to groups facing challenges.

11. Guiding Principles

11.1 The skeleton methodology which guides the eco-credit group project is purposefully designed to allow local stakeholders and participants themselves to specify how funds and groups will

operate. They are expected to choose *inter alia* the governance mechanism both within participating communities and groups themselves, fund management arrangements and loan terms. As such, a substantial number of design choices are left to groups and implementing organisations.

11.2 In support of these decisions, Greenfi suggests guiding principles to inform design decisions taken by project managers and groups.

Table 5: Principles guiding set-up of eco-credit groups

#	Principle	Description
1	Do no harm/ensure positive impact	Firstly, any financing or loan activities should not lead to net environmental degradation, either directly or indirectly. The idea is to ensure that the provision and use of funds contribute positively or neutrally, but not negatively, to the environment. Secondly, environmental activities chosen by groups should not harm any individuals or groups without compensation and their full, prior and informed consent. The implication of this is that eco-credit as a methodology should not be used to incentivise resource closure where that closure is not otherwise compensated. Thirdly, enforcement of loan repayment terms should not be punitive or create additional hardship for borrowers who fail to repay.
2	Self-determination	Central to eco-credit is the principle of self-determination, which empowers individuals and communities to shape their financial and ecological choices based on local contexts and values. Instead of top-down directives, this approach fosters genuine engagement by allowing participants to co-create environmental objectives and activities supporting those objectives. By ensuring stakeholders have agency in their actions, community eco-credit hopes to achieve lasting impact.
3	Incentives are direct	The principle that incentives should be direct to work best is rooted in the broader concept of "alignment of incentives." The idea is that when rewards or penalties are directly linked to a desired behaviour or outcome, they are more likely to influence behaviour effectively. Misaligned or indirect incentives, on the other hand, may lead to unintended consequences or fail to motivate the desired behaviours. This means attaching requirements for participation in environmental activities to loan terms rather than group membership, because it is access to the loan which delivers the incentive and being a group member is not a guarantee of equitable loan access.
4	Equity	This principle refers to a fair distribution of benefits, costs, and opportunities associated with the scheme, ensuring that no particular group is unfairly burdened or left out. The idea is to promote fairness, justice, and inclusivity in the design, set-up and outcomes of the loan scheme – and in scheme access, process and outcomes
5	Verifiability	This refers to the ability to confirm, validate, or prove the assertions or outcomes related to the loan's environmental impact. By adhering to this principle, a scheme would aim to ensure that any claims regarding environmental benefits, mitigation measures, or other related activities are genuine, accurate, and can be substantiated through objective means, supporting funder interest in using the methodology.
6	Expert input	This principle emphasises the importance of providing knowledge, expertise and insights to eco-credit groups from professionals with specialised technical backgrounds in environmental science, economics, finance and related fields. By adhering to this principle, the approach aims

		to ensure that decisions, assessments, and evaluations are based on credible, informed, and current technical understanding.
7	Simplicity	This principle recognises that for an ecological initiative to be widely adopted and maintained, it must be straightforward and easily understood. Overly complex requirements can deter participation and lead to inefficiencies or misinterpretations. Simplicity ensures that all stakeholders, regardless of their background or expertise, can engage with, and benefit from set-up of an eco-credit project.
8	SMART (specific, measurable, attainable, relevant and timebound) objectives	Environmental objectives within the community eco-credit system should be SMART. Emphasising 'measurable' objectives is especially relevant in the context of environmental loan covenants. Positive covenants, which mandate specific actions, are generally more measurable compared to negative covenants that place constraints on actions.
9	Loan Purpose	Loans are for cash-flow smoothing and agricultural inputs, not for enterprise development.

12. Eco-credit Groups

12.1 Community eco-credit groups are self-managed groups of 25-30 people. Groups operate under a constitution agreed by the group itself and which also set out the rules for fund management, environmental objectives and defines the activities which support those objectives which will be included in loan terms.

12.2 Leadership of the group is carried out by three elected officers, a Chairman, Treasurer and Secretary. In practice other officers have also been elected such as data collectors, money counters etc.

12.3 Eco-credit groups are supported in their function by a Community-Based Trainer, who trains them in the eco-credit group methodology and helps them towards undertaking their environmental activities.

12.4 Groups meet according to their own schedule, usually once a week, but some also meet fortnightly.

12.5 Groups can operate independently but are more likely to interact within an existing governance framework. For example, where implementation is carried out in partnership with community-based natural resource management institutions, then this provides a prior standing governance mechanism. Similarly, governance can be established via a higher-level farmer's group or other central organising institution which support and coordinate groups, eg irrigation scheme management.

13. Justification for Grant Funding of Community Eco-Credit Groups

13.1 During the G20 summit in Hamburg, Germany, in July 2017, the G20 nations along with the Multilateral Development Banks (MDBs) endorsed the Hamburg Principles which underscored the dedication of the G20 nations and MDBs to bolster strategies that amplify the role of private finance in delivering on the Sustainable Development Goals (SDGs)[4].

13.2 The G20 and related entities argue that instead of the conventional method of assisting developing nations through public-to-public aids like grants, public resources can be optimised by reducing risks for private capital market investors. By doing this, they believe that these investors can offer significantly greater private funding for developmental activities. Advocates

[4] Rowden R. 2019. From the Washington Consensus to the Wall Street Consensus. Washington, DC: Heinrich Böll Stiftung

believe that this method would attract more investment and reduce the borrowing expenses for developing nations. This strategy is how the G20 and DFIs intend to bridge the financial shortfall required to meet the SDGs by 2030[5].

13.3 The community eco-credit methodology will be largely dependent on grant funding for both group capitalisation and technical assistance. There may be circumstances where private entities invest in eco-credit group formation and capitalisation, and Greenfi provides a financing mechanism which facilitates this, but willingness to pay for ecosystem services by private sector actors is generally quite low for a variety of reasons, justifying in the World Bank's own assessment the acceptability of grant funding.

13.4 This section therefore sets out the justification for grant funding:

- **Market failure in the credit markets:** credit incentives are effective tools for behavioural change, internalising the cost of environmental externalities into the credit price signal. However, in many markets small-scale producers do not qualify for credit despite there being a strong demand amongst this market. This market failure justifies public funds.
- **Public money for public goods:** typical public goods problems (free-riding, non-rivalry, non-excludability) result in an under-investment in important environmental public goods. UK government policy creates a stated precedent for investment in such goods with the "public money for public goods" policy approach, which would apply in this instance.
- **Sectoral derisking for private sector investment:** under-investment in natural resource management creates a risk dissuading private sector investment.
- **Prior-standing efforts:** considerable efforts have been made to market investments to private users of ecosystem services. Practical experience is that willingness to pay is low, justifying investment of public funds. Even in carbon markets– willingness to pay does not meet need.

14. Comparison with Existing Approaches

14.1 The community eco-credit methodology is a performance-based approach, which like similar approaches aims to provide a reward to natural resource managers for their contribution to environmental activities. The below table sets out other performance-based or contractual approaches and compares them to the community eco-credit approach.

Table 6: Comparison of community eco-credit to other performance-based approaches

Feature/Tool	Community Eco-Credit	Direct Payments for Ecosystem Services (PES)	Conservation Easements	Reducing Emissions from Deforestation and Forest Degradation (REDD+)
Management	Managed by local groups of 20-30 members	Typically, government or large NGOs	Landowners in partnership with governments or NGOs	Countries, often in partnerships with international bodies
Funding Source	Grant capitalisation	Often governmental funds or private investments	Donations, grants, or governmental funds	International funding, carbon markets

[5] *Ibid.*

Operations	Decided by group members	Defined by agreement between buyers and providers	Land trusts or conservation organisations	Collaboration between nations and international bodies
Participation Requirement	Participation in group-decided activities	Compliance with agreed-upon conservation actions	Maintenance of land in its natural or historic state	Implementation of sustainable forest practices
Primary Goal	Improve ecosystem services	Preserve or restore specific ecosystem services	Preserve land from future development	Reduce carbon emissions from deforestation and degradation
Scale	Community-level	Can be local, regional, or national	Individual land parcels	National or regional
Flexibility	High (decided by group members)	Defined by PES buyers	Defined by easement creator	Defined by REDD+ guidelines
Benefit Distribution	Direct to groups and group members	To those providing the ecosystem services	To landowners	Funds or credits to participating countries

14.2 There are furthermore a number of emerging approaches which use financial institutions as the entity for delivery of financial incentives or support for transition to sustainable practices. These different methodologies are contrasted below.

Table 7: Comparison of community eco-credit to other finance-based approaches

#	Feature/Tool	Community Eco-Credit	Climate-smart Lending	Community Environment and Conservation Funds	EcoMicro
1	Ownership	Managed by local groups of 20-30 members	Financial institutions (banks, MFIs, SACCOs)	Community-based natural resource management institutions (CBNRMIs)	Financial institutions (banks, MFIs, SACCOs)
2	Funding Source	Grant capitalisation	Mixed funding, including commercial debt, and technical assistance grants	Grant capitalisation	Commercial debt
3	Contingency	Attaches to loan	Attaches to loan	Attaches to CBNRMI membership	Set by loan purpose

4	Management	Decided by group members	Financial institutions and third-party supporters such as NGOs	CBNRMIs	Financial institutions and third-party supporters such as NGOs
5	Participation Requirement	Participation in group-determined activities	Participation in activities determined by the financial institution	Participation in activities determined by the CBNRMI	Participation in activities determined by the financial institution
6	Primary Goal	Improve ecosystem services	De-risk credit issuance	Improve ecosystem services	De-risk credit issuance
7	Scale	Group-level	Agricultural portfolio	Community-level	Agricultural portfolio
8	Flexibility	High	Low	Medium	Low
9	Benefit Distribution	Direct to group members	Between bank and lenders	Community-level	Between bank and lenders

14.3 Community eco-credit is often seen as analogous to the Accumulated Credit and Savings Association (ASCA) instrument, sometimes called Village Savings and Loans (VSLA) or Village Community Banking (VICOBA) methodology, used by NGOs such as CARE, CRS, IRC, Oxfam and WWF.

14.4 While on the surface, the two instruments might seem alike, a closer examination reveals significant differences. The subsequent table elucidates these distinctions.

Table 8: Comparison of community eco-credit to the ASCA methodology

#	Feature	ASCA/VSLA	Community Eco-Credit
1	Primary Objective	Financial inclusion and empowerment	Increase participation in ecological restoration and protection activities
2	Key Benefits	Increase local financial and social capital. Cultivation of savings culture.	Increase local environmental, financial and social capital.
3	Target	Low-income rural inhabitants in developing countries	Similar but with the possibility to be applied in the Global North too.
4	Community-Based Groups	☑	☑
5	Regular Savings	☑	☒
6	Share Mechanism	☑	☒
7	Dividend	☑	☒
8	Transparent Record-Keeping	☑	☑
9	Source of loans	Savings pool	Revolving credit facility
10	Source of loan capital	Member savings	External grant
11	Loan Repayment	☑	☑
12	Self-Management	☑	☑
13	Democratic Decision-Making	☑	☑
14	Sustainability	☑	☑
15	Environmental loan requirements	☒	☑

14.5 A core feature of the community eco-credit model is the grant into the group-owned revolving credit facility. Grants are excluded in the ASCA methodology which instead rely on savings to build capital, and the broad perspective exists that the grant undermines the incentive to save and that it is this savings culture which is the foundation of ASCA approach outcomes.

14.6 In contrast to the ASCA methodology, the Greenfi approach is grant-based because market research identified that ASCA group participants were not able to meet their credit needs from ASCA savings pools and that this was a considerable source of discontent with the approach. Given concerns about grant funding in the community eco-credit methodology, a core element of pilots sort to understand whether the grant element affected group performance.

14.7 Through pilots conducted by partners, Greenfi observed that groups often choose to operate an ASCA instrument alongside a community eco-credit fund and save regularly alongside the use of eco-credit. For example, after some time, this was encouraged within the MKUBA programme operated by MCCC Ltd on the belief that joint savings helped build social solidarity which improved the performance of the eco-credit groups. Additionally, it was found that the prior exposure of communities to the ASCA methodology appeared to help understanding of the credit elements of the community eco-credit methodology.

15. Replication and Scaling

15.1 There are varying definitions for "replication" and "scaling." Below, the community eco-credit approach is assessed against these definitions. This comparison aims to clarify which components of the approach can be either replicated or scaled and which cannot.

Table 9: Assessment of the methodology's ability to replicate and scale

#	Definition	Assessment
1	**Replication**	
1.1	"Activities that explicitly attempt to reproduce a specific intervention in a different location"[6]	The core elements of the community eco-credit methodology — grant capitalisation of groups and the issuance of loans to group members with environmental prerequisites — are replicable. Greenfi's developed tools facilitate this replication more affordably, allowing groups to determine their governance, fund management, loan terms, environmental objectives, and ecological restoration activities – but running on prior-established rails and not needing to redevelop the methodology from scratch. In this sense, the methodology is replicable.
1.2	"An intervention that is self-sustaining"[7]	Using the GEF definition, community eco-credit is self-sustaining as it generates revenue at the group level through interest payments or loan fees. This revenue can fund service provision to groups on an on-going basis. However, if the definition implies that groups can operate without backing from a supporting organisation, then our testing cycle has not confirmed this to date. Also, eco-credit can be used to foster lasting collaboration between local NGOs and local resource user groups and therefore being entirely self-sustaining may not always be an objective in use of the approach.

[6] Kato, et al. OECD. p8. Scaling up and Replicating Effective Climate Finance Interventions. 2014. Accessed October 2023.

[7] (GEF, 2013)

1.3	"A copy-paste replication to grow impact"[8]	While the community eco-credit approach's core elements can be replicated, the specifics are delegated to individual groups and thus the methodology adapts itself to local need. In this sense, perfect "copy-paste" is not achieved.
2	**Scalability**	
2.1	"Refers to activities that attempt to expand an initial intervention"[9]	Core modules of community eco-credit are capable of expansion. However, fund and loan terms, environmental goals, and activities related to ecological protection and restoration may differ from group to group or landscape to landscape. Thus, whilst it is accurate to state that community eco-credit is capable of expansion in its basic components, its specifics are intentionally not. The need for adaptation according to local need has cost implications because costs will be incurred in local negotiation and support.
2.2	"[The ability] to increase your impact at an increased rate, compared to your costs and effort", reflecting a more general business definition of "the ability to increase revenues while your marginal costs decrease with each unit sale"[10]	By this standard, community eco-credit is not scalable as the marginal costs associated with setting up a group have a baseline fixed expense that doesn't decrease. The inherent cost comprises group fund capitalisation and support and this is not low cost at the margin. The Mkuba program in Tanzania tried reducing fund capitalisation expenses by having existing groups finance new ones, but this did not materialise beyond token amounts. Moreover, reducing the available group funds could adversely impact group incentives which might unfairly advantage early cycle lenders by diminishing loan capital available for subsequent loans, compromising the community eco-credit equity principle.

15.2 Beyond these definitions, Greenfi believes that community eco-credit groups may always require external assistance at one time or another. Given that the groups navigate ever-changing financial and environmental landscapes, it is essential to view them as dynamic entities. Similarly, banks are not wholly self-sustaining and benefit from implicit state guarantees and bailouts, and US agri-lenders are recapitalised on an annual basis. Community eco-credit groups should maybe be viewed in a similar way with need for support subject to need.

15.3 As mentioned at section 8 ("Methodology"), when new organisations adopt the approach, it should be tested first as a landscape demonstration, and then as a landscape replication. The purpose of the landscape demonstration is to learn and adjust the methodology, perfecting it ahead of a replication phase. During the replication phase, the number of groups will expand in line with a definition of scaling akin to expansion (see 2.1 in the table above), but cannot scale on an economic basis, with ever reducing marginal costs of group establishment.

16. Eco-credit Loan Agreement and Accounting Treatment

16.1 The loan agreement between the eco-credit group and the borrower establishes a three-tier obligation for the borrower. Specifically, the agreement creates:

- duty to repay the principal
- a commitment to service the interest or pay the loan fee, and

[8] OECD, cited in Vindas, C. p3. "Scaling and Replication: A Way to Grow your Impact". Accessed October 2023.
[9] Kato, et al. OECD. p8. Scaling up and Replicating Effective Climate Finance Interventions. 2014. Accessed October 2023.
[10] Dudnik, N. Social Entrepreneurs Tricky Issues of Sustainability and Scale. Harvard Business Review. Accessed October 2023.

- a responsibility to fulfil the environmental obligation.

16.2 Conceptually, this environmental obligation acts as a counterbalance, seeking to restore the local ecosystem from the effects of resource off-take necessitated by loan repayment.

16.3 The below hypothetical ledger extracts capture the creation and extinguishing of eco-credit obligations, both financial and environmental, on the group and individual loan ledgers.

16.4 Whilst the ledgers record the obligations, the group balance sheet would not capture the uplift in the natural asset, because – unless the environmental asset is owned by the group - that would appear on a community ledger, an example of which is given at (c) below.

16.5 While a community would not typically maintain such a balance sheet, the absence of such a record does not diminish the notion of locally-held environmental assets, even if they remains unrecognised. It further shows how loan repayment necessitates partial liquidation of the environmental asset, but its replenishment through the environmental terms of the loan. In the example below, which is simplified for the purpose of illustration, mangroves are harvested to sell as poles in order to repay a loan, but mangroves are also replanted as a loan requirement to maintain a consistent number of mangroves.

16.6 In the below example, the eco-credit group issues a loan of 100, together with obligations to repay the loan with interest and plant 10 mangroves through the loan repayment cycle.

Table 10: Hypothetical group loan ledger incorporating environmental liabilities and assets

	Date	Account	Debit (USD)	Credit (USD)	Monetary Balance (USD)	Mangroves Owed	Mangroves Planted	Notes
1	Sep 20, 2023	Loan Receivable	100		100	10	0	Loan issued to borrower
	Same Date	Cash Account		100	0			
2	Oct 20, 2023	Cash Account	26.25		26.25			Payment received
	Same Date	Interest Income	1.25		1.25			
	Same Date	Loan Receivable		25	75			Principal payment
	Same Date	Mangroves Owed		2		8		Mangroves planted
	Same Date	Mangroves Planted	2				2	
3	Nov 20, 2023	Cash Account	25.94		52.19			Payment received
	Same Date	Interest Income	0.94		2.19			
	Same Date	Loan Receivable		25	50			Principal payment
	Same Date	Mangroves Owed		2		6		Mangroves planted
	Same Date	Mangroves Planted	2				4	

16.7 The below ledger extract captures the corresponding creation of obligations in the borrower's ledger.

Table 11: Hypothetical individual loan ledger incorporating environmental liabilities and assets

	Date	Transaction	Debit (USD)	Credit (USD)	Monetary Balance Due (USD)	Environmental Liability	Mangroves Planted	Notes
1	Sep 20, 2023	Loan Received		100	100	10 Mangroves	0	Loan received from Example Group
	Same Date	Environmental Liability	10 Mangroves			10 Mangroves		Env. obligation acquired
2	Oct 20, 2023	Payment Made	26.25		73.75			First payment made
	Same Date	Interest Paid	1.25					
	Same Date	Principal Paid	25					
	Same Date	Environmental Liability Reduced	2 Mangroves			8 Mangroves	2	2 Mangroves planted
3	Nov 20, 2023	Payment Made	25.94		47.81			Second payment made
	Same Date	Interest Paid	0.94					
	Same Date	Principal Paid	25					
	Same Date	Environmental Liability Reduced	2 Mangroves			6 Mangroves	4	2 more Mangroves planted

16.7 Whilst invariably never documented, the below hypothetical extract captures the change in the environmental asset on the community balance sheet.

Table 12: Hypothetical community environmental balance sheet

ASSETS	Amount
Initial Mangroves (before loan)	100
Mangroves Used to Service Loan	-4
Mangroves Planted (Loan Obligation)	4
Total Mangroves	100

17. Stakeholders

17.1 Within the community eco-credit methodology, at an early stage in set-up, stakeholders are identified and included in the project design process. Typical stakeholders affected by the approach include, *inter alia:*

Table 13: List of potential stakeholders in a community eco-credit project

#	Stakeholder	Description	Likely Interests
1	Local Communities	Local populations residing in target areas.	Interested in sustainable livelihoods, preserving traditions, and community welfare.
2	Environmental NGOs	Organisations dedicated to conservation and sustainable practices.	Aim to promote eco-friendly initiatives and monitor their impacts.
3	Local Governments	Regional or municipal governing bodies.	Seek to ensure sustainable development, regulatory compliance, and community welfare.
4	Donors and Funders	Individuals or entities providing financial support.	Interested in transparency, accountability, and the success of ecological initiatives.
5	Businesses	Local enterprises or multinational corporations operating in the area.	Aim for sustainable operations, community relations, and potential improvements in ecosystem services.
6	Academic Researchers	Scholars studying environmental, social, or economic aspects.	Aim to gather data, understand impacts, and share knowledge.
7	Local Conservationists	Individuals/groups championing local ecological efforts.	Interested in preserving local biodiversity and promoting sustainable practices.
8	Landowners and Farmers	Those owning or working on the land.	Seek sustainable land management, potential financial incentives, and improved agricultural practices.
9	Community-based Natural Resource Management Institutions	Local community institutions with a mandate for stewardship of local natural resources	Support in mobilising resources in support of their natural resource management plan.

18. Governance

18.1 Governance of community eco-credit projects takes place at two levels: (i) group-level governance, and (ii) scheme or extra-group governance.

18.2 The Greenfi community eco-credit model focuses on the structures for group governance, whilst partner organisations which have implemented the methodology have developed their own governance arrangements, which have been important in group stabilisation and linking group actions to wider community objectives.

18.3 Group governance is by way of a group constitution agreed by group members. A template version of this document covers such matters as election of group officers, environmental objectives, fund management rules and loan terms. Through the set-up process, groups are guided through the key decisions which they need to make in order to develop their governance arrangements.

18.4 Project level governance is set by way of agreements or Memoranda of Understanding linking key actors within the scheme.

18.5 With a community-based natural resource management framework, MCCC Ltd developed a governance framework which operates as set out below. The importance of this governance framework is that it is thought to support the sustainability of groups and ensure that ecological protection and restoration activities align with the community-level natural resource management plan.

18.6 As illustrated in the below diagram, (1) eco-credit groups are capitalised by a funder via an implementing entity, (2) local facilitators – typically a local NGO – supports the implementing entity in set-up as well as eco-credit groups themselves, and (3) the implementing entity operates under the explicit mandate of a local authority, which in turn and in theory is accountable to the local electorate or other source of power.

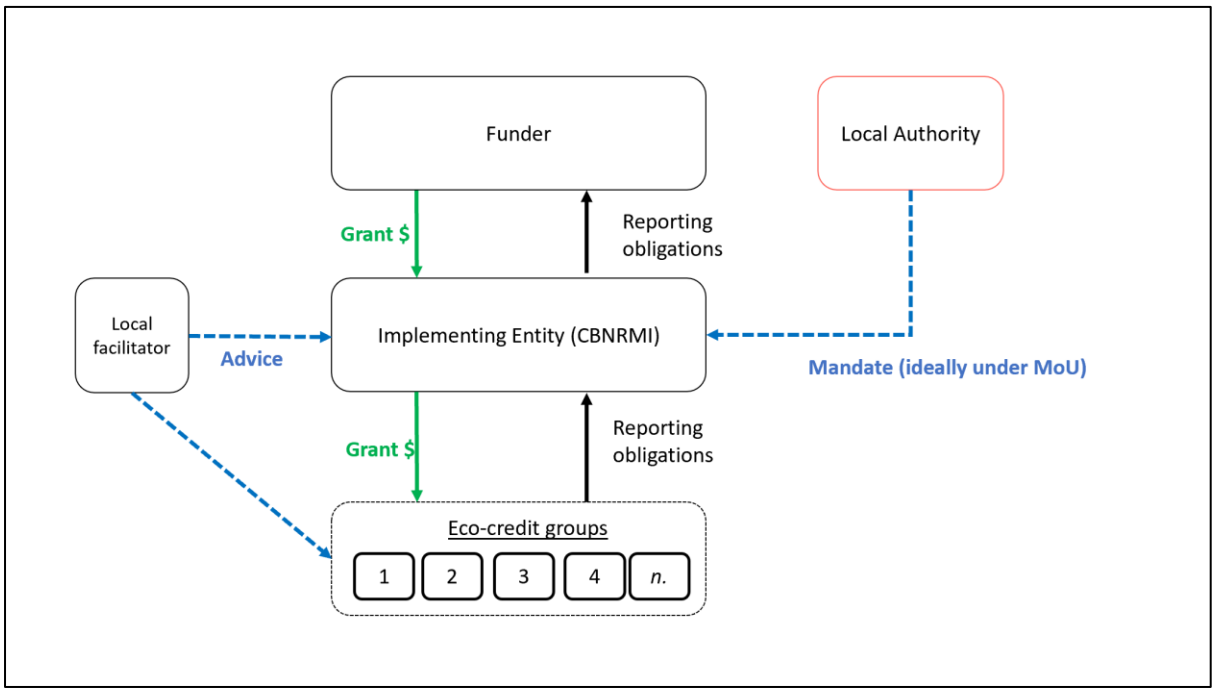

Figure 2: Governance mechanism in a CBNRM framework

18.7 Within contexts where targeted resources are not held in community ownership or management regimes other structures would be appropriate, for example placing eco-credit groups within the authority and support of farmers groups or other local civil society organisations.

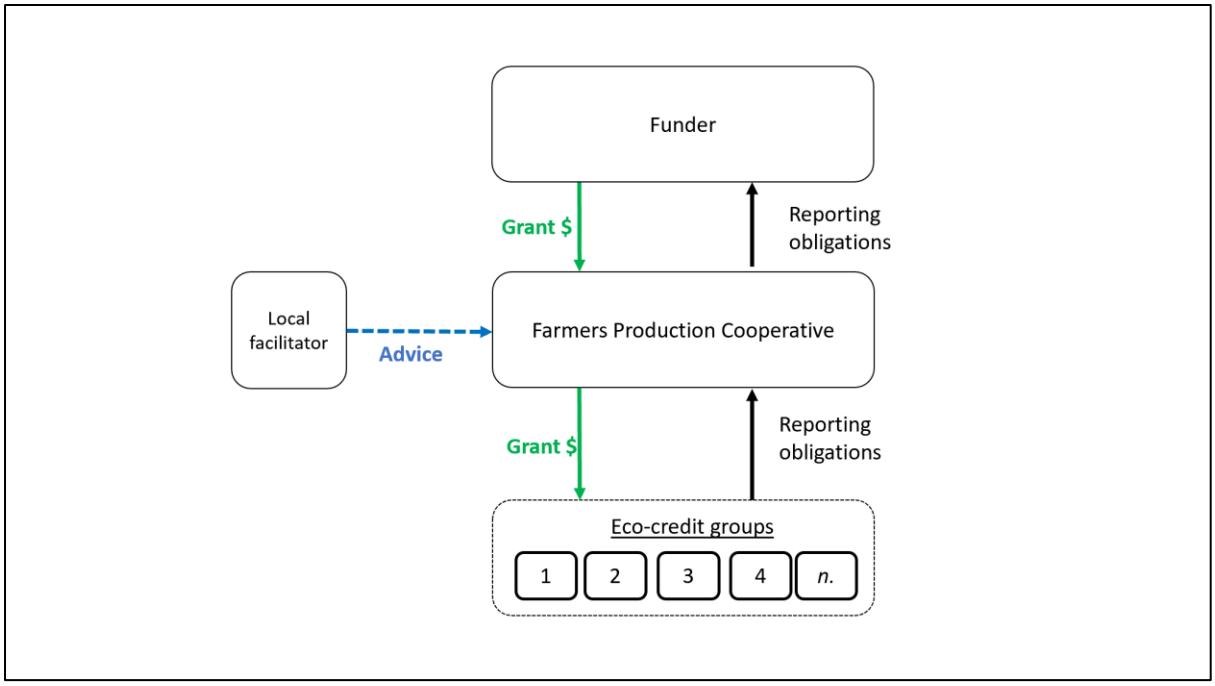

Figure 3: Governance within an agricultural commodity-based framework

19. Financing Options

19.1 Greenfi explored a number of financing options for capitalisation of group-owned revolving credit facilities. Conscious of a donor funding preference for privately financed sustainability initiatives, Greenfi investigated a debt-based model, where eco-credit group funds are capitalised with debt rather than equity, in other words repayable loans rather than grants which vest with the group. Our research revealed that groups in target demographics were unlikely to be viewed as credit-worthy by third party lenders and would not be able to attract loans. However, the community eco-credit group assumption, proven out by pilots is where the groups own the capital from which loans are made, then repayment is sustained by groups which are supportive in that objective.

19.2 As such our conclusion was that whilst groups must be grant financed, this grant can in turn be financed by public or philanthropic funds - or private funding seeking an improvement in ecosystem services, but the capital in the community eco-credit approach will never be repayable by the group to the funder.

19.3 For its own funding, Greenfi explored a licensed-based software-as-a-service business model to fund monitoring tools, but slow uptake and unproven willingness to pay on the part of beneficiaries did not create a compelling investment case in a market which does not consider service providers to organisations with broadly humanitarian aims viable. A further lead-gen based model may have been viable where data or access was provided to third party lenders, but it was felt this might undermine the objective and benefits of the model.

19.4 As such the monitoring tool, in very basic form, is available under an open-source licence to organisations which may want to use it or develop it further. We estimate hosting costs of about USD 50/month for a medium sized project and developer cost of about USD 5-6,000/year as an absolute minimum.

20. Financing Structure

20.1 The financing structure for community eco-credit consists of two core elements: (1) grants to community eco-credit groups, and (2) loans from eco-credit groups to group members. This can

be affected through the following structures at landscape demonstration and landscape replication stage.

20.2 During the landscape demonstration phase one funder provides funds to a local project developer or facilitator, such as an NGO. This project developer in turn funds the eco-credit groups as well as provides the services needed by groups for set-up and operation.

20.3 During the landscape replication phase, multiple funders provide a financial grant to a local basket fund, which in turn onward grants funding to eco-credit groups. Eco-credit groups procure services from service providers for set-up and operation, both from the grant and from revenue created by issue of loans and repayment with interest or a fee. No eco-credit project is yet to reach a full landscape replication stage, but the model for how this could occur is also set out below, which will be adopted by at least one organisation in coming years.

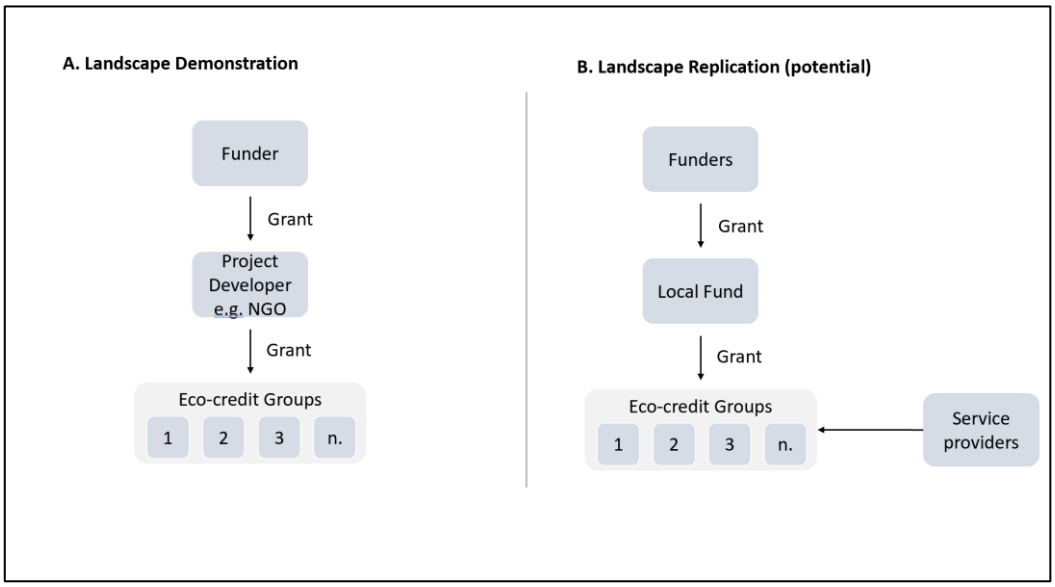

Figure 4: Financing mechanism during landscape demonstration and replication phases

20.4 A common mistake is to believe that the funds given to groups are debt. This is not the case and would undermine the power of the incentive for participation in environmental activities.

21. Sustainability and Longevity

21.1 The community eco-credit approach aligns financial benefits with ecological goals, using local insights to ensure solutions are culturally fitting and sustainable. By involving local stakeholders at the design stage, the method aims at fostering a local sense of ownership.

21.2 The success and sustainability of eco-credit projects depend on their ability to adapt. With shifting ecological and economic contexts, it is crucial for the system to be responsive. Strong feedback mechanisms are essential, and one method is through action learning. Greenfi provides a manual outlining how to integrate a WhatsApp-based action learning system during the group establishment process, which approach has provided useful insight through our project demonstration.

22. Legal context

22.1 A key feature of the community eco-credit methodology is that small autonomous groups own the loanbook, meaning the asset created by the grant of funds into an eco-credit group's revolving credit facility.

22.2 The inclusion of this feature is due to the improved accountability present among members of smaller groups. Additionally, in many countries with credit issuance regulations, such small

groups often remain exempt, thereby not falling subject to associated compliance costs. This is largely because the small scale of eco-credit lending neither poses systemic risks nor fosters predatory lending behaviours.

22.3 It is imperative, nonetheless, for community eco-credit projects to comply with local regulations. In certain jurisdictions, even though minor groups may generally be exempted from onerous financial regulatory norms, predetermined group size or funding thresholds may trigger specific regulatory provisions. Similarly, obligatory reporting and transparency prerequisites may apply. Furthermore, as these community credit systems increase in prominence and expand in scale, it remains plausible that international governing bodies or national governments might contemplate the introduction of more standardised regulations tailored to such innovation.

22.4 Before setting up a community eco-credit project it would be prudent to obtain local legal advice on issues including:

Table 14: Legal issues relevant to community eco-credit

#	Issue	Description
1	Tax Implications	In many jurisdictions, the issuance, management, and even the mere participation in credit or financial systems can have tax implications. For community groups, understanding how generated interest, fees, or any financial gains from eco-credits are taxed is vital.
2	Consumer Protection	While smaller groups might be exempt from many financial regulations, general principles of consumer protection can still apply. This means that groups issuing credits must ensure they are transparent, fair, and not misleading in their dealings. It is also worth considering what dispute resolution mechanisms might be in place if disagreements arise.
3	Digital and Technological Implications	If the community eco-credit system is based on a digital platform or uses blockchain technology, this can introduce an additional layer of regulatory concern.
5	Environmental Claims	If credits are being issued with specific environmental claims (e.g., equivalent to a certain amount of carbon offset), these claims might be subject to environmental regulations or standards. False or misleading claims can lead to legal liabilities.
6	Cultural and Customary Practices	In some regions, especially indigenous communities, financial and credit systems might be intertwined with cultural or customary practices. It's essential to respect and be aware of these practices and understand how they interact with formal legal systems.
7	Sharia Compliance	Where eco-credit schemes are set up in Muslim areas, obtaining a *fatwa* from an Imam, or involving religious authorities in scheme set-up will help ensure Sharia compliance.

23. Monitoring

23.1 Monitoring takes place at up to four levels with different potential monitoring needs. These levels are: (1) the group member level, (2) the eco-credit group level (3) the level of the organisation providing technical assistance and is the immediate source of funding, and (4) the original source of funds such as a donor or philanthropic organisation.

Table 15: Monitoring approaches

#	Level	What is monitored	Purpose	Metrics tracked
1	Group Member	Individual loans and environmental activities	Individual self-regulation	Loans taken (local currency) Loans repaid (local currency) Participation in environmental activities (activity relevant metric)
2	Group	Loan issuance and repayment Individual participation in required environmental activities	Group self-regulation	Loans issued (local currency) Loans repaid (local currency) Fund growth (local currency) Participation by group members in environmental activities (activity relevant metric)
3	Technical Assistance	Individual and group financial and environmental performance Impact Participant satisfaction	Group supervision and reporting to funders	Late loans (local currency) Loan defaults (local currency) Fund growth (local currency) Participation in environmental activities Impact of environmental activities (activity relevant metric) Relative level of participant satisfaction versus other activities (ranking)
4	Funder	Impact	Reporting	Financial portfolio performance (selected metrics) Increase in participation in environmental activities (time spent/other resources used) Impact of environmental activities (activity relevant metric)

23.2 The purpose of monitoring of groups is to (1) provide supervision and trouble-shoot early in the cycle of problem development, and (2) because third party monitoring may contribute to improved group financial and environmental performance.

24. Technology Needs

24.1 The below diagram shows the technologies needed for operation of the community eco-credit system. There are mandatory and non-mandatory elements dependent on funder requirements and whether supporting organisations want to provide remote support or not.

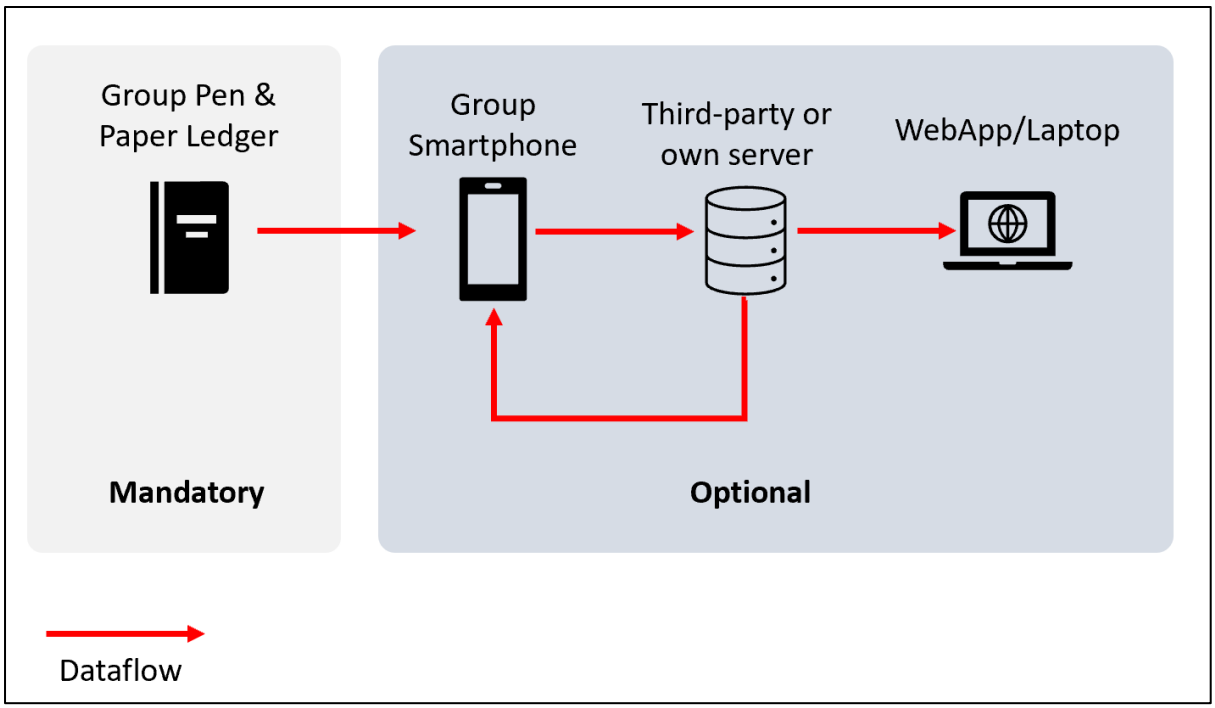

Figure 5: Data flows within a community eco-credit model

24.2 The current mandatory technological element is the pen and paper ledger for group records. It is pen and paper for reasons of familiarity, simplicity, data ownership and access, and usability for all stakeholders. Physical ledgers also foster transparency, as records are kept in a tangible format, accessible for group review and verification. Within the Greenfi methodology, the pen and paper ledger record is primary. Group ledgers can be augmented by individual ledgers or "passbooks", which mirror the group ledger in written form.

24.3 Whilst there are tools on the market for tracking of group financial records, their business models are not fully understood, nor are the implications for the objectives of the eco-credit methodology. For example, where digital tool business models are dependent on providing access to commercial credit providers, whether this will affect group stability and/or whether commercial credit issuance will speed up the rate of resource use. MCCC Ltd may experiment with the Chomoka digital tool, but its impacts may not be understood for several years due to the interface it provides to the formal financial sector.

24.4 The non-mandatory technological requirements of the system facilitate third party monitoring and support:

- Smartphones facilitate the digitisation of handwritten records and submit them for remote review and support, ensuring groups receive timely guidance, feedback, and any necessary interventions.
- Servers facilitate the storage information.
- Webapps facilitate the remote-viewing of that information by group supporters and funders, which can also be passed back to groups for view.

24.5 Greenfi has developed a basic system for transfer and viewing of data remotely, which is available free on open-source licence for management on an organisation's own or cloud servers. Greenfi tried to provide this on a software-as-a-service basis, but the economics are not viable for a system without providing access to third party lenders which could undermine the eco-credit model objectives.

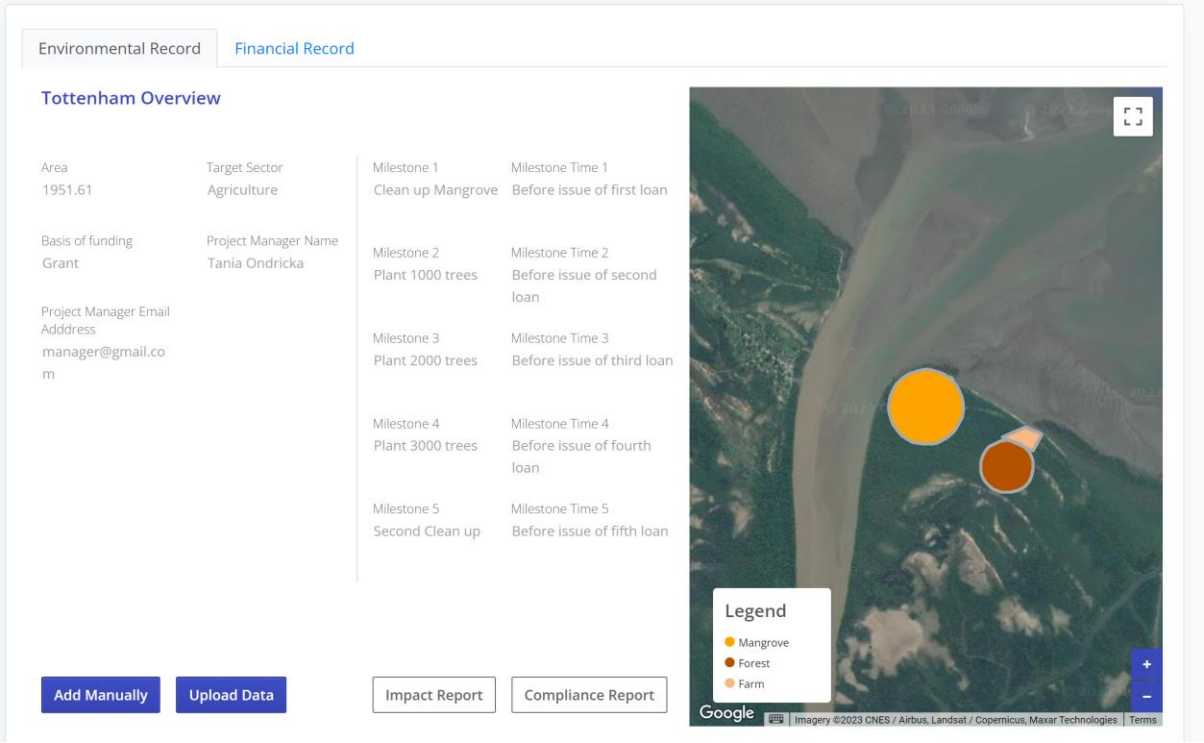

Figure 6: Screenshot of a web app built to facilitate remote monitoring of eco-credit groups (a)

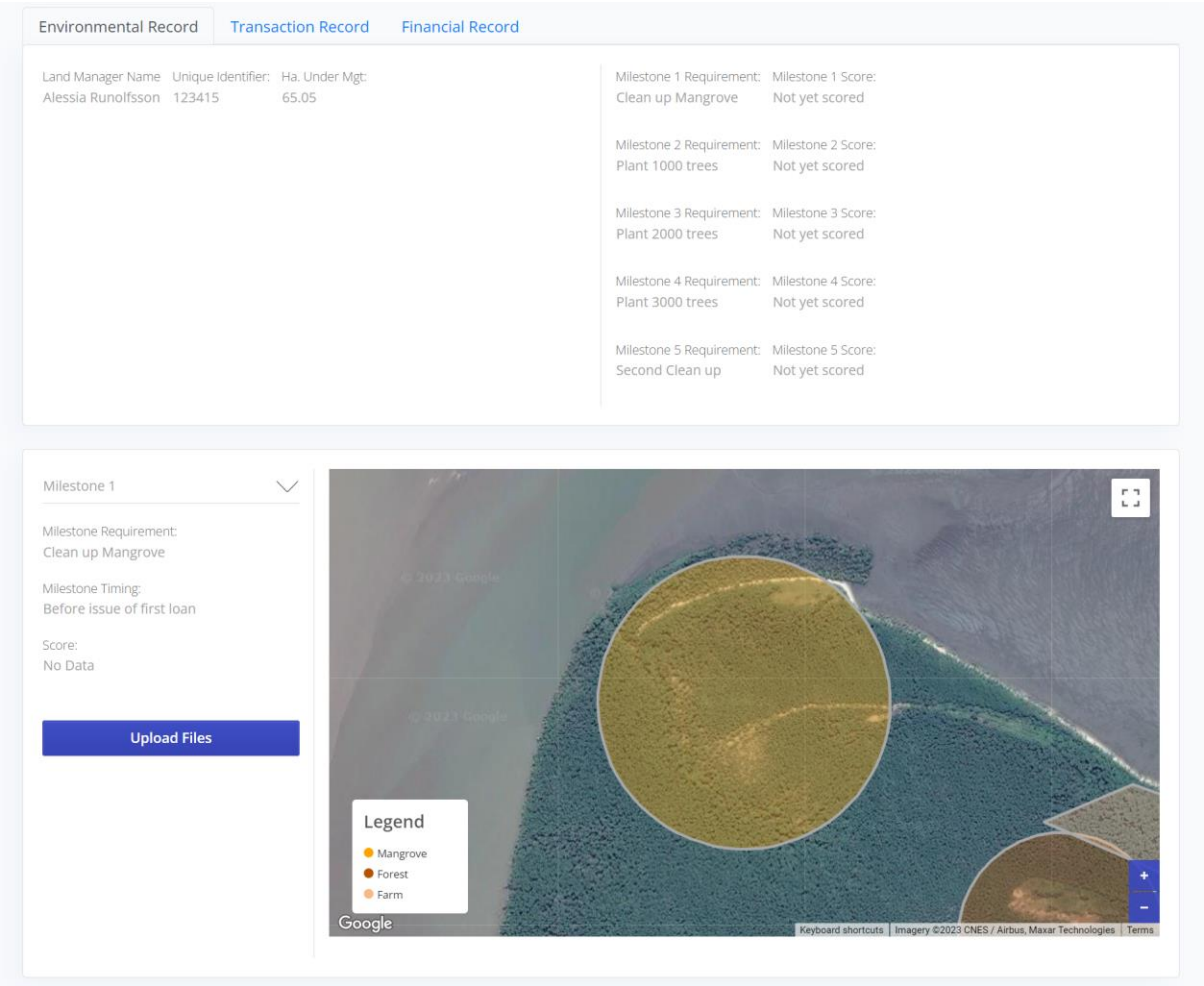

Figure 7: Screenshot of a web app built to facilitate remote monitoring of eco-credit groups (b)

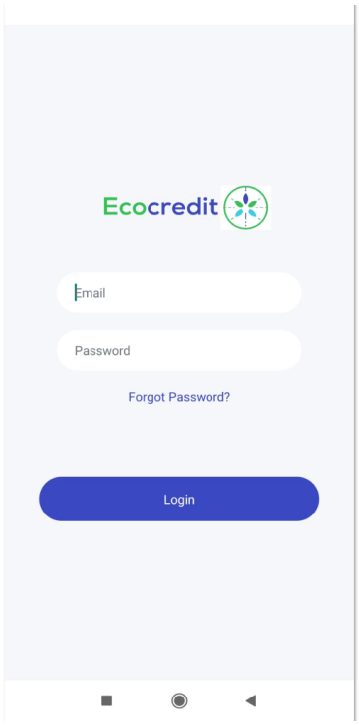

Figure 8: Screenshot of community eco-credit beta login, which mirrors web app data

24.6 Selection of technology options will depend on several factors including: (i) project size, (ii) budget available, (iii) funder requirements, and (iv) project objectives.

Table 16: Monitoring technology options

	WhatsApp-based monitoring	**ODK-based tools**	**Software-as-a-Service IT system**	**Own IT system**
System description	1. Group uses pen and paper monitoring tools. 2. Photos are taken of group records and participation by group members in required activities. 3. Photos are sent via WhatsApp to remote project managers who assess day-to-day group performance. 4. Sample data is transcribed for data analysis for reporting purposes.	1. Set-up XLSForm with necessary questions. A version can be obtained from Greenfi. 2. Groups enter data into a digital app, which data is managers who assess day-to-day group. performance. 3. Sample data is abstracted for data analysis for reporting purposes.	1. Groups enter data into a third-party mobile app. 2. Data pushed to remote server for assessment of day-to-day performance monitoring and analysis.	1. Project uses and adapts an open-source system, such as OpenImpact, or builds its own system from scratch. 2. Groups enter data into a mobile app. 3. Data pushed to remote server for assessment of day-to-day performance monitoring and analysis.
Project size	Small/pilot	Small-medium	Medium-Large	Medium-Large
Project objective	Improved environmental management	Improved environmental management	Improved formal financial inclusion	Improved environmental management
Budget availability	Small	Small	Small	Medium-large
Sampling requirement	Small	Small	Population	Population
Budget needs	Data costs Human transcription costs	Data management and analysis costs	Data costs System license	Data costs Development and hosting costs

	Data analysis costs		Data entry costs at group level	Data entry costs at group level
Indicative budget estimate*	USD 5K/year	USD 5K/year	Free – 3K/year	Low: USD 3-10K a year for an open-source system High: USD 200K a year for a closed-source system
Caution	This system will not scale very well due to the need to review individual group records	This system will not scale very well due to the need to review individual group records	Third party systems often make money by providing data to formal financial services providers, whose actions might undermine environmental objectives	System functionality can be expanded, but this requires financial and management investment

25. Case Studies / Pilot Programmes & Results

25.1 Greenfi partnered with third parties to pilot the community eco-credit model in order to test whether the community eco-credit methodology created an effective and useable approach for improved natural resource management.

25.2 The table below summarises key pilot information from three initial pilots. The source of the information is partner and group self-reporting combined with photos of participation in environmental activities. A fourth pilot, currently being implemented by Sea Sense will be updated to this table as the pilot matures.

Table 17: Summary pilot results

#	Variable	Pilot 1	Pilot 2	Pilot 3
1	Pilot name	Mkuba	Nyanduarua Eco-Credit Project	Kwale Eco-Credit Project
2	Implementing organisation / type	Mwambao/MCCC Ltd	Obadiah Ngigi for Greenfi	COMRED
3	Implementing organisation type	NGO	Sole trader	NGO
4	Country	Tanzania	Kenya	Kenya
5	Landscape/Seascape	Pemba and Zanzibar Islands	Nyandarua County	Kwale County Coastline
6	Operational dates	2018-present	2020-present	2021-present
7	Cumulative number of groups	53	4	25
8	Number of groups still operational	53	3	25

9	Range of natural resource management measures	Use of legal gear, respect of closures, by-law knowledge, meeting attendance, environmental awareness raising, infraction reporting, patrols, mangrove planting, beach clean-up	On-farm tree planting, simple soil conservation measures	Mangrove propagule planting, beach clean-ups
10	Increased rate of participation on natural resource management activities	Yes	Yes	Yes
11	Individual participation in environmental activities	Yes	Yes	Yes
12	Governance mechanism	Community-based natural resource management institution	Stand-alone	Community-based natural resource management institution

25.3 These results are self-reported by either groups or the implementing organisations. Whilst this is standard in the environment/development sector, it is an acknowledged weakness and leads to a tempering of conclusions presented in Greenfi reporting below, which cannot yet be conclusive.

25.4 Fuller results provided by implementing organisations are available via their websites, here and here. The Greenfi pilot undertaken by Obadiah Ngigi was not supported, and groups were left to support themselves due to funding constraints.

25.5 Two of the three pilots have raised funding to begin replicating groups or begin demonstrations in new landscapes. This gives the appearance of fuller proof-of-concept, but without randomised controlled trials the methodology is not yet fully proven, and there remains the possibility that results are confounded with other interventions. This is explored more fully in section 14 ("What We Don't Know"). RCTs could also be included in the standard operational methodology.

25.6 From a Greenfi perspective, these pilots offered the opportunity to test three hypotheses, which in turn rested on underlying assumptions. These assumptions, results and analysis are set out fully below.

Table 18: Greenfi hypothesis, assumptions and findings about the model

Hypothesis 1:	**Eco-credit is an effective and scalable incentive mechanism for improved natural resource management** *Note: This hypothesis rests on assumptions 1.6-1.7 below.*
Assumption 1.1:	*People want to participate in eco-credit groups with the attendant benefits and obligations* ***Finding:** In each of the land/seascapes where the system was tested there was a sizeable number of people wishing to join and set-up eco-credit groups. There was also a small number of people who did not want to join.*
Assumption 1.2:	*Group members take loans, accepting the requirements for participation in activities* ***Finding:** In most groups, most members take loans.*

Assumption 1.3:	*Group members repay loans* ***Finding:*** *Most groups maintain sustainably high rates of repayment, albeit with support. When groups in the Mkuba pilot on Zanzibar Island went without support during Covid, borrowers fell into arrears. Obviously other impacts around Covid confounded lack of support, however members in arrears caught up in loan repayments once mentoring was restarted. MCCC Ltd reports a default rate lower than 2% on its MKUBA programme.*
Assumption 1.4:	*Group members implement environmental activities* ***Finding:*** *We are able to conclude that eco-credit group members do participate in environmental activities, but we have as yet been unable to ascertain how precisely the activities undertaken align with the activities agreed to under loan agreements. Due to funding constraints, we experienced difficulty in verifying self-reporting by groups and results at this stage are indicative and directional rather than precise.*
Assumption 1.6:	*Group members can take over eco-credit group management without support* ***Finding:*** *Greenfi initially hypothesised that groups would be able to fully assume their own management and that this would be an exit strategy for funders and project developers. Experience is that groups need independent support to thrive. Given that this assumption failed, the alternatives are either (i) that local conservation NGOs accept there will be permanent relationships created with local communities, or (ii) that an alternative mechanism is set-up whereby local trainers/coaches provide support and services at a fee to groups which helps sustain them. There is precedence in this, created by CRS approach to savings groups operating ASCA models. A pilot in this model will shortly begin.*
Assumption 1.7:	*The community eco-credit mechanism is scalable* ***Finding:*** *See section 15 ("Replication & Scaling") for a discussion of the different meanings of scalability. Pilots suggest that the core elements of the approach are scalable, i.e., capable of expansion on the same model. However, the pilots also suggest that the core model is not scalable on the economic definition that implementations costs decrease as scale increases. This is because groups require a minimum capitalisation, and environmental, governance and financial management will be redetermined in each project site, requiring consultation and negotiations.*
Hypothesis 2:	*Eco-credit is a cost-effective mechanism for improved natural resource management* ***Note:*** *This assumption rests on the assumption explained below and the indicative cost estimates for landscape demonstration and replication phases as set out in this document. Landscape demonstration costs are estimated at USD 170/participant in the demonstration phase and USD 90/participant in the replication phase (see section 30 ("Costs") for a breakdown).*
Assumption 2.1:	*Cost of eco-credit group set-up is cheaper than conventional agri-environmental programme cost* ***Finding:*** *This assumption is currently unproven, due to the difficulty in establishing true costs of other agri-environmental programmes.*

Hypothesis 3:	**NGOs and other organisations can set-up and operate the system** ***Note:*** *Proof of this hypothesis rests on the validation of the assumptions below. In aggregate, Greenfi experience is that, yes, representative organisations and their staff can effectively establish and oversee eco-credit groups but subject to investment, in both funds and time, in developing or on-boarding the skillsets necessary to implement community eco-credit projects. What we have observed is that, ahead of project outset, natural resource management organisations may lack the finance skills necessary to successfully establish eco-credit groups. Similarly, development-oriented organisations may lack the natural resource management skills to successfully establish eco-credit groups. However, these skills can be acquired with sufficient resources and a willingness to invest in the learning curve that organisations will face in developing competence in a new methodology.*
Assumption 3.1	*Staff can understand the system* ***Finding:*** *Yes, with training and support. The particular difficulty which arises is in ensuring the checks and balances are understood and implemented, particularly where adjustments are made to the methodology to reflect local context, and which can give rise to new and unforeseen challenges and trade-offs.*
Assumption 3.2	*Staff can effectively communicate system function and use to eco-credit groups* ***Finding:*** *Yes, with training and support.*
Assumption 3.3:	*Staff support system implementation* ***Finding:*** *Yes. However, not all staff will necessarily support the methodology due to a number of factors. Firstly, misconceptions develop about the methodology, particularly about the grant element with an assumption that the grant to eco-credit groups is in fact a loan. Secondly, although community eco-credit does not use the ASCA methodology, there is a perception amongst ASCA experts that groups using the ASCA methodology should not receive external injections of funding. Thirdly, there may be a sense that market-based or market-like tools are inappropriate to natural resource management work.*

25.7 At this stage, Greenfi partners are providing descriptive evidence that the methodology works: group members repay loans and participate in environmental activities – but this is a preliminary proof of concept, awaiting greater certainty, amidst the many influences of real-world implementation. Nevertheless, it appears there is sufficient evidence to justify further investment in undertaking RCTs to deliver fuller proofs of concept.

25.8 In addition to the above hypotheses, Greenfi was testing assumptions on the fundability of the mechanism, by which is meant how to finance both capitalisation of group funds and funding of service provision to groups. Conclusions to these hypotheses are set out in section 19 ("Financing Options").

26. Lessons Learned about Benefits, Costs and Risks

26.1 Pilots allowed an assessment of costs, benefit, and risks associated with each element of the community eco-credit approach, namely (i) grant capitalisation of group eco-credit fund owned by the eco-credit group, (ii) issue of loans upon request to group members, (iii) repayment of loans together with interest or sharia-compliant fee to the group fund, and (iv) participation by borrowers in ecological restoration or protection activities as a term of the loan. Additionally, costs, benefits and risks arise as a result of the methodological elements working in aggregate.

26.2 The below table (overleaf) sets out the full list of benefits, costs and risks so far identified by Greenfi as identified through the series of pilot implementations. The biggest risk is with regard to environmental trade-offs: protection of one resource is achieved at the cost of damage to others where loans fuel consumption or activities which themselves impose an environmental cost.

Table 19: Benefits, costs and risks of community eco-credit

#	Core Design/ Intervention Feature	#	Impacted Party	Cost/ Benefit/ Risk	Description	How can benefits be enhanced, costs reduced, or risk mitigated?
1	**Grant capitalisation of group eco-credit fund owned by the eco-credit group**	1.1	Group	Benefit	**Financial gain:** Groups gain the value of the grant	No recommendation
		1.2	Funders	Cost	**Financial loss:** Funders lose the value by which an eco-credit project or programme is funded	Grant funding of groups is not a cost that should be reduced as it risks diluting the incentive provided for participation in groups
		1.3	Implementing organisation	Benefit	**Revenue generation:** Implementing NGO revenue by administering the eco-credit scheme	Although a benefit to the NGO, this will be experienced as a cost to funders and scale-up methodologies should reflect the need for reduced costs
		1.4	Global community	Risk	**Rundown of natural capital elsewhere:** depending on the funding source, natural resources elsewhere in the world may be unsustainably depleted to fund eco-credit fund capitalisation	Mitigate this risk by screening sources of funds for group capitalisation and do not accept funds generated with large environmental externalities
2	**Issue of loans upon request to group members**	2.1	Group members	Benefit	**Access to credit (informal financial inclusion):** Group members gain access to credit where previously no such credit was available.	No recommendation
		2.2	Group members	Benefit	**Increased optionality for financial services:** Group members increase their optionality for informal financial service access	Pilot partners have already added a savings mechanism and social fund, but other service options could be added, such as insurance
		2.3	Group members	Benefit	**Lowered cost of credit:** Group members gain access to informal credit at a lower cost than otherwise available	Groups should be advised not to allow costs of capital to increase, ideally capped to the rate of inflation
		2.4	Group members	Benefit	**Improved terms of credit:** Group members gain access to a more reliable source of informal credit than previously possible, thus providing peace of mind	Groups should be encouraged to create credit terms well-suited to their needs. Other than low cost of credit, this should include low repayment pressure. Options to renegotiate repayment schedules in the event of financial shocks preventing loan repayment should be included
		2.5	Group members	Risk	**Over-indebtedness:** Where group members have access to other forms of debt, the addition of eco-credit risks adding to a pressure of over-indebtedness with consequent risks of financial distress, that	Eco-credit should not be used in environments where commercial credit providers are highly active. Additionally, groups should receive training in avoiding

					individuals are pushed into a poverty trap, negative psychological impact and social and family strain	over-indebtedness, particularly given the increasing availability of digital credit
		2.6	Group members	Risk	**Unintended consequences:** Where loans are used to fund activities or consumption which themselves have an environmental footprint, then local restoration is achieved at the expense of environmental damage elsewhere: the environmental overuse problem is shifted but not necessarily reduced	Pilot partners attempted to manage this by asking groups to avoid lending for environmentally-damaging uses. Although in reality this is difficult to control due to the fungibility of money, and likelihood that all production or consumption entails environmental damage to some degree. Given this, the tool needs to be justified as allowing groups to pursue their own environmental agendas, and try and model out the likely environmental externalities that arise as a result of loan use for the purpose of full disclosure
		2.7	Group members	Risk	**Indirect rebound effect:** Where cost of capital is lowered, cost savings are used for consumption purposes which increase pressure on local or distant environmental resources	Similar to the above, this impact needs to be modelled as part of a fully-quantified cost benefit analysis and disclosed to funders
		2.8	Local and global community	Benefit	**Reduced pressure on natural resources at critical times:** the cash loan replaces natural resource extraction as a source of cash which could be especially valuable when resources, for example fisheries, should be closed	System users could encourage use of loans during times when resources are otherwise closed, e.g., fish breeding seasons etc
		2.10	Non-participating community members	Risk	**Increase in social tension:** Resentment towards community members who are admitted to eco-credit groups from community members who are not	Sufficient funding needs to be in place for all community members to join a group should they want to
		2.11	Community	Benefit	**Improved supply of ecosystem services:** where loan repayment pressure is low, this may lower resource pressure as resource offtake efforts are spread over time.	A low-pressure loan repayment schedule potentially replaces the need for a shorter, sharper harvesting effort. Whilst this assumption is not perfect, groups should nevertheless be encouraged to use low pressure repayment schedules rather than high pressure repayment schedules
3	**Repayment of loan and payment of sharia-compliant fee to the group fund**	3.1	Group	Benefit	**Fund profit:** The group gains the value of the interest or fee paid into the fund	Implementers will come under pressure to substitute grants for loans. Where this happens, groups will no longer capture this benefit, reducing the incentive to participate in the scheme
		3.2	Group members	Cost	**Cost of credit:** Group members pay the credit cost	Groups should be encouraged to charge a fair credit cost
		3.3	Third party debt providers	Cost	**Revenue loss:** third party debt providers lose profit opportunities	In environments where eco-credit is used, where formal financial service providers are not present, then local informal credit providers stand to lose revenue

						sources. Where these providers are exploitative, this is less of a concern. Where such credit providers are not exploitative, they could be included within local administration such as CBTs, for example
		3.4	Local and global community	Cost	**Pressure on natural resources:** Loan interest or fees may be financed through overuse of local natural resources. Where natural resources are unsustainably used, this means added pressure towards overuse	This is another reason to advise groups to keep loan interest rates low
4	**Participation by borrowers in ecological restoration or protection activities as a term of the loan**	4.1	Community members	Benefit	**Improved ecosystem services:** Community members dependent on targeted resources benefit from restoration and protection activities	This should be communicated to the wider community to demonstrate benefits of the approach
		4.2	Global community	Benefit	**Improved ecosystem services:** The global community also gains the benefits of enhanced ecosystem services as the described scheme encourages ecological restoration and sustainable land management practices	This should be communicated to a wider community as there are psychological benefits to knowing such activities are taking place
		4.3	Group members	Cost	**Time and resource cost:** Group members incur a time and resource cost in fulfilling the requirements for participation in ecological activities required by loan terms	Groups should be advised not to over burden themselves with actions and that a fair balance has to be found between the incentive and the activities required
		4.4	Group member	Risk	**Costs outweigh benefits:** There is a risk that the work required in meeting the environmental requirements for loan terms is greater than the benefit, which could be inequitable and/or lead to reduced participation in the scheme.	Implementers should perform a rough cost / benefit assessment for all groups thinking about participating once they have defined the ecological restoration or protection activities they wish to pursue, with feedback to groups on the net cost or benefit
		4.5	Group members	Risk	**Environmental activities failure:** Where groups do not receive training in the environmental activities they want to engage in, there is a risk that group activities will not translate into desired project outcomes	Training resources should be available for groups undertaking ecological restoration or protection activities and budget allocation made for this
		4.6	Local community	Risk	**Opportunity cost of work:** where labour is constrained, participation in environmental activities diverts labour efforts of participating members from other tasks	Activities should be focused on local priorities rather than donor or NGO priorities and funding selected carefully to ensure available labour and other resources serve local needs
		4.7	Group members	Risk	**Performance risk:** where ecological activities are defined outside the group, this undermines agency, increasing performance risk	Groups and group members should themselves define the ecological actions and activities they wish to participate in
5	**Aggregate: all design elements work**	5.1	Group members	Benefit	**Empowerment:** By providing grants and facilitating access to low-interest loans, the scheme empowers community groups to actively	No recommendation

together to create compound effect				participate in ecological restoration efforts. It fosters a sense of ownership and responsibility among participants.	
	5.2	Group members	Benefit	**Social cohesion and community bonding:** The approach can foster social cohesion and community bonding as participants work together on ecological restoration activities and engage in a shared goal. This sense of community can have positive social impacts beyond the ecological benefits.	No recommendation
	5.3	Group members	Benefit	**Environmental education and awareness:** The approach provides an opportunity for participants to learn about ecological restoration and sustainability practices, enhancing their environmental awareness and knowledge. This can lead to long-term behaviour change and a broader understanding of ecological issues.	No recommendation
	5.4	Local community & implementing organisation	Benefit	**Conflict mitigation:** The approach allows a constructive dialogue around shared benefit between the implementing NGO and the target community. Traditional conservation approaches risk passing participating communities the cost and risk of conservation interventions, while implementing NGOs gain the immediate benefits. The approach sees a more equitable alignment of cost, benefit and risk.	No recommendation
	5.5	Local community & implementing organisation	Benefit	**Increased cooperation:** Related to the above point, there is an improved cooperation between implementers and participating communities	No recommendation
	5.6	Implementing organisation	Risk	**Reputational Risk:** Implementers bear a risk that they will be identified with debt enforcement against collateral in the event of credit default by participating individuals	Implementers already carefully explain to participating communities that it facilitates the approach, but ownership (including fund ownership) lies with groups
	5.7	Groups	Benefit	**Spillover benefit:** Well-functioning groups are attracting support from third party NGOs	Implementers could advertise the presence of these groups to third party NGOs with valuable services to offer
	5.9	Groups	Risk	**Group priorities:** Implementers invest heavily in group set-up. Where third parties contact these groups for their own purposes, there may be a reorientation of group priorities, e.g., to service government loans.	Provide an advisory service for groups to weigh up the costs and benefits of new partnerships

27. Implementation Roadmap & Indicative Costs

27.1 The implementation roadmap is set out in the table below and indicative costs provided at 31 for Landscape Demonstration and Landscape Replication stages.

Table 20: Elaboration of steps in the implementation roadmap

#	Step	Description
1.	**Landscape Demonstration**	
1	Preliminary Feasibility & Scoping Assessment	This step involves an initial evaluation to determine the viability of implementing the eco-credit system within a specific region or community, identifying key environmental, economic, and social factors that could influence its success.
2	Set-Up	Stakeholder introductions, community consultations, project preparation and social harms assessment & mitigation, eco-credit group and fund set-up , ongoing group supervision and management
3	Cost-Benefit Analysis	A thorough evaluation of the financial and non-financial outcomes of the eco-credit system is conducted. This analysis helps stakeholders understand the tangible and intangible benefits relative to the costs of implementation and maintenance.
4	Randomised Controlled Trial	To empirically measure the effectiveness of the eco-credit system in a new context, a randomised controlled trial should be established at project outset and concluded as part of the demonstration. This statistical approach provides unbiased evidence on the impact of the system, offering insights for potential improvements and scalability. Although with 10 groups, or 200-300 participants, the sample is small, a size calculator suggests this is a sufficient sample with an 85% confidence level and 5% margin of error.
2.	**Landscape Replication**	
1.	Funding mechanism set-up	An efficient funding mechanism is established for the scale-up, likely with input from all stakeholders.
2	As for demonstration	Repeat the steps undertaken during the demonstration phase, including analysis with a representative sample.

27.2 The cost estimate for the 2 phases is as follows. These costs are indicative only, and a full budgeting exercise using local cost inputs should be used to inform an accurate budget.

Table 21: Indicative costs through landscape demonstration and replication phases

#	Phase	Number of groups	Cost est. (USD)
1.	Landscape Demonstration	10	*c.* 100,000
2.	Landscape Replication	200	*c.* 550,000

28. Lessons Learned about Ethical Considerations

28.1 Past experience of microfinance-type projects, natural resource management, together with implementation of community eco-credit project pilots point to a number of ethical considerations which need to be considered by organisations which sponsor or organise community eco-credit implementation.

28.2 These ethical considerations may not be peculiar to community eco-credit, and bear similarities to ethical issues arising from natural resource management approaches, performance-based conservation finance tools and debt instruments tools more widely. Nevertheless, they are real

concerns due to the nature of the obligations set up by the methodology which have real-world consequences (overleaf).

Table 22: Ethical considerations and possible responses

#	Ethical Consideration	Description	Possible Management Response
1	Informed Consent & Participation	All participants should fully understand the implications, benefits, and potential risks of the community eco-credit approach. Their engagement should be voluntary and well-informed. This consent should also be sought from individuals other than direct participants who might be affected by changes in resource use or relative availability of financial resources (for example people who choose not to join community eco-credit groups).	Carry out an ex-ante analysis of potential harms and costs to all classes of stakeholder in line with the community eco-credit set-up manuals and ensure these are fully disclosed through initial consultations and through the harms analysis.
2	Unequal opportunities for participation	Providing funds for some groups and not others risks creating or exacerbating community tensions. This could be driven by limited funds available for project implementation.	All individuals who want to participate in eco-credit groups within a community should be given the opportunity to do so. Where funds are not immediately available, a plan should be agreed with the participating community for raising that funding, to which the project developer commits.
3	Environmental trade-offs	Credit availed through groups will likely finance consumption or activities which have a negative environmental footprint and create a local economic multiplier effect which may similarly increase local environmental degradation. Often this damage will be diffuse and unquantifiable. This disbenefit cannot be delinked from the benefits achieved by contingent loans and are instead a direct trade-off necessitated by the approach. Implementing NGOs should be clear with local communities and funders about this trade-off and the steps available to them in the context they work to mitigate the negative effects of the trade-off.	Community eco-credit projects should proceed on the basis of cost benefit analyses which identify trade-offs and seek a net benefit for both communities involved and funders.
4	Funding trade-offs	Numerous conservation organisations receive donations from entities that accumulate surpluses at the expense of the environment, potentially muddying the waters of genuine sustainability where those funds capitalise eco-credit groups.	The environmental externalities created by the funder in building their source of funds should be estimated in the cost benefit analysis. In communicating successes of the community eco-credit methodology, it should be made explicit where funds have come from.

5	Transparency & Accountability	All operations, financial transactions, and decisions should be conducted transparently between sponsoring organisations and groups.	The community eco-credit methodology works towards the creation of documentation and paper trails, which should be accessible to parties with legitimate interests.
6	Privacy	Individuals participating in eco-credit groups should be afforded a right to privacy in their transactions beyond the group level. At the group level, it is accepted that group members will have overview of member transactions, in common with other savings club type methodologies.	Implementing parties should develop data privacy policies which align with the standards set in data privacy laws and discuss with participating groups the trade-offs between benefits and costs of monitoring.
7	Cultural Respect & Sensitivity	Recognise, respect, and integrate local traditions, values, and practices.	Follow correct procedures for stakeholder and community consultation through project set-up. The community eco-credit manuals contain guides for this.
8	Economic fairness	Implementing organisations and groups should be advised against choosing environmental activities that pose a higher cost than the benefit achieved through the incentive. Additionally, group environmental activities often impose standardised or uniform costs on all participants, but the resulting benefits may not be evenly distributed. For instance, where individuals undertake the same environmental activities, then loan sums should be harmonised.	When taking project design decisions, project managers and participating groups should assess how the decision will affect the allocation of costs and benefits across groups and people affected by the choice.
9	Self-determination	Often, funding comes from organisations with specific environmental objectives that might not align with the priorities of eco-credit groups. This discrepancy can overshadow the fundamental principle of self-determination, potentially limiting the autonomy and genuine engagement of these groups.	The group is the basic unit of operation within the methodology. Group sovereignty should be respected in choosing the environmental objectives they wish to pursue, and groups should be fairly informed about the variety of options of options open to them.
10	Monitoring & reporting	The community eco-credit methodology presents a compelling narrative of community benefits, including access to credit, ownership of financial assets, enhanced environment, and bolstered cooperation. While it is vital to share these stories, it is equally crucial to substantiate them with transparent reporting. Additionally, it is imperative to communicate to funders the trade-offs involved in securing these benefits, ensuring clarity and understanding of perverse outcomes in complex systems.	Implementing bodies should make a commitment to accurate reporting and appropriately caveat results.

11	Over-indebtedness	Community eco-credit should not be used as a tool which contributes to borrower over-indebtedness and adds to burdens of financial management for over-indebted individuals.	Prevalence of over-indebtedness within a potential project location should be assessed during the pre-feasibility phase.
12	Stimulating local competition	Enterprise loans in poorly-developed markets risk stimulating competition with already-existing businesses. The community eco-credit loan is a cashflow smoothing or agri-input loan for this reason.	This should be made explicit to both funders and community participants.
13	Reciprocation	The community eco-credit approach benefits from already existing social capital and bonds of reciprocation in communities which can be disrupted.	Participating groups should not employ punitive practices which might disrupt those bonds, such as security enforcement, where groups do not already use such devices.
14	Enforcement and stigmatisation	Loan enforcement risks stigmatising non-payers to the detriment of their position in the communities where they live.	Groups need to be trained in methodologies which avoid such stigmatisation whilst ensuring repayment, including repayment holidays, groups guarantees and conversion of financial obligations into in-kind obligations.
15	Closing resources	Some groups, and supporting organisations, are tempted to use the tool to support closure of resources or bring pressure to bear to close resources, such as fisheries, which are used by individuals outside the eco-credit group system and excluded from its benefits.	Resource closure is a negative loan covenant, not a positive loan covenant, and inconsistent with the SMART principles of the community eco-credit methodology, and additionally gives rise to ethical concerns where compensation is not given. Community eco-credit is not an appropriate tool for such objectives.
16	Destabilisation of existing groups	Already-established groups will have formed around a set of norms appropriate to management of capital without the eco-credit instrument and protocols. New instruments could disrupt those norms and may increase group vulnerability. Ethical concerns arise where groups are destabilised towards objectives which are extrinsic to the group rather than intrinsic.	Where existing groups on-board a community eco-credit instrument, they should be fully consulted and informed about potential risks. Sufficient funds should be available to support those groups through the creation of new norms around the operation of new instruments and groups monitored for signs of discord. Groups which are longer established may be at lower risk of disruption with the on-boarding of new tools.

29. Barriers and Challenges

29.1 Conservation projects in developing countries face a multifaceted set of barriers and challenges. These can range from limited financial resources and inadequate infrastructure to complexities associated with resource access and control, including tenure. Additionally, there may be conflicts between immediate livelihood needs of local communities and long-term conservation goals, with local populations sometimes relying on environmentally unsustainable practices for survival. Cultural differences and lack of awareness or education about conservation can further complicate efforts. Moreover, political instability, lack of proper enforcement mechanisms, and potential conflicts with commercial interests, such as logging or mining, can further undermine conservation initiatives.

29.2 The community eco-credit approach is subject to these typical or generic challenges as well as problems specific to the methodology, including:

Table 23: Challenges ad possible responses

#	Challenge	Description	Response
1	Cost	A substantial problem faced by community eco-credit is the cost of set-up, requiring a great deal of consultation, capacity-building and management checks to ensure that ethical considerations are properly considered and managed.	It should be communicated to funders that it is possible to set-up groups and projects at low cost, but that best-practice consultation, capacity-building and monitoring is costly, and its absence creates risk. Greenfi believes that although community eco-credit is costly, this is partly because the methodology is fully costed, and where other conservation interventions are similarly costed, the cost may be comparable or greater. Additionally, in the landscape replication phase, steps must be taken to reduce costs. A replication model is explained in section 19 (“Financing Structure”). Additionally, in the future, it is anticipated that such a fund could be operated by an AI system on the basis of smart contracts, greatly reducing fund management cost.
2	Monitoring	Fully robust monitoring systems have proven difficult to implement.	This was largely due to several factors, including (i) limited resources available for piloting, (ii) high ambition and over-complication of required environmental activities. Focus on one activity would likely enhance monitoring outcomes.
3	Self-determination and funding constraints	Due to the nature of NGO funding, to date the community eco-credit option has been offered to communities on an opt-in, opt-out basis. All communities have opted-in because the access to credit is, on evidence thus far, meaningful – but this does not mean it would	To be truly participant-led, a variety of instruments should be offered to communities through participatory process of project development, and those communities able to choose themselves which services are best suited to their community needs, with community eco-credit being one of a variety of interventions offered. This would entail

		have been a preferred choice from a range of options.	substantial project development with communities ahead of funding applications, and it is recognised that this is frequently not the way that the sector finances itself given very limited resources for project design.
4	Need for technical assistance	Groups and their members self-determined their environmental priorities and targets. In pursuing these targets, difficulties can be encountered through a lack of technical know-how in how to undertake environmental actions successfully.	In groups selecting their objectives and actions, they should be made aware of whether technical assistance is available to help them in their preferred strategies.
4	Competing theories of change	Community eco-credit follows a specific theory of change. In implementation, participants adapt the methodology – often implicitly – to their own theories of change or experiences. This can undermine community eco-credit objectives without a full appraisal of the impacts of change being conducted.	The methodology is designed to be flexible and recognises that different actors will want to modify the approach according to their needs. However, it is recommended that a qualitative cost benefit analysis is undertaken before any change is made. Additionally, the change should be trialled through a landscape-level pilot and then replicated if successful.
5	Bandwidth & management resources	The set-up methodology is complex relative to the bandwidth of the type of organisations the approach is likely to be used by. This is particularly in respect of steps needed to ensure ethical considerations are addressed and checks and balances are in place. Many issues unfamiliar to conservation organisations need to be communicated and understood, and the resources available to projects are typically small.	Budgets need to fully reflect the complexity and learning curve faced by organisations adopting the community eco-credit methodology.
6	Over-ambition	Both groups and the organisations which support them have great ambition for ecological restoration and protection, likely linked to the scale of the pressures confronting communities, but also what is promised to donors in competitive funding competitions. However, this over-ambition also risks overwhelming the ability of groups to get the	The solution is to resist pressure to overburden groups' capacities and focus on only one environmental activity per year, for example.

	basics right: lend, repay, undertake activities focused on one objective – and repeat.

30. What We Don't Know

30.1 Community eco-credit shows potential for promoting environmental action at the community level. However, there are multiple issues not fully understood about the operation or the impact of the approach.

30.2 Addressing these open questions, set out below, could help improve the eco-credit approach and ensure it works effectively in different settings.

Table 24: Unknown issues regarding the approach

#	Issue	Description
1	Causality	Group members participate in activities determined by their groups. A key question is whether there exists (a) a causal relationship between community eco-credit interventions and increased environmental participation or whether changes are driven by other interventions, and (b) the impact of participation on impact. To confirm this, randomized controlled trials (RCTs) should be conducted in each new area adopting the methodology if statistical proof is required. A challenge in evaluating the community eco-credit system's effectiveness is differentiating its impact from other factors. External drivers can influence community behaviour, making it challenging to pinpoint the cause of behaviour change. For example, the desire to maintain a relationship with a supporting NGO or the influence of other local sustainability initiatives can overlap with eco-credit's effects. Thus, understanding eco-credit's specific role among these factors is crucial and complex.
2	Catalytic elements of the methodology	Although the approach is designed to provide an economic incentive for improved management of natural resources, the community eco-credit methodology entails a variety of linked interventions which may contribute to change. These include, deep consultation and joint planning, full prior and informed consent, self-determination of environmental activities, and robust follow-up, monitoring and support. We do not understand which of these elements are most significant in catalysing changed behaviours. At its heart, community eco-credit necessitates a change in the way local communities are engaged in protection and restoration of local ecosystems and this may ultimately be more important than the economic incentive.
3	Longevity	The longevity of community eco-credit groups remains an open question. As a relatively novel tool, its sustainability and long-term impact have yet to be rigorously assessed. Factors influencing its endurance might include the adaptability of the system to changing environmental and economic conditions, continued community engagement, and potential external pressures. Related to this, the level of supports groups need to cohere, and in what circumstances, remains unknown.
4	Interaction with formal finance systems	The interaction of the community eco-credit system with formal finance mechanisms is yet to be fully understood. Gaining access to the community eco-credit system might inadvertently boost the perceived creditworthiness of eco-credit group members in the eyes of formal financial institutions. This enhanced credit profile could lead to users obtaining loans or credits from mainstream banks or financial entities. While on the surface, improved creditworthiness might appear beneficial, it carries potential risks, especially if it translates to heightened borrowing and spending. This could result in increased consumption, production, or land development activities, which, in turn, might exacerbate

		environmental pressures. The allure of financial opportunities from external sources might shift priorities away from local eco-centric focuses to broader economic endeavours, some of which might not align with sustainable practices. The potential for overuse or misuse of environmental resources due to increased access to external finance underscores the need for careful monitoring and guidance within the eco-credit community.
5	Interaction with other instruments used by eco-credit groups or community microfinance groups	Eco-credit groups become a platform for access to other environmental and development instruments and services. It cannot be ascertained whether these will support or undermine community eco-credit objectives and how different methodologies will interact. For example, savings methodologies can inadvertently incentivise resource overuse and unsustainable monetisation of natural resources if pursued too aggressively.
6	Scalability	How well can the eco-credit system be scaled? While it might work effectively for small community groups, questions arise when considering expansion to larger communities or across different cultural and ecological contexts. Greenfi has been advised that the approach benefits where participating groups have a degree of prior exposure to savings group methodologies. Financial pilots somewhat notoriously do not scale, as the small scale of the pilot and its scrutiny are contributing factors to their success. Organisations which are using the Greenfi tool are currently replicating, and this will provide valuable lessons on true scalability.
9	Economic volatility	How resilient is the eco-credit system to broader economic downturns or shocks? Economic instability, inflation, or other macroeconomic factors can influence the value and trust in any credit system. How can groups be resuscitated in the event of collapse when project funding has been exhausted is a concern.
10	Legal and regulatory challenges	Beyond the known legal contexts, are there potential legal or regulatory challenges that might emerge, especially as the system grows and gains prominence? This could include areas related to property rights, land use, or even international treaties and agreements.
12	Feedback loops & unexpected outcomes	Could there be feedback loops where the success or challenges of the eco-credit system influence community behaviours in unexpected ways? For example, a successful system might attract more members, but could increase participation lead to loss of focus?

31. Indicative Costs

31.1 Community eco-credit necessitates three types of cash cost, provided below as indicative estimates. Actual costs will vary according to local project costs, the size of grant paid to groups, and overhead charged by NGOs.

Table 25: Indicative costs

#	Cost Item	Assumptions	Landscape Demonstration Cost/Group *(est.)**	Landscape Replication Cost/Group *(est.)**

1	Capitalisation of eco-credit group funds	Assuming two milestone payments of USD 750.	USD 1,500	USD 1,500
2	Eco-credit group support	Landscape demonstration cost derived from costed activities set out in the logframe. Replications costs based on assumed payment of USD 5/meeting paid by group to CBT.	USD 1,500	USD 250
3	Project management cost	Derived from costed activities set out in the logframe.	USD 2,000	USD 1,000
	Total cost/group		USD 5,000	USD 2,750
	Total cost/individual		USD 170	90

* Assumes 30 members

32. Artificial Intelligence

32.1 Rapid emergence of artificial intelligence systems during the end phases of pilots offers to change the way in which the methodology is rolled-out. The following table sets out areas for exploration developing the model further.

Table 26: Potential for artificial intelligence to improve methodology function

#	Benefit	Explanation
1	Bespoke monitoring systems	Each community where eco-credit is set-up will be able to set up their own monitoring tools and databases in which they have proprietary rights.
2	Reduction in technical support service costs	Currently the cost of support services is substantial, and bespoke advice must be found according to the environmental objectives of groups. This type of advice and support may be more cheaply available through AI services in the future.
3	Benefits of data sharing	Groups will be able to choose which data to share with third parties, such as other groups to effect cooperation for example intra-group loans or support in jointly beneficial environmental activities.
4	Predictive Analytics for Decision-Making	AI can process vast amounts of data to forecast ecological trends, helping communities make informed decisions about resource management.
5	Automated Compliance and Reporting	AI tools can ensure that eco-credit practices adhere to established guidelines, automating compliance checks and generating reports without manual intervention.
6	Enhanced Engagement through Virtual Platforms	AI-powered platforms can facilitate community engagement, using chatbots or virtual assistants to answer queries, and provide instant feedback on eco-credit matters.

7	Optimized Resource Allocation	AI can analyse community needs and ecological data to recommend the most efficient distribution of resources or eco-credits, maximizing impact.
8	Learning and Adaptation	As more communities engage with eco-credit, AI systems can learn from patterns and outcomes, refining the methodology and offering improved strategies over time.

32.2 The full viability of community eco-credit as a tool for localised ecosystem management remains under exploration. Should its efficacy be fully ascertained, there is potential for an AI-driven fund-of-funds model. This approach could markedly reduce entry costs for emerging groups keen on implementing eco-credit schemes but reduce the human element in projects which necessitate high touch approaches.

33. Conclusion & Vision

33.1 Various instruments, from green bonds to payments for ecosystem services, have been employed for years to link financial mechanisms with conservation goals. A chief problem faced by these models has been sustainability and sufficiency of funding.

33.2 Greenfi believes that "community eco-credit" system with its unique combination of revolving credit facilities, group-owned and managed funds, and loans contingent upon environmental actions—brings a new perspective and approach, which could improve if not fully address the problem of sustainability and sufficiency of funding for natural resource management.

33.3 Rooted in a four-pronged system, community eco-credit uses a grant-financed revolving credit facility, loan issuance with environmental requirements attached to loan terms, repayment, and transparent reporting, to address the economic barriers hindering active participation in ecosystem restoration efforts.

33.4 Preliminary results from pilot tests in diverse landscapes show initial promise, as the methodology seems to drive desired ecological protection activities and loans are repaid. Nonetheless, it is crucial to acknowledge the complexities inherent in these social and environmental systems, and as such, the approach's full proof of concept remains subject to definitive studies.

33.5 A collaborative effort, the methodology's inception, and early tests were spearheaded by Greenfi Systems Limited, in partnership with multiple organizations. Emphasizing transparency and open-access, Greenfi has transitioned into an open-source entity, making all resources available to the broader community for further testing and development.

33.6 Greenfi believes it is imperative to approach the community eco-credit methodology with both enthusiasm and caution. As an evolving tool, continuous iterations, updates, and feedback are integral to its success. The true value of this approach will be determined not just by its immediate impact but by its scalability, adaptability, and the sustainable change it brings to communities and ecosystems in the long run.

33.7 The vision for the future, is that with investment of resources in randomised controlled trials, the tool can be adjusted for improved use and context dependencies can be better understood. Operational costs remain a drag, but it is foreseen that automated funds operating on the basis of smart contracts could potentially reduce overheads in the future.

Glossary

ASCA	Accumulating Savings and Credit Association
CBNRM	Community-Based Natural Resource Management
CECF	Community Environment and Conservation Fund
DFI	Development Finance Institution
G20	"Group of Twenty." It is an international forum for the governments and central bank governors from 19 countries and the European Union (EU).
LFA	Logical Framework Approach
MDBs	Multilateral Development Banks
MFI	Microfinance Institution
PES	Payments for Ecosystem Services
RCT	Randomised Controlled Trial
REDD+	Reduced Emissions from Degradation and Deforestation
SACCO	Savings and Credit Cooperative
Savings Groups	Informal community financial self-help groups encompassing VLSAs, VICOBAs, merry-go-rounds, chamas etc
SDGs	Sustainable Development Goals
VSLA	Village Savings and Loans Association
VICOBA	Village Community Bank