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Nature-based carbon as collateral for smallholder finance.

PROGRAMME
Innovation Booster Sustainable Digital Finance

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Innovation Booster Sustainable Digital Finance Report

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1. Brief description of the team leader, their team(s), and background

Team Leader: Rahel Guggenbühl (CEO)
Rahel brings 10 years of entrepreneurial experience across Climate and Nature-Tech, Food Tech and HR Tech (Felfel AG, Lionstep AG, MyBluePlanet), where she developed crucial skills in business and project development, stakeholder management, and scaling solutions. Her journey into smallholder finance began during her studies at University of Zürich and University of St. Gallen, where her bachelor's thesis developed a microfinance solution for Kenyan farmers and her master's thesis created a credit model using standing trees and forests as collateral. Her hands-on work with farmer groups in Tanzania and Brazil revealed the critical insight that smallholder finance fails not because of farmers, but due to banking economics and lack of collateral. This led her to found reilo with the mission to turn nature into bankable assets that can be used as collateral in smallholder finance.

Core Team:

- Patrik Brandenberg (COO): 8 years in product development, financial services, and operations (Valantic), bringing essential IT systems expertise
- Ulrich Scheuermeier: Implementation Partner providing on-ground expertise in Tanzania

Tanzania Team:

- Elibariki Tweve: Local Project Coordinator
- Bahat Tweve: Forest Group Facilitator in the Kiyowela Ward
- Ragpar Tweve: Forest Steward in the Kiyowela Ward

Advisory Support:
Dr. Johannes Pulsfort (carbon markets), Simeon Max (forestry and environmental services, carbon projects), and Pol Budmiger (venture scaling).

The team uniquely combines finance expertise, nature-based carbon knowledge, and viable smallholder farmer access.

2. Brief problem statement and how you identified the problem

Problem Statement:

Smallholder farmers in the Global South produce 30% of global food supply yet face a $170 billion annual finance gap. 80% are excluded from formal finance due to lack of collateral, remote locations, seasonal cashflows, and high transaction costs for banks. These farmers don't own traditional bankable assets but possess valuable natural assets worth $10-40 billion in carbon markets. Without access to productive capital, farmers cannot increase productivity by 50-70% or adapt to climate change, perpetuating poverty cycles while nature remains economically invisible to financial systems.

How We Identified the Problem:

The problem was identified through Rahel's academic research and field work. Her master's thesis at University of St. Gallen specifically investigated why smallholder financing doesn't work in the Global South despite enormous potential. This research revealed that the failure point wasn't the farmers themselves, but rather banking economics and the lack of acceptable collateral. Working hands-on with farmer groups in Tanzania and Brazil, Rahel witnessed the paradox firsthand: farmers own some of the planet's most valuable resources - natural forests - yet cannot use them to access financing. The gap between the intrinsic value of natural assets and their inability to unlock economic opportunity became the foundation for reilo's solution.

3. Solution approach and short description

reilo is a climate-fintech platform that makes nature bankable by converting farmer's natural assets into acceptable loan collateral. We aggregate smallholders (1), develop carbon projects and certify them (2), secure binding offtake agreements with corporate buyers (3), and use our digital platform to transform future carbon revenues into bankable collateral (4).

1. **Farmer Aggregation & Forest Registration:** We work with smallholder farmers and trusted forest stewards to register their forest assets digitally, creating a verified baseline of the natural capital they own.

2. **Nature-Based Carbon Project Development:** We develop carbon projects (biodiversity protection, biochar carbon removal) and certify them based on CO_2 sequestration and biodiversity value.

3. **Carbon Offtake Agreements:** We secure carbon offtake agreements with corporate buyers, creating a future revenue stream from carbon credits.

4. **Collateral Transformation:** We transform these secured carbon revenues into bankable collateral that financial institutions accept to secure agricultural loans and give farmers access to capital today.

Value Creation:

For Farmers: Access to affordable loans (10-12% interest), +60% carbon income share, 50% productivity gains, and recognition of their natural asset's economic value.

For Financial Institutions: 80% reduction in loan risk, lower collateral management costs, effective due diligence and access to a $40 billion underserved market.

For Carbon Buyers: High-quality, high-impact carbon credits with strong co-benefits (biodiversity, food security, economic development of farmers), no upfront project development investment required, and diversified risk through aggregated smallholder portfolios rather than single large projects.

For Environment: Nature conservation, Carbon sequestration, and biodiversity restoration.

The model creates aligned incentives where protecting nature becomes economically beneficial for all stakeholders.

4. Testing approach to verify the idea

Note: The second test-run is still in evaluation, due to the fact that we were only able to start the 2nd test-run in October, due to later payment of the first badge in February and 2nd badge mid September. So the results can be delivered by May 2026.

a. Viability (Economic sustainability)

Kiyowela Pilot (Tanzania, February-July 2025):

- 7 farmers participated in the initial test run
- 50 acres of Miombo forest ecosystems protected
- 12% annual interest rate (1% per month) tested
- Main crops: Potatoes, Beans

Key Viability Tests:

- **Transaction Costs:** Verified that reilo transactions can be done via mobile payment, keeping costs low enough for the model to work at scale
- **Default Risk Modeling:** Developed methodology to model default risks, essential for financial institution acceptance
- **Revenue Streams:** Tested whether carbon revenues, farmer interest payments, and protection fees create a sustainable business model
- **Local MFI Engagement:** Successfully demonstrated the model to local microfinance institutions, with active discussions of partnerships for cycle 3
- **Financial Validation:** The pilot proved that the unit economics work - farmers can afford 12% interest rates, while carbon revenues provide additional income and loan security.

b. Feasibility (Technical and operational capability)

Forest Registration & Certification:

- **Digital Registration:** Forest registration is possible in 2 hours without extensive training, making it scalable.
- **Minimum Forest Size:** Confirmed that 1 hectare minimum doesn't exclude too many farmers, ensuring inclusive access.
- **Mixed Collateral:** Demonstrated that a mix of tree and forest as collateral is feasible.

Contracting & Operations:

- **Digital Contracts:** New contracts are understood and accepted by farmers.

- **Local Partnerships:** Validated that working with local forest stewards trusted by farmers ensures effective implementation.

Monitoring & Verification:

- **Reporting Standards:** Confirmed that monitoring reports match with carbon certification requirements
- **Cost-Efficient Technology:** Identified viable, cost-efficient options for technical monitoring (remote sensing, eDNA)
- **Third-Party Verification:** Established partnerships with MRV providers like Isometric. The test demonstrated that the technical infrastructure - from forest registration to monitoring to payment systems - can operate efficiently in remote, low-infrastructure settings.

c. Desirability (Market demand and stakeholder acceptance)

Farmer Demand:

- Started with 7 farmers in pilot
- 75 farmers joined the waitlist, demonstrating strong organic demand
- Farmers showed high acceptance of new contracts and protection requirements
- Income increases achieved (measured after completion of loan cycle)

Financial Institution Interest:

- 1 bank in active negotiations in Tanzania (CRDB Bank)
- Local MFI convinced to test cycle 3, validating model desirability from lenders' perspective
- Strong interest from Brazilian financial institutions (Regia Capital, Sitawi, Caixa Bank)

Scalability Signals:

- Successfully completed Cycle 1 (February-August 2025)
- Cycle 2 launched in September 2025 with 15 farmers
- For cycle 3 we plan to scale from 15 farmers to 150 contracted loans
- Expanded scope: Brazil pilot with 2,000 farmers in development

Partnership Validation:

Established partnerships with FARIP, University of St. Gallen, University of Dar es Salaam, Elisema, Ministry of Natural Resources and Tourism, National Carbon Monitoring Center in Tanzania - demonstrating multi-stakeholder buy-in across academia, implementation partners, and carbon markets.

Awards & Recognition:

- Venture Finalist, I4N Finalist, IC Award Finalist
- Bluelion and remove accelerator
- Swissnex partnership

The overwhelming demand (75 farmers waitlisted from a 7-farmer pilot) and institutional interest validate that the solution addresses a real, urgent market need.

d. Key Learnings and Adaptations

1. Crop Selection and Risk Diversification:

We started with farmers producing different crops to diversify risks, including poultry farms where farmers had limited prior experience. However, we learned that crops like poultry took longer to generate revenue compared to established crops such as beans or potatoes, which delayed repayment. For the 2nd test-run, we decided to focus exclusively on bean and potato loans with a 6-month repayment term, allowing us to better predict cash flows and reduce default risk.

2. Climate Resilience and Flexible Repayment:

Climate risks such as excessive rain and floods demonstrated that farmers with access to loans became more resilient - they could replant much faster after weather events. However, these climate shocks also delayed repayment schedules. We learned that for such risks, there should be the possibility of longer repayment periods with adjusted interest rates (maintaining 1% per month). We implemented this flexibility in the 2nd test-run to better accommodate climate-related delays while maintaining financial sustainability.

3. Digital Registration Data Quality:

For the 2nd test-run, we implemented a digital registration form where farmers and forest stewards could enter data directly from the field using mobile phones. While this proved more efficient in terms of time and scalability, we observed that data quality was not consistently at the same level as manual registration. Moving forward, we need to further improve the digital registration process together with local forest stewards through better training and validation protocols to ensure the same high data quality while maintaining efficiency gains.

Impact of Learnings:

These iterative improvements demonstrate our commitment to evidence-based adaptation and our ability to learn quickly from field experience. Each test-run has systematically de-risked different aspects of the model, from operational efficiency to financial risk management, positioning us for successful scaling.

5. How the Innovation Booster supported us

The Innovation Booster Sustainable Digital Finance provided critical support at several key stages:

Identifying the Solution:

- Helped us refine our understanding of how to make nature-based assets acceptable to financial institutions through digital systems
- Connected us with experts in sustainable finance who could validate our approach to collateral management

Shaping the Solution:

- Supported the design of our testing methodology for the Kiyowela pilot
- Helped us identify the critical questions we needed to answer in the test run: What is the right minimum forest size? How quickly can registration happen? What monitoring technology is cost-efficient? How do we model default risks? Can contracts be understood and accepted?
- Guided us in structuring the pilot to answer these questions systematically

Designing the Solution:

- Provided funding (CHF 20,000 via Innosuisse Start-up Core Coaching) that enabled us to conduct the Tanzania pilot.
- Helped us think through the scalability requirements from the beginning, ensuring our pilot design would yield insights applicable to larger deployments. The Innovation Booster's digital finance expertise was particularly valuable in helping us design the interface between carbon markets and banking systems - a novel intersection that required careful technical and regulatory consideration.

6. What support we valued most

The most valuable support came in three key areas:

1. **Financial Support for Risk-Taking (Most Critical):**

   The CHF 20,000 Innosuisse Start-up Core Coaching funding enabled us to conduct real-world testing in Tanzania. This was transformational because it allowed us to move from theory to practice, test assumptions with actual farmers, forests, and financial transactions. The results (7 farmers expanding to 75 waitlisted) gave us concrete proof points for fundraising. Without this funding, we would have remained in the conceptual phase much longer.

2. **Expert Network & Credibility:**

   Being part of the Innovation Booster network provided validation when approaching banks and financial institutions, access to sustainable finance experts who could pressure-test our model.

3. **Structured Problem-Solving Framework:**

   The Innovation Booster helped us break down our complex solution into testable hypotheses. Instead of trying to validate everything at once, we systematically tested registration, contracting, monitoring, and repayment. This structured approach gave us clear go/no-go decisions for each component and helped us communicate progress to stakeholders and identify what to prioritize next.

The Innovation Booster's emphasis on proving feasibility through low-cost, efficient processes pushed us to validate that forest registration could happen in 2 hours without extensive training. This single insight transformed our scalability potential - proving we could onboard farmers quickly was essential for unit economics and became a key selling point with financial institutions. The combination of funding, network, and structured methodology accelerated our development by at least 12-18 months and directly enabled the successful pilot that has now opened doors to bank partnerships and our next funding round.