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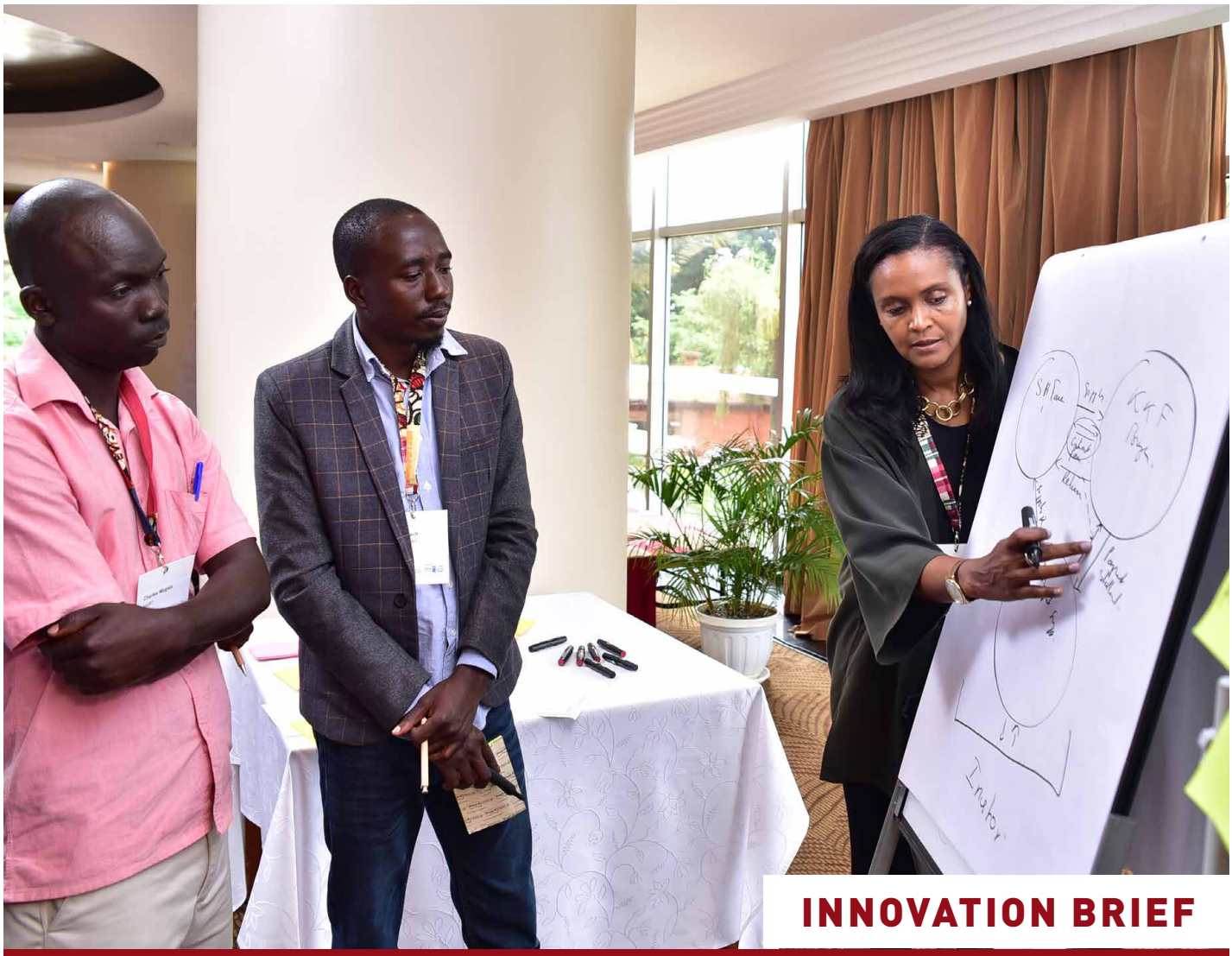

INNOVATION BRIEF

BOTTOM-UP INNOVATION FOR ADAPTATION FINANCING

New Approaches for Financing Adaptation Challenges Developed through the Practitioner Labs Climate Finance

Jonas Restle-Steinert and Tobias Hausotter

In cooperation with SEED promoting entrepreneurship for sustainable development

Imprint

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List of Abbreviations

AI	Artificial Intelligence
AR	Augmented Reality
ASEAN	Association of Southeast Asian Nations
AVCF	Agriculture Value Chain Financing
BAAC	Bank for Agriculture and Agricultural Cooperatives
CBO	Carbon Sequestration, Biodiversity Support, and Oxygen production
CII	Confederation of Indian Industry
CMP	Community Mangrove Project
CR	Critically Endangered
CVA	Community Verifying Agent
EADB	East African Development Bank
EN	Endangered
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
FSD	Financial Sector Deepening
GIS	Geographic Information System
GIZ	German Corporation for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit)
GMT	Global Mangrove Trust
GNP	Gross National Product
GRO	Global Reforestation Objective
ICO	Initial Coin Offering
ICT	Information and Communications Technology
IFC	International Finance Corporation
IGES	Institute for Global Environmental Strategies
IUCN	International Union for Conservation of Nature
LAST	Living Animal Social Token
MFI	Microfinance Institutions
MNO	Mobile Network Operators
MoU	Memorandum of Understanding
MSME	Micro, small and medium-sized enterprise
NA	Nursery Administrator
NARO	National Agricultural Research Organization
NBFC	Non-Banking Finance Companies
NDC	Nationally Determined Contribution
NFT	Non-Fungible Token
NGO	Non-governmental organisation
PLCF	Practitioner Labs Climate Finance
PPP	Private-Public Partnership
RCC	Regional Collaboration Centre
ROI	Return on Investment
SACCO	Savings and Credit Cooperative Organizations
SDG	Sustainable Development Goal
SFI	Specialised Financial Institution
SIDB	Small Industrial Development Bank of India
SME	Small and medium-sized enterprise
SPV	Special Purpose Vehicle
SUP	Stand-up Paddling
SUTD	Singapore University of Technology and Design
UAIS	Uganda Agriculture Insurance Scheme
UDB	Uganda Development Bank
UI	User Interface
UIA	Uganda Insurers Association
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USSD	Unstructured Supplementary Service Data
VAT	Value Added Tax
VR	Virtual Reality
VU	Vulnerable
WIF	Worldview International Foundation

EXECUTIVE SUMMARY

This Innovation Brief presents six innovative **bottom-up adaptation financing approaches** from the ***SEED Practitioner Labs Climate Finance*** 2018 in India, Thailand and Uganda, and shares **overarching learnings about challenges and solutions**. The Labs facilitated the development of the following **prototype solutions** with a focus on small- and medium-sized enterprises (SMEs):

- *Mobile-Enabled Microinsurance* (Uganda)
- *Irrigation System Microleasing for High-Value Crops* (Uganda)
- *Green MSME Finance Tool* (India)
- *Last of Ours – Blockchain-based Conservation Fund* (Thailand)
- *Global Mangrove Trust – A Blockchain-based Conservation Finance Incentive* (Thailand)
- *Smart-Irrigation-as-a-Service Vehicle* (Thailand)

Challenges for Developing Bottom-Up Adaptation Financing Approaches

- **Lack of capacities and information among enterprises on the ground, particularly the lack of financial literacy** of SMEs is a crucial barrier for mobilising adaptation finance effectively.
- **Financial institutions** and investors often **lack information on and technical understanding of innovative green technologies or adaptation measures** and **their impact** to properly assess the creditworthiness of projects and understand the full business value of innovations in this space.
- **Low accessibility of financial instruments** for climate adaptation **in remote areas** as distribution networks and branches of financial institutions are often primarily located around (peri-)urban areas.
- **Mismatch of demand and supply** in the design of financial instruments: Particularly in the agricultural sector, there is **misalignment between repayment schedules** of loans or premium payments for insurances **and seasonal income patterns** of SMEs, particularly agribusinesses.
- **Limited number of dedicated investors** or donors involved **in adaptation finance**, with SMEs competing for very limited resources. This exemplifies the **need for diversifying the sources of adaptation finance**, mobilising new players, and developing self-sustaining business models.

Solutions for Addressing Recurring Challenges Regarding Bottom-Up Adaptation Financing

- **Strengthening of capacities on the ground through grouping enterprises**, farmers or projects into networks and collectives in order to create synergies, peer learning opportunities, shared resources, and stronger collective bargaining positions.
- **Provision of smart data gathering and sharing techniques** with **very different levels of complexity**, ranging from blockchain-based impact measurement tools to simple databases for collating and sharing information and data.
- Increasing the openness to and **use of innovative technology-driven solutions**. The level of complexity needs to be adjusted to the specific local context. This includes using mobile technology for contract management, mobile money for premium payments and insurance pay-outs as well as blockchain technology for mobilising finance.
- **Overcoming misaligned seasonal income patterns and revenue cycles** of agribusinesses **and repayment schedules for loans** through **restructuring of transactions and payment flows**.
- **Mobilisation of new stakeholders, and investors**, such as private companies, commercial banks, and **consumers** from the **wider public** as **new sources of adaptation financing** and **tapping into underutilised markets** (e. g. online game community or urban youth).
- **Usage of gamification** as a cross-cutting solution strategy: The basic principle of gamification approaches is to use game elements, online games, or fun activities in non-game settings for value and impact creation in order to reach new target groups.
- **Coupling of different service offerings by financial institutions or technology providers**, such as **combining the provision of financing with sharing information** about business practices or supplying technology solutions.

OVERARCHING LEARNINGS FROM THE PRACTITIONER LABS CLIMATE FINANCE FOR BOTTOM-UP ADAPTATION FINANCING

1

BACKGROUND

It is widely acknowledged that a bottom-up approach involving businesses and stakeholders on the ground in emerging and developing countries is essential for driving climate change adaptation finance as local companies and communities are directly affected by climate change. Small- and medium-sized enterprises (SMEs), which should focus primarily on their own adaptation while also having the potential to offer products or services that can help their clients adapt to climate change, are crucial stakeholders in this context as they often play a dominant role in the private sector in developing countries and should thus be driving forces in localised climate change adaptation.[1] However, despite the fact that local businesses and communities are in urgent need of suitable financing instruments, SMEs on the ground face significant financing challenges in many developing and emerging economies, particularly with regards to climate change adaptation.

To tackle this issue, SEED[2] has set up the *Practitioner Labs Climate Finance (PLCF)* and, in close cooperation with SEED, adelphi has developed and integrated a specific adaptation finance stream in the existing PLCF targeted at small- and medium-sized eco-inclusive businesses & enterprises (see Appendix II for a more in-depth overview of the Lab approach and review of the 2018 cycle)[3]. This allowed us to engage innovators on the ground in peer-to-peer exchange and to facilitate the development of prototype solutions and mechanisms for adaptation finance challenges across the globe. The aim of the adaptation stream is to develop prototype solutions and financial instruments that particularly facilitate mobilising finance for adaptation measures and increasing climate change resilience on the ground beyond more generic climate finance initiatives with a stronger focus on mitigation.

The Labs bring together different organisations, businesses, and stakeholders with an interest in solving climate finance issues and support participants in jointly developing targeted solutions for pressing challenges specific to their organisations and sectors. In this working process, the Labs unite different stakeholders to engage in a series of exchanges in order to strengthen the solution implementing capacity of

1 For more information about the roles and activities of SMEs and other private sector entities regarding climate change adaptation, see Cochu, Annica, Tobias Hausotter and Mikael Henzler (2019): The Roles of the Private Sector in Climate Change Adaptation – an Introduction. Berlin: adelphi (forthcoming).

2 SEED is a multi-donor programme and network for action on sustainable development and the green economy hosted by adelphi research gGmbH. It focuses on enterprise support and ecosystem development for eco-inclusive entrepreneurship. More information can be found at www.seed.uno.

3 Further information on the Practitioner Labs Climate Finance and the specific Labs in India, Thailand and Uganda can be found on the SEED website at https://seed.uno/programmes/ecosystem-building/finance/climate-finance

participants, build a network of trust, facilitate output-oriented knowledge exchange, share best practices and lessons learned as well as enable peer-to-peer learning between participants from different organisations and sectors. Through implementing, continuously improving, and expanding the designed prototypes, the Labs aim to instigate wider long-term change in the sector or organisations.

The PLCF were conducted in three pre-defined SEED target countries: India, Thailand, and Uganda in 2018 – closely aligned with the priorities of SEED's IKI counterparts. They resulted in prototypes for bottom-up adaptation financing with different fields of application, ranging from information tools for banks to purely technology-based solutions for mobilising financing. These solutions were developed for the respective specific country contexts. However, they may also be replicable in other countries with similar conditions. Learnings can be drawn by identifying common themes, differences, solutions and recurrent challenges that appeared across the different countries, working groups, and prototypes.

This Innovation Brief focuses on sharing some of the overarching learnings about challenges and solution ideas for innovative adaptation financing approaches with climate finance experts, public and private funders as well as local and international financial institutions, banks, and investors. It is important to note that we cannot make judgements about the actual impact of any of the developed solutions and innovations at this point given that these new ideas are all in prototype stage. Consequently, this paper provides new ideas and angles that could be considered, adopted, and tested by relevant actors in the field rather than fully fledged recommendations.

2

CHALLENGES FOR DEVELOPING BOTTOM-UP ADAPTATION FINANCING APPROACHES

1 Lack of capacities and knowledge among enterprises on the ground

Across all three countries, irrespective of their level of development, one common challenge that came out clearly from our lab process was **lack of data, knowledge and information** in different forms that creates a barrier and challenge for mobilising or directing adaptation finance effectively. This comes in different shapes and forms, affects a multitude of key stakeholders, and triggers or exacerbates additional challenges further down the line. A very obvious problem and consequence in this regard is the **lack of financial literacy of agribusinesses and small-and medium-sized enterprises (SMEs)** that limits their access to finance for resilience building measures, climate smart technologies and other green innovations. As each player on its own is very weak, this problem is particularly severe if SMEs, agribusinesses or community-level projects act individually rather than pooling resources and forming groups in order to create synergies and strengthen their collective capacity and bargaining position.

2 Lack of data and reliable information among financial institutions and investors

On a slightly different dimension, **banks and financial institutions** often **lack data as well as information on and technical understanding of innovative green technologies or adaptation measures** to properly assess the creditworthiness of respective SMEs or projects. Beyond assessing creditworthiness, this lack of information further limits the understanding of the full business/commercial value and investment potential of innovative ideas in this space. Furthermore, several groups raised the issue that neither banks nor businesses in the respective countries have sufficient experience in assessing the financial risks associated with climate change. As a consequence, the **banking and financial sector** in many developing and emerging countries **lacks interest in interacting with or investing in SMEs/projects with a climate change or adaptation focus,** partly due to a lack of knowledge and resulting risk aversion.

Related to this, a shared challenge faced by most investors and philanthropic donors in the space

of climate change adaptation that was voiced in several working groups is the **limited access to reliable data and information on the expected or actual impact of specific initiatives or project ideas**. Directing available funds to the most promising or effective initiatives seems unfeasible in many instances, creates uncertainty and deters some donors and investor from financing such projects altogether.

The **lack of information and data** on multiple levels further **aggravates an already harmful gap for adaptation financing** as most investors and financial institutions in developing countries are known for being rather **risk averse** in general and, on top of this, risks for investing in SMEs and climate change adaptation initiatives are already perceived as particularly high by them.

3 Lack of access to remote areas

Another key challenge that has been addressed in several working groups is the **low accessibility of financial instruments for climate adaptation in rural and remote areas**. A lack of developed distribution networks for financial institutions and insurance companies as well as insufficient decentralised or digital solutions have been mentioned as key reasons for this issue.

4 Mismatch between available financing mechanisms and income patterns

An additional financing barrier that has come up in several groups is the **mismatch of demand and supply in the design of financial instruments** for certain markets. For example, due to crop cycles and harvest calendars agribusiness have seasonal revenue at certain times/seasons rather than stable, continuous income throughout the entire year. At the same time, banks and insurance components require regular (e. g. monthly) payments for loan or insurance products even at times when the farmers and businesses have limited liquidity. Particularly in the agricultural sector, this **misalignment of repayment schedules of loans or premium payments for insurances with seasonal income and revenue cycles** of agribusinesses/farmers causes a huge barrier for financing climate smart farming innovations and adaptation measures, such as irrigation systems and crop insurances.

5 Limited number of investors and stakeholders involved in adaptation finance

Another challenge that has been particularly discussed in the Thailand Lab was the **limited number of conventional climate financers and dedicated value-driven or socially-minded investors or donors** that make any **reallocation of funds a zero sum game**. As different initiatives aim for the same funding sources, this limits the ability of new innovative initiatives to scale up impact without harming other existing initiatives in the same area by reducing their funding. This exemplifies the **need for diversifying the sources of climate and adaptation financing**, expanding the horizon, and mobilising new players, such as the private companies, commercial banks, and consumers from the wider public as well as developing self-sustaining business models.

3

SOLUTIONS FOR ADDRESSING RECURRING CHALLENGES REGARDING BOTTOM-UP ADAPTATION FINANCING

When looking at the developed adaptation financing prototypes, there are some common elements, such as data sources utilised, types of players mobilised, and business model logic applied in the solutions to the abovementioned challenges, but also some significant differences such as technologies used.

1 Capacity building and grouping of enterprises on the ground

One key methodology that has been integrated in several of the prototypes is the **strengthening of capacities on the ground through grouping enterprises, farmers or projects into networks and collectives** in order to create synergies, peer learning opportunities, shared resources, and strengthen their collective bargaining position. As explained above, limited accessibility of financial instruments for SMEs and local players as well as the mismatch between bank and investor requirements for accessing loans, insurance products or investment capital on the one side and the capacities of potential borrowers and investees on the other side, are key barriers for adaptation finance. Therefore, pooling players with similar investment needs in the same area has proven to be a viable strategy. For instance, grouping has been integrated in the prototypes aiming at financing smart irrigation systems in Thailand and Uganda as well as in the blockchain-based conservation finance incentive for mangroves in Thailand.

2 Data and information provision and sharing

Another crucial approach is the **provision of smart data gathering and sharing techniques**. This has been used across the prototypes with **very different levels of complexity**. At one end of the spectrum, data gathering in the two blockchain-based prototypes for conservation financing in Thailand works through highly complex and technology-driven solutions that enable effective fund allocation and impact monitoring. In contrast to this, the *Green MSME Financing Tool* in India primarily focuses on collating key data and information about green technologies and business models. It then stores and shares the information with the banking sector via a basic database and a manually managed information and data management tool. Beyond these data-focused approaches, elements of data sharing are also integrated in other prototypes such as the microinsurance prototype in Uganda. This model uses weather data for identifying appropriate pay-outs and shares weather data and information on the insurance product and agricultural practices via mobile phones with farmers.

3 Technology-driven solutions

The aspect of data management is closely related to another key element of several approaches which is increasing the openness to and **use of technology-driven solutions**. Here, it is important to note that the level of complexity **needs to be adjusted to the respective local context**. In Uganda, using mobile technology for contract management and mobile money for premium payments and insurance pay-outs for the developed crop-insurance is considered a revolutionary approach that solves the issue of reaching remote and rural areas. In Thailand, however, the economy is already very much focused on high-tech solutions, which is why the level of ambition to create technology-driven approaches is much higher. In line with this, two prototypes focus on smart contracts, crypto-currencies, e-wallets, and gamification through blockchain-based technology solutions for mobilising finance. Even in the less obvious cases of smart irrigation financing in Uganda, technology plays a role as portable solar-powered irrigation kits have been identified as a solution for overcoming the barrier of how irrigation equipment can be shared between groups of farmers in order to increase affordability.

4 Aligning payment schedules of financing mechanisms with agricultural seasons

Another common thread is **overcoming misaligned income cycles of SMEs, in particular agribusiness, and repayment schedules for loans** through **smart restructuring of transactions and payment flows**. The different approaches used include microleasing, restructuring of premium calendars for crop insurances as well as contract farming and three-party agreements between technology providers, farmers, and buyers or aggregators. In such models, the tranches for loan repayments or insurance premiums by the farmers and SMEs are not due every month but rather during harvest seasons and revenue peaks when the businesses have sufficient liquidity and income in alignment with agricultural seasons and revenue cycles.

5 Mobilising new stakeholders

Another promising innovation in several prototypes is the **mobilisation of new stakeholders, and investors**, such as private companies, commercial banks, and **consumers** from the **wider public** as **new sources of adaptation financing** and **tapping into underutilised markets**. This is integrated in the various models to differing degrees. In India, the provision of information, data, and knowledge is used to convince commercial banks to slightly shift their business focus and invest more in currently still underfinanced green micro, small-and medium-sized enterprises (MSMEs) and adaptation measures. In a much more extreme approach, the blockchain models in Thailand aim at mobilising entirely new players, such as the online game community or urban youth, with no pre-existing connection to adaptation finance through connecting the world of online games with conservation and adaptation measures.

6 Gamification

This leads to another last cross-cutting solution strategy of the prototypes that is worth mentioning here. The **usage of gamification** is integrated in both blockchain-based models in Thailand. The basic principle of gamification approaches is to use game elements, online games, or fun activities in non-game settings **for value and impact creation or other specific purposes in order to engage users more actively or reach new target groups**. For example, in the *Last of Ours* prototype model in Thailand, the online game community gets mobilised to contribute to financing social enterprises and philanthropic organisations that support conservation initiatives. This general approach appears to be a highly promising approach for getting new target groups excited about climate or adaptation finance. In adapted forms, this technique could be applied widely (e. g. for farmers and small entrepreneurs) within different areas of climate finance for mobilising adaptation investments and allocating funds to specific initiatives or projects.

7 Coupling of service offerings

A last approach worth mentioning here that has been integrated in several prototypes is the **coupling of different service offerings by financial institutions or technology providers**, such as **combining the provision of financing with sharing information about business practices or supplying technology solutions** (e. g. agricultural value chain financing (AVCF)). This is a key element in all agriculture-focused prototypes. For instance, the smart-irrigation models in Thailand and Uganda connect the delivery of the irrigation equipment with financing schemes (e. g. microleasing/hire-purchase in Uganda) as well as with the provision of agricultural inputs (e. g. seeds, fertiliser) rather than seeing this as separate transactions. Furthermore, sharing information and knowledge on climate smart agricultural practices is closely integrated in the provision of these services as well. This approach is also taken in the microinsurance prototype for crop and harvest losses in Uganda. The coupling of different service offerings and business streams is often facilitated by the use of extension systems and pre-existing business networks as good access to target markets is a key success factor. Further requirements for successful coupling of services are strong partnerships between finance, knowledge, and technology providers or solid in-house capacities of the main provider in the respective service areas.

4

IMPORTANCE OF SPECIFIC COUNTRY CONTEXTS FOR BOTTOM-UP ADAPTATION FINANCING

The Lab process has reconfirmed that paying attention to the very context-specific and local demands, requirements, and capacities of countries is fundamentally important for identifying challenges and designing and implementing approaches and solutions for adaptation finance. An inclusive process that integrates local perspectives and knowledge about the specific context is likely to help pinpoint the challenges to be addressed in the most accurate way while also furthering the needed acceptance and to increase the efficiency and effectiveness of proposed solutions.

Despite the many similarities across the countries and prototypes, we have identified some fundamental differences throughout the Lab process that need to be considered when developing or replicating respective prototypes.

- The most obvious varieties exist in the **general levels of economic development in the three countries that are directly reflected in the way the respective banking sectors are structured**. Financial institutions in Thailand and India are generally very well established but have limited interest and capacity to work in the specific field of adaptation finance. In contrast, the banking sector in Uganda is significantly weaker and lacks capacity and presence in a couple of sectors and certain geographical areas. The development of new financial instruments for adaptation need to take such differences into account in order to be effective.
- In line with this, paying attention to the very context-specific demands, requirements, and capacities is fundamentally important when implementing creative processes for developing innovative solutions to existing challenges in specific sectors and countries, such as the prototypes for adaptation finance challenges in this case. It is interesting to see the huge differences in the levels of complexity in the prototypes across the three countries. What can be drawn from this is that **challenges in a less developed sector can often be tackled most effectively by rather small but focused innovations and straightforward solutions** (e. g. irrigation financing model via microle-

asing in Uganda) whereas overly complex instruments might not even work that well in the same context. On the other hand, **in a highly technology-driven country** like Thailand, there is great appetite for purely tech-driven innovations that integrate blockchain technology and cryptocurrencies, whereas potentially effective but **simple solutions addressing a specific challenge might fail in creating excitement among the target group**.

- Another key aspect to **keep in mind** that has intentionally been kept out of the creative process in the Lab, but has come up in most groups, is **the policy and regulatory framework in the respective countries**. The intention of the Lab process was to develop private sector driven prototypes and instruments rather than new policy recommendations for the government. However, paying attention to the existing policies in a country is crucial for developing effective new approaches and solutions. Therefore, the focus was to develop instruments that can work in the given framework without any conditions attached that ministries need to change regulations first. Examples of relevant policies to pay attention to in the prototype design include existing subsidy schemes for specific sectors or banking regulations. It is important to make sure that these framework conditions are kept in mind even if policy considerations are not dominant in the design stage as all developed solutions need to be applicable to the respective regulatory framework in the roll-out stage in order to be effective.

5

APPROACHES FOR BOTTOM-UP ADAPTATION FINANCING

In the following Appendix, we present the six different prototypes of financial instruments that have been created by the working groups in the Lab process 2018 in Uganda, Thailand and India. The prototypes are presented in the form of mostly standardised Concept Notes that have been pre-structured by the Lab facilitators but written by the respective Challenge Hosts and Prototype Developers within the working groups (see Appendix II for more information on the process). Progress with regards to preparing the roll-out of the models differs between the prototypes. As all approaches are still in prototype stage or early roll-out, it is too early to draw any conclusions about their impact potential and actual implementation at this stage.

Uganda

1. Mobile-Enabled Microinsurance

hosted by Financial Sector Deepening (FSD) Uganda

Offers smallholder farmers superior agriculture insurance by leveraging mobile technology and reliable weather indexing for improved product delivery, servicing, and claims pay-outs.

2. Irrigation System Microleasing for High-Value Crops

hosted by Swisscontact

Directs deal flow to climate-smart irrigation systems to improve productivity and climate adaptation capacities of small-scale agribusinesses. The micoleasing product provides low-risk microleasing with buy-back options, payments adjusted to crop cycles, decentralised delivery via technology suppliers, and awareness raising & training.

India

3. Green MSME Finance Tool

hosted by TARA and Grameen Capital

Offers a knowledge platform for providing data and frameworks to banks for understanding green-technology-based enterprises and evaluate them for financing. The *Green MSME Finance Tool* addresses the information gap in banks on green finance and high transaction costs in assessing green enterprises.

Thailand

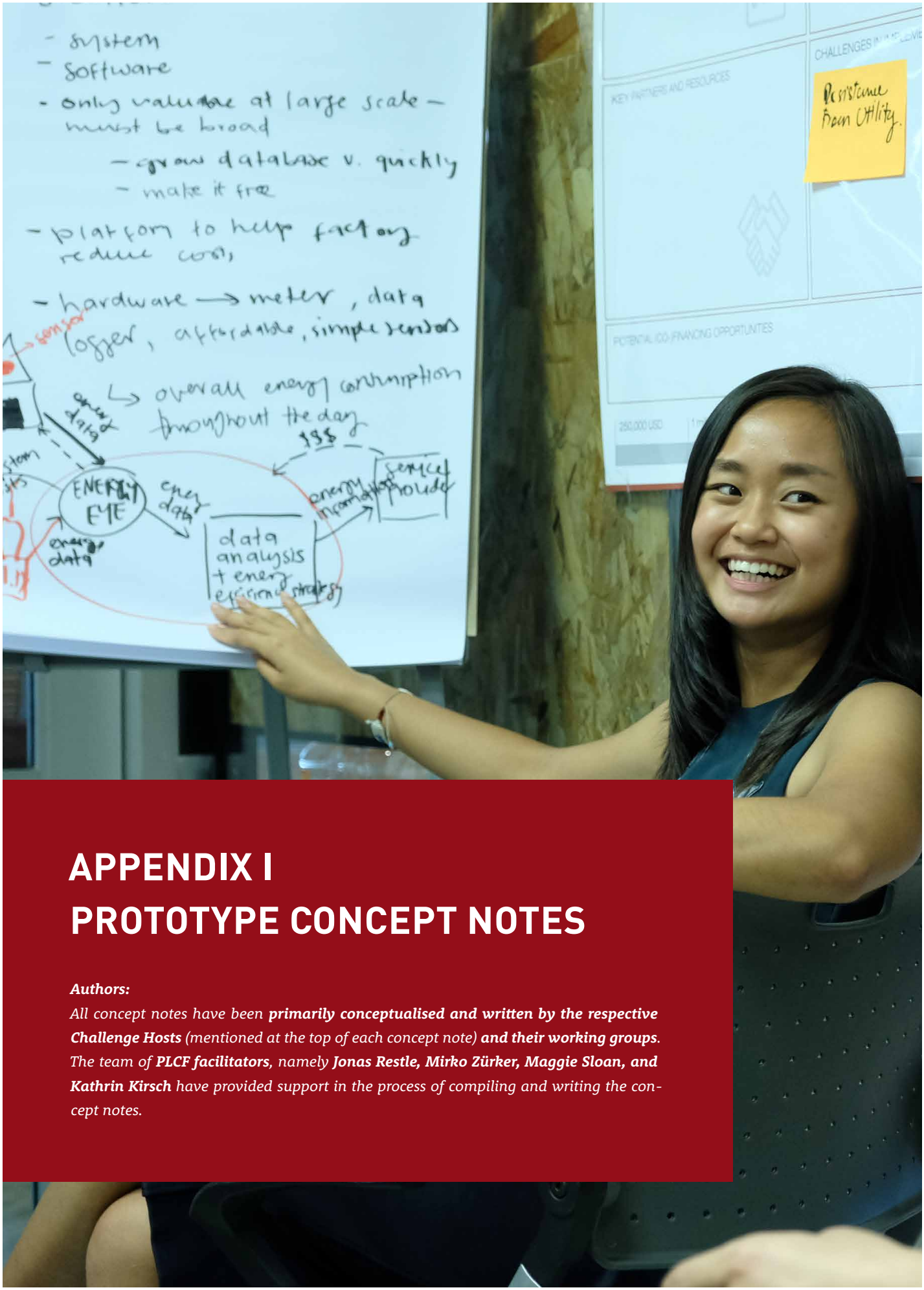
4. Last of Ours – Blockchain-based Conservation Fund

hosted by KXmade

Offers a platform for wildlife conservation initiatives to raise awareness and fund their projects. *Last of Ours* brings people together to protect our planet's endangered species & habitats and creates a shared value between social entertainment & real-world impact.

5. Global Mangrove Trust – A Blockchain-based Conservation Finance Incentive
   hosted by Global Mangrove Trust
   Offers a digital platform based on blockchain that enables households and businesses around the world to undertake direct, transparent and efficient support for community-based mangrove forest projects.

6. Smart-Irrigation-as-a-Service Financing Vehicle
   hosted by UNFCCC Regional Collaboration Centre (RCC) Bangkok / Institute for Global Environmental Strategies (IGES)
   Directs deal flow to climate-smart irrigation systems to improve productivity and climate adaptation capacities of small-scale agribusinesses. The vehicle provides microfinance alongside technical assistance and aggregates smallholder farmers at the village level.



APPENDIX I
PROTOTYPE CONCEPT NOTES

Authors:

All concept notes have been ***primarily conceptualised and written by the respective Challenge Hosts*** *(mentioned at the top of each concept note)* ***and their working groups****. The team of* ***PLCF facilitators****, namely* ***Jonas Restle, Mirko Zürker, Maggie Sloan, and Kathrin Kirsch*** *have provided support in the process of compiling and writing the concept notes.*

APPENDIX I

1 MOBILE-ENABLED MICROINSURANCE

Hosted by FSD Uganda in PLCF Uganda

1.1. Synopsis of Product Prototype

The *Mobile-Enabled Microinsurance* prototype catalyses mobile-based technology to increase access to and improve the quality of agriculture insurance solutions offered to small-scale agribusinesses in Uganda. Real-time risk management and efficient pay-outs are major challenges to existing agriculture insurances. This is complicated by a lack of public awareness of the purpose of agriculture insurance and the wide geographical spread of agribusinesses across Uganda. The *Mobile-Enabled Microinsurance* product aims to insure commercial small-scale agribusinesses against production and harvest losses. Monitoring works through real-time weather indexing. Product delivery, servicing and claims pay-outs are facilitated by a network of insurance agents supported by local-level representatives as well as mobile-money and communication technology. This innovative insurance product will:

- **Extend the market penetration of agriculture insurance** among small-scale agribusinesses across key commercial crop value chains
- **Leverage mobile-based technology** to inform and deliver insurance solutions to remote areas while allowing flexible consultation and pay-outs
- **Increase investment in commercial crops and climate-smart agriculture** by freeing up capital previously spent on rebuilding from weather-related losses

The uptake of affordable agriculture insurance which employs weather indexing and responds in real-time to consumer needs strengthens the climate resilience and adaptation capacities of small-scale farmers to the benefit of a climate-smart agriculture sector.

FIGURE 1

Product design of Mobile-Enabled Microinsurance

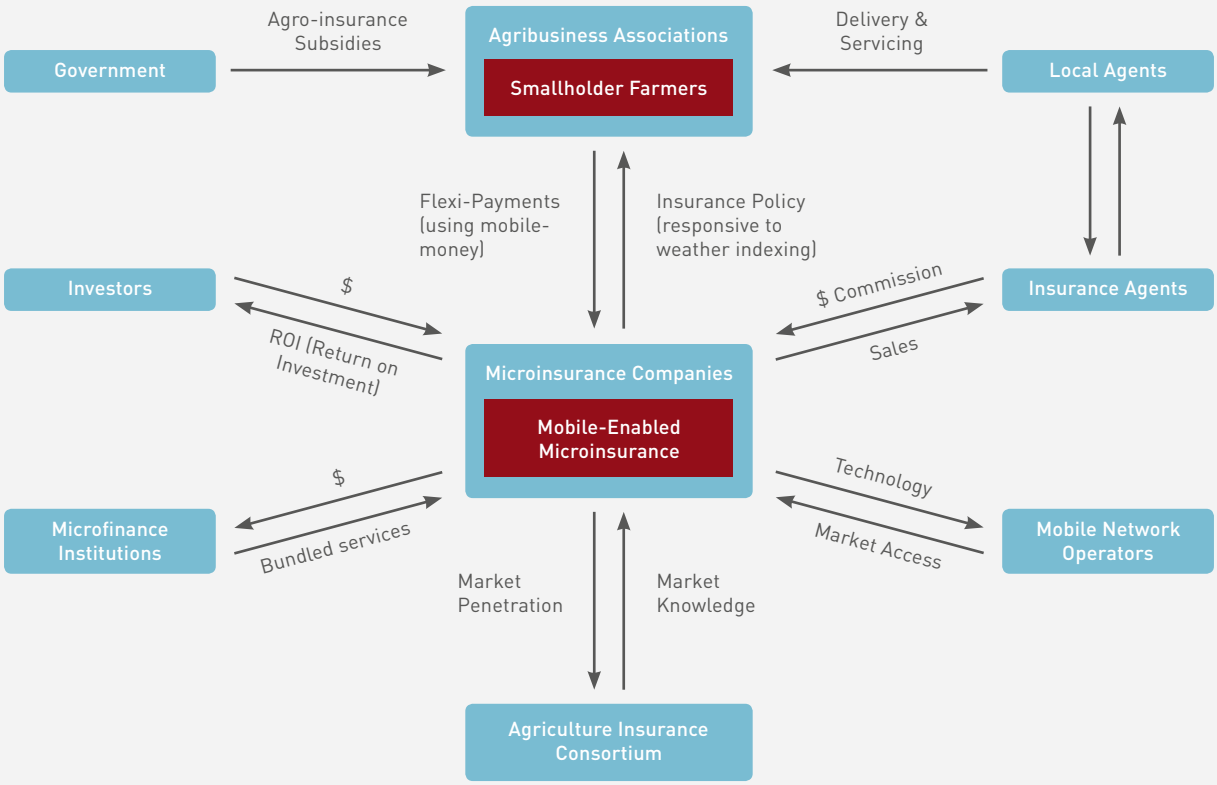
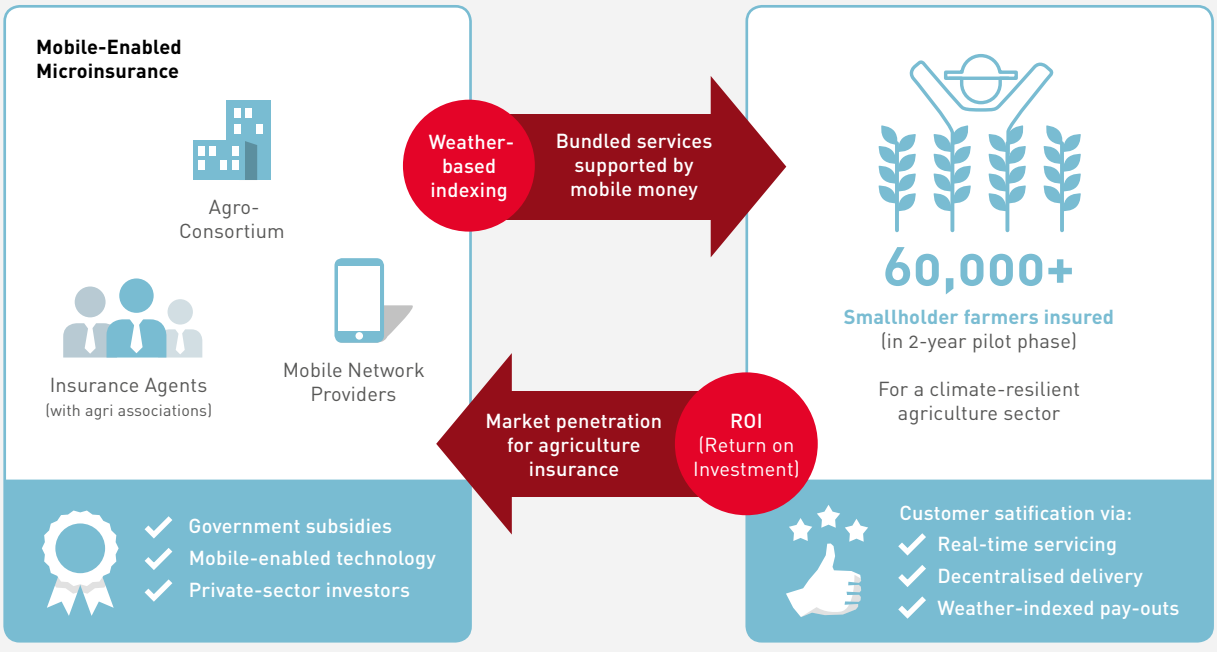


FIGURE 2

Product mechanism of Mobile-Enabled Microinsurance



1.2. Innovative Characteristics

Mobile-Enabled Microinsurance is equipped to improve market penetration and product delivery and servicing through the following innovative characteristics:

Leverages mobile-based technology for bundled services

The prototype's *Insure Tech Platform* utilises the technical capacities of mobile phones, especially feature phones, for improved geographical coverage and ease of use. This platform is able to send messages, process complaints and efficiently issue claims pay-outs. Flexi-payments and a simplified refund policy improve usability. The technology is provided free-of-charge and is equipped to field requests in multiple languages. The platform adopts a mixed technology interface that combines mobile-money with toll-free calling and texting.

Insure Tech Platform's marketing platform offers consumers more than potential claims pay-outs. This technology allows for real-time climate risk and agricultural market updates. The *Insure Tech Platform* informs small-scale agribusiness networks of agriculture input and technology promotions (e. g. promotions on fertilisers, irrigation systems or seeds in partnership with agricultural input companies) and training. The bundled services offered are specifically aimed at improving the adaptation capacities of smallholder farmers. The combination of insurance and agricultural information incentivises policy purchase and allows farmers to derive further benefits from the capital invested in premium payments.

Decentralises delivery and servicing through insurance agents

A network of insurance agents will improve public access to insurance information and mobile-enabled technology. These agents are central to on-boarding (customer acquisition) as well as for complaints handling and pay-outs. Agents work directly with communities to ensure ease of delivery and continued support. They are equipped with training materials to empower local community leaders to hand over components of on-the-ground support. Agents earn commission on their insurance sales which incentivises their involvement during the early stages of product dissemination. These financial incentives will be replaced by more limited peer-to-peer information delivered through the local representatives.

Streamlines claims pay-outs with weather indexing and mobile money

As a weather-based-index agriculture insurance, this prototype pegs pay-outs to weather (i. e. rainfall and temperature fluctuations) rather than actual losses in agriculture yields. *Mobile-Enabled Microinsurance* employs existing weather indexing data used by the Ugandan Agro Consortium and dispenses insurance pay-outs when levels deviate from the average by a certain degree. Pay-outs are efficiently delivered via the *Insure Tech Platform's* mobile-money function and guaranteed within 10 – 20 days after the claims receipt. Using weather data for pay-out decisions has several key advantages: it helps to overcome the significant monitoring issue of using actual harvest losses, it reduces transaction costs for insurance companies and farmers, and it allows a comprehensive country-wide insurance coverage without insurance offices in all regions.

Targets commercial crop value chains

The insurance product targets small-scale agribusinesses which produce commercial crops, i. e. crops that lend themselves to commercial value chains. This focus on commercial crops emphasises the economic value derived from insuring these crops and incentivises private-sector cooperation, particularly the involvement of insurance companies.

Guarantees affordable insurance pricing

Policy prices for *Mobile-Enabled Microinsurance* are responsive to the buying capacity of small-scale agribusinesses in Uganda. Product pricing accounts for current government subsidies for agriculture insurance as well as the price barriers of value added tax (VAT) and stamp duty collected on agriculture insurance. Prices are determined through a comprehensive pricing analysis that employs financial sector and development index data provided by key private and social sector actors.

Secures consumer buy-in through community-based networks

Insurance agents, fundamental to product roll-out, are supported by a network of agribusiness associations and community leaders. *Mobile-Enabled Microinsurance* capitalises on existing networks to respond to questions and concerns, raise awareness, and improve risk tolerance among small-scale agribusinesses. The respected status and position of local council leaders and extension practitioners in communities are leveraged to promote agricultural insurance solutions and provide continual training.

1.3. Target Market

During the two-year pilot phase for *Mobile-Enabled Microinsurance*, the product aims to insure 60,000 farmers through a USD 1 million investment. The product targets small-scale agribusinesses that produce higher value commercial crops. These farmers are significant contributors to economic growth in the agriculture sector and are particularly vulnerable to weather shocks due to their lack of collateralisable farm assets available to respond to climate-related production disruptions. These farmers are accessed through partnerships with agribusiness associations. The 18–24 months pilot phase collates valuable comparative data for improving the delivery and servicing of responsive and accessible agricultural insurance.

Selection of pilot value chains and regions

Two target value chains and two regions are selected for the pilot stage which have a significant economic impact on the agriculture sector and face unpredictable weather shocks in Uganda. The regions selected also have sufficient available weather data and strong networks of farmers and community leaders. Pilot value chains have been selected for the level of available rainfall and agricultural productivity data. The value chains selected have proven commercial value and are at the core of economic growth in Ugandan agriculture.

1. Northern Uganda

Northern Uganda is a major (and growing) commercial producer of sunflower, upland rice and soya. Soya production typically rotates with that of other crops and each crop has different rainfall requirements for optimal yields. These crops are produced in Northern Uganda on a larger commercial-scale and by smallholders. In terms of smallholder farming, land is typically owned by the smallholder farmers themselves though the proportion of farmers who lease remains high. These farmers are often unaware of the adaptation advantages and availability of agricultural insurance. The land ownership structure among smallholder farmers who both own and lease land and diversity of rainfall requirements for each crop make Northern Uganda an ideal pilot region for *Mobile-Enabled Microinsurance*.

2. Eastern Uganda

In Eastern Uganda, maize, lowland rice and soya dominate commercial crop production. Similarly to Northern Uganda, smallholder farmers – who typically own their land or lease – rotate production between multiple crops throughout the year.

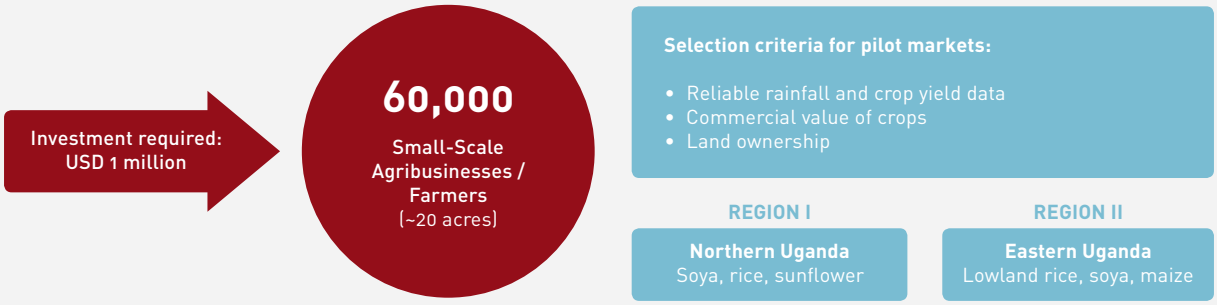
Mobile-Enabled Microinsurance financing model

Mobile-Enabled Microinsurance offers convenient instalment payments (beginning before the season) on affordable agriculture insurance. The product's pricing structure and use of mobile-enabled technology for payments address the shortcomings of existing agriculture insurance with complicated and slow payment systems. *Mobile-Enabled Microinsurance* is eligible for government subsidies and leverages the success to-date of the Agro Consortium's insurance solutions through a product that is able to multiply access to agriculture insurance in Uganda.

Expected initial investment costs over the two-year pilot period total USD 1,024,000 (based on detailed cost analysis – not included in this paper). With this level of investment, 60.000 smallholder farmers could be reached.

FIGURE 3

Target market of Mobile-Enabled Microinsurance



1.4. Impact Potential

Educate and secure buy-in of small-scale agribusinesses / farmers

- Improved awareness of insurance benefits among small-scale agribusinesses
- More smallholders trained in sustainable agriculture and mobile-based technology

Extend agriculture insurance market

- Increased number of insured small-scale agribusinesses
- Improved customer satisfaction with superior delivery and servicing

Improve climate resilience, productivity and food security

- Reduction of production losses from changing rainfall
- Adoption of climate-smart practices
- Improved commercialisation potential of crop yield

1.5. Key Partners & Resources

To support the roll-out of the prototype, following players have been identified as potential partners:

Mobile network operators (MNOs) and tech platform providers deliver the technical support required to develop and maintain information and communications technology (ICT) infrastructure. Airtel and MTN Uganda have the adequate mobile-money Unstructured Supplementary Service Data (USSD infrastructure to support the *Insure Tech Platform* by providing their infrastructure for premium payments, claims pay-outs and updates.

Weather indexing analysts facilitate the procurement of real-time weather data which is responsive to changing weather-related production risks. The Agro Consortium utilises quality data provided by EARS Earth Environment Monitoring, which will be used for *Mobile-Enabled Microinsurance*. The Food and Agriculture Organization of the United Nations (FAO) offers weather-based risk mapping that will be referenced in the design and analysis of risk profiles in the determination of microinsurance premiums.

Insurance companies which offer insurance products specifically targeted at smallholder farmers and their risk profiles will provide their expertise and adapt their

products through the use of mobile-enabled technology. The *Mobile-Enabled Microinsurance* prototype specifically targets insurance companies involved in the Uganda Agriculture Insurance Scheme (UAIS) – a key co-financing opportunity. m-Omulimisa (key product developer) has a Memorandum of Understanding with the Agriculture Insurance Consortium.

Sector-specific experts and agribusiness networks comprised of agriculture-focused non-governmental organizations (NGOs), extension systems, agribusiness associations and development organisations contribute consumer market analysis insights and facilitate access to target markets.

Government officials from the Ministry of Agriculture must support the climate finance product with targeted policies which incentivise commercial crop production using sustainable agriculture methods. Subsidies administered by the Ministry of Finance through the UAIS will ensure deal-flow to target consumers.

Community leaders from local councils and Savings and Credit Cooperative Organizations (SACCOs) provide access to target markets and ensure localised support networks available to support consumers with payments, claims and troubleshooting.

Microfinance Support Centre offers bundled products of agriculture inputs (i. e. seeds and fertilisers primarily) with agriculture insurance integrated. This microfinance centre facilitates access via loans to bundled agricultural inputs through which the agricultural insurance is delivered.

1.6. (Co-)Financing Opportunities

Multiple co-financing opportunities exist to coordinate activities with insurance companies and venture capitalists as well as through various government subsidy schemes and grant programmes.

Uganda Agriculture Insurance Scheme (UAIS)

The major focus of the *Mobile-Enabled Microinsurance* prototype is to strengthen the efforts and delivery of agriculture insurance issued through the UAIS. This private public partnership (PPP) with the Uganda Insurers Association (UIA) is a consortium of insurance companies and government bodies with the support of international financial sector, research and NGO partners.

Agro Consortium: UAIS

The Agro Consortium in Uganda has helped to reduce the costs of agriculture insurance for small and large scale farmers through the UAIS, a private public partnership launched in 2016 with ten insurance companies from the UIA and the Government of Uganda (Ministry of Finance). The scheme provides government subsidies of 30 – 80 % for insurance premium payments, with a 50 % subsidy provided to smallholder farmers and 80 % to both small and large scale farmers in particularly vulnerable areas.

1.7. Challenges in Implementation

ICT specifications and infrastructure

Technology specifications are multi-faceted, mixing mobile-money USSD with toll free support. This results in complex structures and high costs associated with the delivery of mobile technology infrastructure and troubleshooting. This challenge needs to be mitigated in partnership with major MNOs.

Insurance and digital literacy

Many small-scale farmers and potential community leaders lack knowledge of mobile money and agriculture insurance. This is a major challenge to improved market penetration for agriculture insurance. Insurance agents and MNOs are required to improve the insurance and digital literacy of smallholders through product training and support mechanisms.

Regulatory constraints

Regulators are largely unfamiliar with innovative mobile technologies and taxes (VAT and stamp duty) remain high on agriculture insurances. The pilot phase for *Mobile-Enabled Microinsurance* depends on effectively communicating the need for mobile-enabled agriculture insurance to address the limitations of current insurance schemes and to reduce taxes that render these risk management solutions unaffordable for small-scale agribusinesses.

Distribution and customer service

The dispersed network of insurance agents and community leaders and adoption of largely unused mobile technologies for insurance purposes complicates product distribution and customer service. The mixed structure of delivery – with insurance agents moving between and community leaders remaining in communities – ensures efficient product training and continuous customer support.

1.8. Market Analysis for Mobile-Enabled Microinsurance

Overview of agriculture sector

SMEs, including small-scale agribusinesses, play a significant role in economic growth and inclusion in Uganda. The 2018 World Bank report on the status of Ugandan agriculture reports that the agriculture sector, which contributes half of all exports and one quarter of Uganda's Gross Domestic Product (GDP), employs 70 % of Ugandans primarily on smallholder farms. The current National Development Plan in Uganda identifies the strategic importance of the agriculture sector on economic growth and inclusion. However, issues with productivity and crop value have a destabilising effect on the sector and food security in Uganda. These challenges drain potential income from farmers and are exacerbated by the increasing occurrence of weather-related shocks and a lack of collateralisable farm assets to respond to these shocks. Targeted insurance solutions help to mitigate production risks and protect small-scale agribusinesses from losses incurred from unpredictable weather.

Overview of climate resilient agriculture

Global food security depends on a stable agricultural sector that is resilient to climate-related shocks. Fluctuating temperatures and rainfall patterns threaten the productivity of millions of smallholder farmers globally who are at the core of agriculture systems and a major source of employment, supporting approximately two billion households. These smallholder farmers are central drivers of climate-smart agriculture through their common adoption of environmentally friendly production methods which actively preserve biodiversity. Despite the contributions of smallholder farming to global food security and sustainable, income-generating agriculture, small-scale agribusinesses remain highly vulnerable to the impacts of climate change and attractive insurance options to protect them from such shocks are rare.

Weather shocks can destroy expected returns from harvests and trap farmers and households in cycles of poverty. Weather-related risks also limit the willingness of farmers to invest in advanced technology and resources to increase their productivity and produce higher value crops. Without insurance, farmers dedicate tremendous resources to protect themselves against risks or rebuild their assets in response to losses. Insuring smallholders against weather-related production risks would increase their resilience to these shocks and ensure that capital is available to invest in more sustainable and climate-resilient production measures. A climate resilient agriculture sector depends on insurance solutions which are targeted at small-scale agribusinesses and account for their unique risk profiles while enabling the further adoption of climate-smart agricultural practices.

Overview of insurance sector

Despite the potential for insurance solutions to support a climate resilient agriculture sector, only 1 % of the Ugandan population is insured with particularly low levels of insured small-scale farmers. This is despite 11.75 % growth on average in the insurance sector since 2012, as calculated by the UIA.

Despite the financial incentives offered by the Agro Consortium's agriculture insurance, Ugandans struggle to afford insurance products and many insurance providers and associates, including the UIA, are lobbying for the reduction of VAT and stamp duty on insurance services. Public trust in and understanding of insurance products remains low and technology has largely not been leveraged to disseminate insurance information and sales.

APPENDIX I

2 IRRIGATION SYSTEM MICROLEASING FOR HIGH-VALUE CROPS

Hosted by Swisscontact Uganda in PLCF Uganda

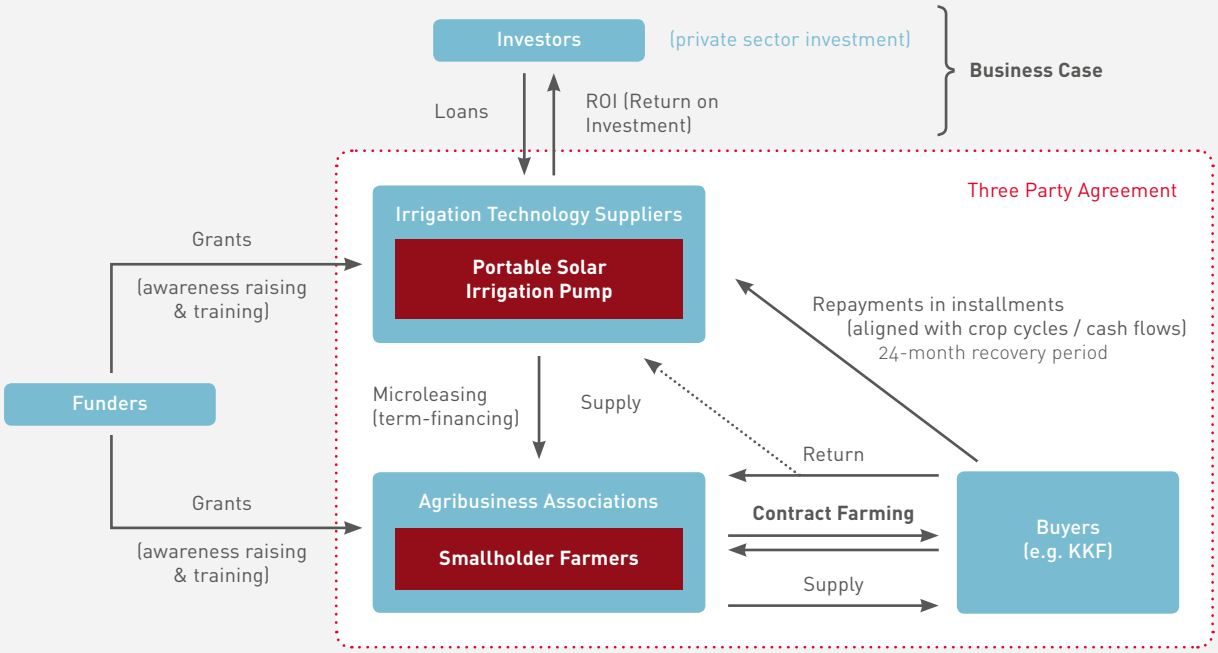
2.1. Synopsis of Product Prototype

The *Irrigation System Microleasing for High-Value Crops* prototype directs deal flow to climate-smart irrigation technologies and management mechanisms for small-scale agribusinesses. Investment in irrigation systems reduces the dependency of smallholders on unpredictable and less climate-resilient rain-fed production while significantly increasing crop yields and commercialisation potential. Irrigation system deployment for climate change adaptation and productivity improvements depends on coordinated institutional arrangements, irrigation infrastructure and capacity-building measures. This innovative irrigation financing product:

- **Offers low-risk microleasing for irrigation systems** that delivers irrigation systems and system financing via technology provider networks to align cash flows with climate-smart technologies and incentives for sustainable agriculture practices;
- **Aligns climate-smart technology payments with crop cycles** through comprehensive climate-smart technology assessments and issues term-based payments aligned with crop cycles and agribusiness cash flows;
- **Decentralises delivery of bundled agricultural inputs** (irrigation systems, fertilisers, etc.) through technology providers for improved climate-resilience and value crop production by small-scale agribusinesses.

FIGURE 4

Product design of Irrigation System Microleasing for High-Value Crops



This innovative product mitigates investment risks for both farmers and financial institutions. *Irrigation System Microleasing for High-Value Crops* directs financing for climate-smart irrigation technologies to agribusinesses that produce (or have the potential to produce) commercial crops which generate higher profits at market. The financing mechanism for irrigation systems engages the private sector to maximise Return on Investment (ROI) of productive farm assets (specifically irrigation) in the agriculture sector.

2.2. Innovative Characteristics

Irrigation System Microleasing for High-Value Crops is designed to increase levels of private sector investment in climate-smart irrigation systems that increase the productivity and climate resilience of small-scale agribusinesses across Uganda through the following product characteristics:

Mitigates consumer and supplier risks through microleasing

The product will use a self-collateralised financing mechanism (e. g. lease or hire-purchase model) to improve accessibility and flexibility, reduce consumer risk, and ensure the dissemination of innovative climate-smart technologies. Financing options are administered by technology suppliers, rather than financial institutions themselves, through credit line in order to align financing with climate-smart technology needs and expertise. This financing structure enables multiple payments and eases administration of these payments directly through technology providers. Funds are issued based on crop cycles and cash flows using a lease or hire-purchase model that allows farmers to access irrigation systems when they most need it with a reduced financial burden. This financing model incentivises sustainable agriculture practices through favourable interest rates on input financing and relies on technology providers to ensure that appropriate technology is selected and financed.

Aligns financing with crop cycles and cash flow data

The financing mechanism aligns data analytics with cash flows for selected climate-smart irrigation technologies, such as solar pumps. Soil condition and seasonal income data support this mechanism. This ensures that adequate technologies are supported by the financing mechanism and adjustments are made in real-time to reflect product developments and crop cycle needs.

Bundles climate-smart agriculture solutions

The *Irrigation System Microleasing* prototype uses a structured financing mechanism which offers micro and small-scale irrigation solutions and bundles irrigation products with other agro-inputs for climate-resilient agriculture. Appropriate micro and small-scale irrigation technologies are identified in collaboration with technology suppliers and small-scale agribusinesses. The product specifically targets the dissemination of *climate-smart* irrigation technologies which improve resource efficiency and support smallholders' climate change adaptation by adopting sustainable agricultural practices. The financing mechanism enables the creation of decentralised networks of suppliers and service teams to support raising awareness on climate smart agriculture and technology dissemination.

Targets high-value commercial crops

The focus on irrigation solutions for high-value commercial crops reduces credit risk by ensuring that appropriate irrigation systems which best increase crop yields and derive the highest market value are financed. This combats general risk aversion to agricultural investments and low levels of private-sector lending to farmers by guaranteeing ROI.

Decentralises awareness raising and distribution

The financing mechanism enlists a network of extension practitioners, smallholder associations and agricultural input companies to improve access to small-scale agribusinesses across Uganda in need of irrigation solutions. Banking infrastructure for irrigation financing is extended to rural areas by enlisting financial service providers such as SACCOs, microfinance institutions, commercial banks, and insurance companies. Awareness raising activities are funded through grants and are primarily focused on the district level, with a strong emphasis on increasing awareness of climate-smart agricultural technologies and microleasing opportunities.

2.3. Target Market

This financing mechanism is targeted at small-scale agribusinesses with up to 20 acres who are involved in high-value crop production. The irrigation systems financed by this product are micro and small-scale irrigation systems that are compatible with small-scale agribusinesses with less than 5 hectares to between 5 – 100 hectares, respectively. Product marketing concentrates on farmers groups and associations operating in areas where water resources for irrigation are readily available but underutilised.

Selection of pilot markets and irrigation technology

The pilot phase for *Irrigation System Microleasing for High-Value Crops* involves facilitating financing for irrigation systems in two different agro-ecological zones with varying crop value chains. This pilot phase aims to collate evidence of the ROI derived from irrigation system investment across value chains and climatic zones, thereby strengthening the economic rationale for the financing mechanism. The pilot phase aims to reach 1,000 farmers.

Consumer profile

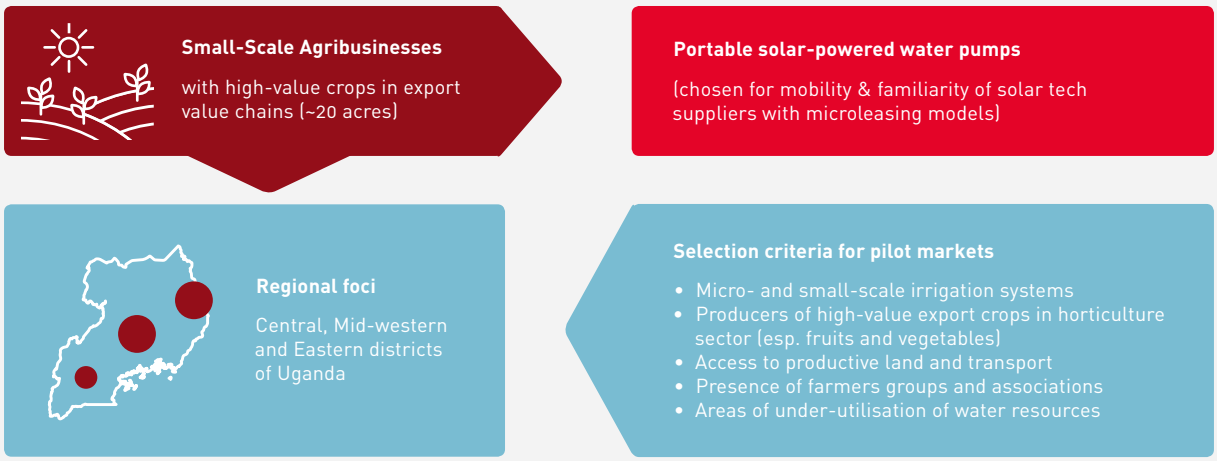
The farmers targeted during the pilot phase are already involved in export value chains. Typically, these farmers (and smallholder farmers generally) grow more than one crop and would benefit from irrigation for the production of all crops. Though many smallholder farmers in Uganda own their own land, flexible financing (microleasing) offered by *Irrigation System Microleasing for High-Value Crops* facilitates access to irrigation systems for land-leasers. All farmers targeted during the pilot phase recognise the value of irrigation systems for sustainable agriculture practices which are resilient to climate change impacts and improve climate change adaptation.

Pilot region and market

The pilot phase of the irrigation system financing will take care of Central and Mid-western and close Eastern districts of Uganda. This will primarily target horticulture products for export which are mainly fruits and vegetables (including okra, hot pepper, chilli, grape nuts, kalera, sweet potatoes). The proposed regions have access to productive land and transport access to Kampala for fresh fruits and vegetables. There are already on-going business partnerships between farmers and agribusiness companies producing for the

FIGURE 5

Target market of Irrigation System Microleasing for High-Value Crops



export market in these regions. Through the business partnerships, farmers access inputs which are mainly seeds and chemicals as well as technical support on agronomic practices through contract farming.

Swisscontact is currently supporting over 3,000 young farmers through working with 6 agribusiness companies. There are also on-going pilots on access to irrigation kits through direct financing by irrigation companies building on the contract farming arrangement with agribusiness companies and farmers. The horticulture sector in Uganda has grown significantly with a rapid export growth market for products of fruits and vegetables in the regional and international market. Exploiting this potential would increase employment opportunities along these value chains and help to reduce poverty within the country particularly for young people. Apparently, there are over 15,000 young and mature farmers engaged in this sector and over 8 local export companies involved in the market. However, this market has remained fragile with fluctuating prices as the majority of the famers rely on rainfed production.

Choice of climate-smart irrigation technology

Portable solar-powered irrigation pumps are supported by the product prototype for *Irrigation System Microleasing for High-Value Crops*. These irrigation systems are portable and affordable for target consumers and support climate adaptation in the agriculture sector. The current solar irrigation products on the market are designed mainly for smallholder farmers. Companies such as Solar Now are demonstrating and modifying the pumps based on the value chains and geographical factors. Currently, few financing options are available for irrigation technology, with attention largely on solar systems for electrification. Some of the current solar suppliers such as Solar Now and Anuel Energy are committed to pilot solar irrigation. The choice of portable solar pumps is being piloted by Solar Now in partnership with Swisscontact, with support from Mastercard Foundation. Unlike solar for electrification where companies have effectively adopted microleasing structures, the irrigation package requires companies to integrate more players in the structure (see suggested three party agreement) to mitigate risks related to limited markets and access to inputs as well as addressing the challenge of liquidity. Through business partnerships between farmers, off-takers and input dealers, including solar irrigation suppliers, the irrigation financing product will adopt the direct microleasing financing structure. The pilot will build on and scale up the current financing mechanism spearheaded by Solar Now, KK Foods, and Tropical Dynasty, facilitated by Swisscontact. The pilot aims to further bring on board Anuel Energy, another solar irrigation provider, National Agricultural Research Organisation (NARO) for research and technical support on agronomical practices, and East African Development Bank (EADB) Biodiversity Investment Fund to provide financing. EADB is implementing the Biodiversity Investment Fund to provide attractive financing to businesses that can generate a measurable contribution towards biodiversity and has expressed interest in supporting this irrigation financing product. Some of the enlisted organisations and companies are already building partnerships on related areas.

Irrigation System Microleasing for High-Value Crops product prototype financing model

The *Irrigation System Microleasing for High-Value Crops* product prototype draws on private sector investment and grants. The buy-in of financial institutions is central to ensure low interest rates for irrigation system financing. Grants support awareness raising and capacity building activities required to on-board and train consumers in product need and use.

Many agriculture financing products developed for farmers consider credit financing structures through conventional financial institutions. These products are built on normal credit policies and procedures of the institutions and regulators. They include credit administration costs and appraisal systems, making it inaccessible for smallholder farmers. In addition, financial institutions have limited buy-back options for assets, which again increases costs and risks.

In this prototype, the irrigation financing product will adopt a direct financing model by solar irrigation suppliers using a microleasing structure. Farmers will need to be involved in business partnerships with buyers and technology providers (see suggested three party agreement) to mitigate risks related to market access and access to agronomical practices that have a direct effect on production costs. Through contract farming arrangements, farmers will be able to generate revenue and provide reliable supply to off-takers while solar suppliers will be able to recover directly through period payments provided by off-takers on bank accounts. The contract farming will mitigate the risk for the investor (irrigation supplier). Large investment financiers such as EADB will provide direct line of credit to solar irrigation suppliers at reasonable interest rates (14 % maximum) to reduce the risks related to liquidity.

The financing of the solar irrigation product considers but is not limited to the following parameters:

- Irrigation suppliers will work directly with off-takers to undertake an assessment of the farm, including a cost-benefit analysis to determine the expected ROI.
- Consumers/farmers will need to pay an initial commitment deposit of at least 15% of the asset value/water pump price
- The provider will consider a grace period and payment instalment based on the crop cycle
- The asset/water pump will be self-collateralising and in case of non-payment, the supplier will re-possess it.
- Off-takers will make period payments to farmers, at the same time making deductions and remitting periodic instalments to the irrigation suppliers.
- Both the farmer and the off-taker will keep and share period production records and specific production and market projections.
- Irrigation suppliers will offer timely delivery of the pumps and provide technical support on usage and basic servicing of the asset during installation and maintenance.

2.4. Impact Potential

The product prototype generates positive impacts at both the client and provider levels. Financial institutions are able to grow their portfolios by attracting equity/debt financing for expansion. Clients derive benefits from increased productivity and better risk management for improved climate resilience and food security.

Delivers effective risk management mechanism

- Draws in private sector investment via payment terms and buy-back options
- Improves liquidity of tech suppliers via direct credit line and reasonable interest rates

Increase levels of climate-smart technology adoption

- Promotes knowledge-transfer activities among financiers, climate smart tech providers, and small-scale agribusinesses
- Trains farmers in sustainable agriculture practices and tech
- Agribusinesses adopt climate-resilient agriculture practices

Increase sustainable and climate resilient agricultural productivity

- Increases commercial crop yields for climate adaptation, food security and profitability
- Proof of irrigation value to small-scale commercial agriculture sector in Uganda
- Greater adoption of irrigation solutions

Improve climate resilience and food security

- Reduction in small-scale agribusinesses' production losses
- Implementation of climate change adaptation measures in the agriculture sector

2.5. Key Partners & Resources

Irrigation technology suppliers (e.g. SolarNow and Davis & Shirtliff) are responsible for identifying and distributing resource efficient and appropriate irrigation technologies financed by the *Irrigation Systems Microleasing for High-Value Crops* through their networks and in coordination with financial institutions. These technology suppliers have access to water users associations who are responsible for the distribution, maintenance and monitoring of common pool water resources.

Conservation experts (Green Resources, Ecotrust, Deniva, Makerere University College of Agriculture and Environmental Sciences) provide research and advice to identify appropriate and climate-smart irrigation technologies. These experts work in direct coordination with technology suppliers as they identify products for sale and with financial institutions to direct financial flows to climate-smart activities. Conservation experts are central to ensuring that the deployment of irrigation solutions is sustainable and aligned with climate change adaptation objectives.

Financial institutions and experts, including the Uganda Development Bank (UDB), European Union (EU) bodies, EADB and Green Climate Fund coordinate private-sector activities to extend their financing mechanisms and enlist private-sector support for irrigation system financing.

Solar Entrepreneur Network for Decentralised Energy Access (Sendea) provides technical support for solar-powered irrigation technologies and mobilises entrepreneurship networks to locate market opportunities for technology dissemination and servicing.

2.6. (Co-)Financing Opportunities

Swisscontact has implemented a microleasing programme in East Africa (Uganda, Rwanda, Kenya and Tanzania) which supports financial services and support services providers to develop leasing mechanisms for smallholder farmers and other SMEs to acquire productive assets (e.g. irrigation systems, solar systems, biogas plants, dairy cows, etc.). Swisscontact collaborates with SACCOs, microfinance institutions (MFIs), insurance companies and asset suppliers.

Mastercard Foundation fosters effective and inclusive markets through their rural and agricultural finance programmes which emphasise knowledge-sharing in addition to locating and supporting private-sector firms to expand financial access for smallholder farmers.

International Solar Alliance promised 1,500 solar water pumping systems for irrigation to Uganda in 2017. The Alliance is committed to reducing the costs of solar energy finance and technology through programmes including the Scaling Solar Applications for Agricultural Use and Affordable Finance at Scale programmes.

Other potential players include: SolarNow, AnuelEnergy, KK Food, Tropical Dynasty, Venture South, and EADB.

2.7. Challenges in Implementation

Risk aversion of smallholders and financial institutions

The *Irrigation System Microleasing* product prototype addresses the lack of private (and public) sector investment in irrigation systems for more productive and climate resilient agriculture that is exacerbated by limited public awareness. Smallholder farmers are largely unaware of the added-value of irrigation technologies and the wide geographical spread of these agribusinesses across Uganda complicates dissemination of knowledge and technology. Furthermore, private sector investors lack an understanding of the impacts of climate change on their portfolio growth. Development partners such as Swisscontact and NARO will facilitate awareness and capacity building for smallholder farmers, financial institutions, and irrigation suppliers to strengthen their understanding of the value added of irrigation pumps for their business portfolios.

Scarcity of water resources and formal land ownership

Rainfall and groundwater levels are variable throughout Uganda and land ownership is often disputed. In terms of water resources, inconsistent water levels and changing weather patterns across Uganda mean that some areas are better suited to irrigation systems. Issues with land ownership and shifting risk profiles as the result of climate change make access to finance difficult for smallholder farmers. Many small-scale agribusinesses fail to fulfil banks' lending requirements due to their current vulnerability to weather-related shocks and low market value. *Irrigation System Microleasing for High-Value Crops* accounts for this challenge by adopting a low risk leasing model and bundling context-specific irrigation technologies with other climate-smart agricultural inputs that improve the resilience and profitability of small-scale agriculture in Uganda.

Liquidity of irrigation system providers

Many irrigation system providers lack financial liquidity which results in long waiting periods for technology. This is exacerbated by greater attention and investment in solar energy solutions which draws private sector investment and government subsidies away from irrigation systems. Based on the microleasing financing structure, solar Irrigation suppliers will be linked directly with large financing initiatives such as the EADB Biodiversity Investment Fund, to access financing at affordable rates.

Financial and technological literacy

Many small-scale agribusinesses lack financial and technological literacy. Many farmers are unaware of the value of investing in irrigation solutions. This threatens the market penetration of micro and small-scale irrigation solutions. Knowledge-sharing measures, including the use of extension systems and small-scale agribusiness networks, mitigate this issue by emphasising the value of irrigation systems to increased productivity and higher crop value at market. Quality certifications for irrigation systems ensure financial flows to appropriate technology with high potential for increased yields and market value.

Distribution and customer service

Coordination between the decentralised network of financial service providers and educators is complex. The mixed structure of delivery – with the involvement of climate-smart irrigation system providers and agri-business networks – ensures efficient irrigation system training and continuous customer support.

2.8. Market Analysis for Irrigation System Microleasing for High-Value Crops

Overview of agriculture sector

SMEs, including small-scale agribusinesses, play a significant role in economic growth and inclusion in Uganda. The 2018 World Bank report on the status of Ugandan agriculture reports that the agriculture sector, which contributes to half of all exports and one quarter of Uganda's GDP, employs 70 % of Ugandans primarily on smallholder farms. The current National Development Plan in Uganda identifies the strategic importance of the agriculture sector to economic growth and inclusion. However, issues with productivity and crop value have a destabilising effect on the sector and food security in Uganda. These challenges drain potential income from farmers and are exacerbated by the increasing occurrence of weather-related shocks and a lack of farm assets such as irrigation solutions to adapt to these shocks. Well-managed micro and small-scale irrigation can support the adaptation of the agriculture sector to climate change and more than double crop yields. However, generally farmers feel little impetus to invest in irrigation systems due to a lack of knowledge of irrigation benefits and lack of access to finance.

Overview of climate-resilient agriculture

Global food security depends on a stable agricultural sector that is resilient to climate-related shocks. Fluctuating temperatures and rainfall threaten the productivity of millions of smallholder farmers globally who are at the core of agriculture systems and a major source of employment, supporting approximately two billion households. These smallholder farmers are central drivers of climate-smart agriculture through their common adoption of environmentally-friendly production methods which actively preserve biodiversity. Despite the contributions of smallholder farming to global food security and sustainable, income-generating agriculture, small-scale agribusinesses remain highly vulnerable to the impacts of climate change with few financing options for climate-smart farm assets (including irrigation systems) that improve their capacity to adapt.

Weather shocks can destroy expected returns from harvests and trap farmers and households in cycles of poverty. Weather-related risks also limit the willingness of farmers to invest in advanced technology and resources to increase their productivity and produce higher value crops. Although irrigation in Africa has the potential to significantly boost agricultural productivity, food production on the continent is still mostly rain-fed. Rain-fed agricultural productivity is declining as the result of climate-related risks, over-cultivation and lack of access to quality agriculture inputs for process improvements. Only very small parts of total cultivated areas are equipped with irrigation

infrastructure. Increasing deal flow to irrigation system financing would improve the resilience to climate change of agribusinesses while increasing their crop yields, quality and profitability.

Financing for irrigation systems

The *Irrigation System Microleasing for High-Value Crops* product prototype summarised in this concept note is targeted at increasing deal flow to small-scale agribusinesses across Uganda. The financing mechanism improves risk tolerance and provides targeted financing that allows farmers to invest in irrigation and adapt to the impacts of climate change.

Overview of financial sector

The Ugandan economy has continued to grow in recent years. According to the World Bank, the average annual growth from 2000 to 2015/2016 stabilised at 4.5 %, as compared with 7 % during the 1990s and early 2000s. Despite these indications of growing economic prosperity at the national level, key challenges continue to affect economic growth across sectors in Uganda, including weather and private sector credit constraints. The agriculture sector in particular continues to be plagued by low levels of return on investment from poor quality crops and high production risks caused by vulnerability to weather shocks. This has rendered the agriculture sector a low priority for the private and financial sector. The agriculture sector's adaptation to climate change and transition from subsistence to commercial production is stifled by low levels of private and public sector investment in mechanisation such as irrigation farming and climate-resistant agricultural inputs (e. g. high quality fertilisers) which improve productivity and crop quality.

Market opportunity for Irrigation System Microleasing for High-Value Crops

Irrigation System Microleasing for High-Value Crops addresses the challenges with existing financing for productive farm assets available to small-scale agribusinesses in Uganda. Resource efficient and affordable irrigation technologies help to improve and sustain high quality crops and increase yields, thereby supporting smallholders to generate higher, more reliable incomes. The main challenges in impacting access to and levels of irrigation system financing solutions in Uganda include:

- Irrigation technologies remain costly

  Smallholder farmers lack financing mechanisms to improve their crop quality through reliable, climate-smart irrigation systems. Most small-scale agribusinesses do not have sufficient capital for equity finance and debt financing mechanisms are difficult to access, making irrigation systems prohibitively expensive for smaller enterprises. This is despite government commitments to invest in irrigation solutions through National Irrigation Policy and efforts to involve the private sector. Private sector buy-in is influenced by a high level of risk aversion, caused in part by a lack of clear risk profiling for weather-related agricultural losses and knowledge of risk mitigation benefits from irrigation solutions.

- Lack of coordination between financiers and input suppliers

  Lack of coordination between financial institutions and agricultural input companies limits the knowledge-sharing required to direct financing to high quality agricultural inputs and farm assets. In part, this is the result of the financial sector's limited knowledge about and information on irrigation farming and its profit-generating potential. Increased coordination between financiers and input suppliers would insure that financial flows are directed to appropriate climate-smart technologies.

- Distribution channels for technology and education are limited

  Distribution channels for irrigation equipment, education and training are not well developed. This makes it especially difficult to reach rural farmers and convince them of the purpose and value of investing in irrigation farming. The institutional capacity and supply of extension practitioners to educate on irrigation farming is limited. In terms of financial literacy, financial institutions are largely inaccessible in remote areas and lack targeted financing mechanisms for farm assets.

- Seasonality of income and crop cycles challenge liquidity

  Small-scale agribusinesses typically have seasonal access to capital based on crop cycles. When seasonal financial flows do not align with irrigation system needs, smallholders fail to procure the capital required to engage in irrigation leasing schemes.

APPENDIX I

3 GREEN MSME FINANCE TOOL

Hosted by TARA and Grameen Capital in PLCF India

3.1. Synopsis of Product Prototype

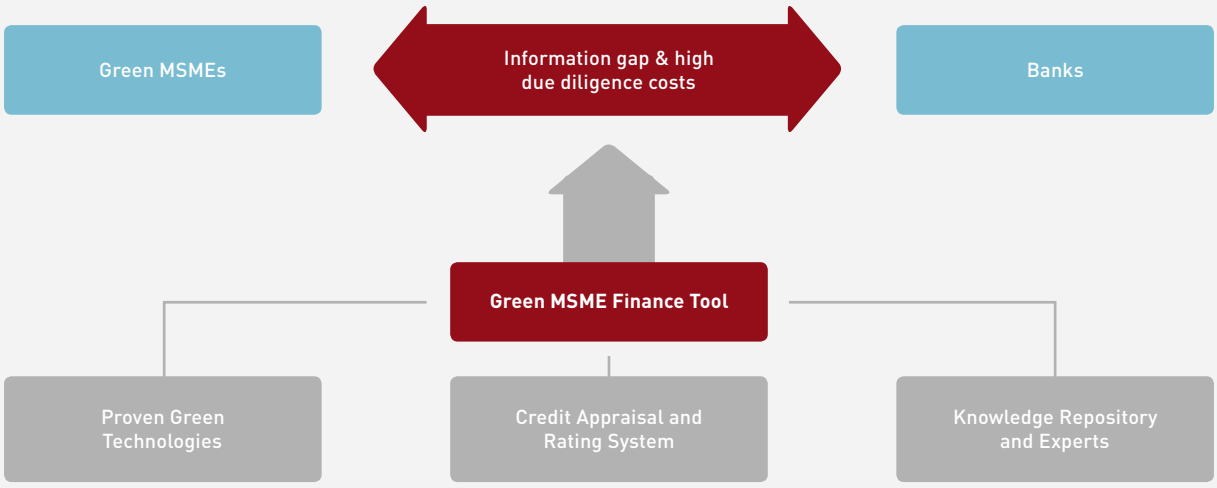
The *Green MSME Finance Tool* is a knowledge platform that provides banks with data and frameworks to understand green-technology based enterprises and evaluate them for financing in order to bridge the information gap between banks and green enterprises as well as reducing the high due diligence costs. The platform will aggregate information drawn from credible government agencies, technology and research providers, enterprise platforms, Non-Banking Finance Companies (NBFCs) and other financial institutions to build evidence on green enterprise benchmarks and performance on the database. The prototype will be positioned as a one-stop source for organised financial information about green MSMEs, credit appraisal and rating systems for green technology solutions and potential monetisation of green solutions. The scope of the tool will comprise three main features:

- **A list of validated green technologies and models** containing a list of credible technology providers as well as a demand assessment for various technologies
- **A credit rating system** that includes a risk vs. return assessment for listed green technologies and metrics to assess climate-induced risk for climate proofing the portfolio
- **A knowledge repository** with access to experts and guidelines for loan restructuring and product development processes of the banks

The knowledge platform connects banks with information on green technologies and adaptation measures and facilitates access to finance for green MSMEs.

FIGURE 6

Product design of Green MSME Finance Tool



Pilot phase

Within the 3-year pilot phase, the *Green MSME Finance Tool* will list 75 green technologies through an initial investment of USD 2 million. The pilot will be implemented in a phased approach once funding is secured. The operational plan of the pilot implementation is split into four stages that partly run in parallel:

Stage 1 — Product development and identification (12 months)

- Develop wireframe
- Establish partner network
- Refine business plan and outline objective of the tool
- Design workshops with focus on tool appraisal

Stage 2 — Information gathering (18 months)

- List 75 technologies through a partner network
- Develop appraisal tool
- Set up knowledge repository
- Two consultative meets

Stage 3 — Validation of the tool (30 months)

- Beta-testing with 10–15 financial institutions including exposure visits
- Testing of application on three technologies including an impact evaluation
- Gather feedback and learnings through workshops

Stage 4 — Dissemination and feedback (36 months)

- Redefining the working model and functionalities
- Conduct meetings and workshops to raise awareness and on-board users

3.2. Innovative Characteristics

The *Green MSME Finance Tool* is equipped to improve access to finance for green MSMEs through its following characteristics:

Provides banks with information on green technologies and models as a one-stop shop

The *Green MSME Finance Tool* serves as a one-stop shop for banks and provides a comprehensive list of green technologies with proven models. This list of technologies comes along with a carefully selected list of credible technology providers and vendors, as well as a demand assessment of the various technologies. This is central to reducing the high due diligence costs, bridge the information gap and speed up access to finance for green MSMEs.

Boosts transparency through establishing a credit appraisal and rating system

A risk versus return assessment of the listed green technologies will position the technologies in a credit rating system and inform the platform users thoroughly about the potential of the green technologies. This includes standardised metrics using Sustainable Development Goal (SDG) and Nationally Determined Contribution (NDC) tools that assess the climate-induced risk which is key to enabling users to climate proof their portfolio.

Serves as a knowledge repository for banks

As an innovative one-stop source, the platform will provide research, experts and guidelines. This includes standardised systems and frameworks needed by banks to assess green MSMEs on a case-by-case basis efficiently and develop financial products that fit with the needs of the green MSMEs. Thereby, it allows streamlining processes for loan restructuring and product development.

3.3. Target Market

Target stakeholders of the platform

The *Green MSME Finance Tool* addresses and connects four main target groups:

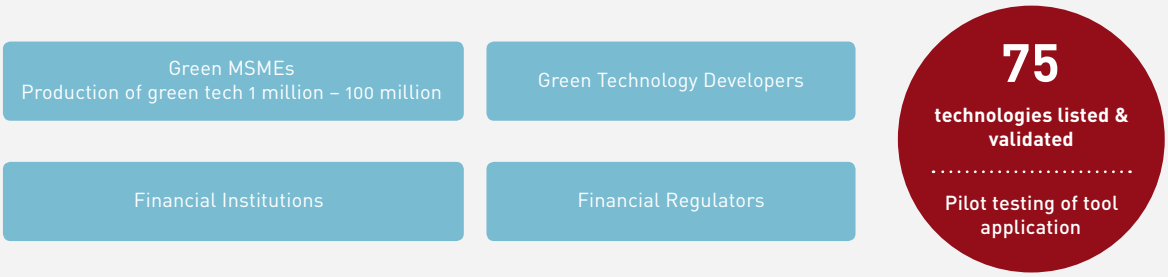
1. MSMEs adopting green technologies who will be featured on the platform
2. Green technology providers who will be featured on the platform
3. Financial institutions (commercial banks for final dissemination and NBFCs/MFIs for piloting) as users of the platform
4. Regulators as users of the platform.

The green MSMEs listed on the platform are selected based on an initial list of criteria. The green enterprises should:

- apply a commercial model with proven returns for their business and their users
- be in business already for at least three years
- outline their plans for the next five to ten years within their business plan
- be replicable (key criterion)

FIGURE 7

Target market of Green MSME Finance Tool



3.4. Impact Potential

The *Green MSME Finance Tool* boosts impact on three main levels:

Unlocks access to finance for green MSMEs

By providing information on green technologies and models to banks and speeding up the due diligence process and credit appraisal significantly, MSMEs, especially those that struggle to access finance due to a lack of track record, gain access to external financing. It supports MSMEs in assessing and integrating climate-induced risk into their business model to strengthen their resilience. Once roll-out has started, the prototype aims that in the first three years:

- 250 climate-smart MSMEs gain access to finance
- 75 green technologies are certified as a "proven model"
- 35 green technologies are rated using the credit rating framework

Expand awareness of and knowledge on green technologies

Through setting up a knowledge repository on green technologies, awareness of and knowledge about green technologies are spread and carbon literacy of banks is increased. By providing guidelines, the development of new green financing products is streamlined and facilitated. Once roll-out has started, the prototype aims to achieve that in the first three years:

- 20 financial institutions increase their carbon literacy through using the platform
- 3 green financing products have been developed

This will be a first step in the transition to a green and inclusive economy while responding to the SDG framework

The emissions of greenhouse gases can be reduced by fostering the application of green technologies. This supports climate change adaptation and mitigation and accordingly the overall achievement of NDCs and SDGs.

- Creation of green enterprises and green jobs
- Mitigation of CO^2 emissions
- Reduction of exhaustible resource consumption

This will contribute to the achievement of SDGs 8, 9, 12, and 13

3.5. Key Partners & Resources

The development of the knowledge platform requires a range of partners, including regulatory and technical experts, subject-matter experts and operating partners.

Data collection

The data and information that will be provided on the platform will be gathered in cooperation with a broad range of partners to ensure that the database is comprehensive. Partners for data collection are credible government agencies, technology and research providers, banking experts (public and private), commercial banks, NBFCs as well as other financial institutions and investors (e. g. CIBIL, Ministry of Corporate Affairs (MCA), AC Nielsen). Further partnership opportunities exist with Small Industrial Development Bank of India (SIDBI) and Confederation of Indian Industry (CII) on existing platforms such as CII's and Fifteenth Finance Commission (FFC).

Consortium

The development and implementation of the prototype will be driven forward by a consortium comprising TARA, Grameen Capital, financial experts and advisors as well as retired bankers. It will be supported by SEED and a broader group of practitioners in the field. The consortium will also perform a review and analysis of existing tools like Energy Savings Assessment Tool for MSMEs by SIDBI, Energy Efficiency Benchmarking by adelphi, and Energy Efficiency Toolkit by National Housing Bank.

Operating partner

The platform will be maintained by an operating partner in the long term for example from International Finance Corporation (IFC) as a foreign partner, Indian Institute of Technology (IIT), Indian Institute of Management (IIM) and National Institutes of Technology (NIT) from academia, Federation of Indian Chambers of Commerce & Industry (FICCI) or CIBIL from the industry, TATA from the private sector and Ministry of MSME and The Ministry of Environment, Forest and Climate Change (MOEFCC) from government.

3.6. (Co-) Financing Opportunities

Investment requirements for the pilot

The development and the implementation of the pilot phase needs to be financed by grants from development finance institutions or development organisations as well as private, family or banking foundations. In addition to the grant, product partners will provide seed funding. The pilot will be implemented at no cost for users to raise awareness and build a network around the knowledge platform.

Post-pilot business model

Once the pilot has been implemented, the financing model will gradually move towards self-financing as a paid-service model with revenue generation by the fifth year of the prototype. For the transition period, early stage innovation funds will be approached for funding. Then, banks, technology companies, and NBFCs will have to subscribe to the platform and will be charged fees for the usage.

3.7. Challenges in Implementation

Availability and reliability of data

The value of the platform and thus the potential impact is strongly dependent on the quality and quantity of the information provided on the platform. Accordingly, it is crucial to ensure access to information from partners in order to be able to provide added value that leads banks to encourage other banks to indeed use the tool. Product developers will carefully pay attention to the hurdle that enterprises are often not willing to share financial information with intermediaries and will address this challenge by building a network of trust with partners.

Neutrality of the platform

The consortium of agencies is set-up to ensure the neutrality of the platform. A critical point is to clearly divide responsibilities of developing, analysing and engaging in the prototype development. A multi-stakeholder partnership will be established at the start of the programme to ensure transparency and accountability to all key members

Moving forward, we believe that the prototype will be strengthened by answering some of the following key questions

- Specifics on the revenue model?
- How to create awareness and marketing of the tool?
- Defining the nature and scale of green enterprises supported under the initiative?
- How to develop a robust and comprehensive regulatory framework?

3.8. Market Analysis for Green MSME Finance Tool

Overview of climate-smart MSMEs in India

The Indian economy is strongly characterised by micro and small enterprises: According to the IFC, there are 80,000 small enterprises and 1.5 million micro enterprises registered in India. In total, these companies employ more than 9 million people and generate almost 10 % of the Gross National Product (GNP). Unofficial statistics indicate much higher numbers and estimate over 40 million companies, an employment of more than 40 % of India's workforce, and a contribution to the national economy of 45 %. Either way, it becomes clear that MSMEs are of key importance for the country's economy. This prototype can pave the way for climate-smart MSMEs to access finance and thus contribute significantly to the Indian economy.

Overview of the financial market in India

The commercial banking sector in India is extremely well developed: The improvement of access for large parts of society is progressing steadily; moreover, the banks are sufficiently capitalised and well regulated. Credit, market and liquidity risk studies suggest that Indian banks are generally resilient and have withstood the global downturn well. Despite the strong position of commercial banking, green finance and financing climate resilience-building measures do not play a significant role yet in the sector. Overall, the topic is being picked up by several initiatives like the "National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business" by the Indian Banking Association and the issuances of the green bond guidelines by the Securities and Exchange Board of India (SEBI) which lead to an upsurge of green financing instruments such as green and blue bonds. Still, the initiatives have mostly been in the form of often indirect and vague guidance rather than mandatory regulations which could effectively encourage the mainstreaming of green finance. Though NGOs do address the topic of green finance, their impact is relatively low.

Market Opportunity for Green MSME Finance Tool

Though the commercial banking sector in India is well developed, the financing of green enterprises and resilience-building measures has still not found its way into the banks' core business and the proportion of financial products that specifically address the needs of green enterprises is low. There are three specific challenges that impede the growth of green finance in commercial banking:

Information gap for green MSME financing

Commercial banks lack data, knowledge, benchmarks and frameworks with respect to green MSMEs. For example, existing standard frameworks do not cover the full business model of green enterprises. Further, there is a lack of information on which green business models exist and which are scientifically proven.

High due diligence costs of financing green MSMEs

The costs and expenses involved in green MSME financing are comparatively high. On the one side, green MSMEs often lack a sufficient track record to simplify the determination of their eligibility for green financing. On the other side, bankers lack the knowledge about green business models and the capacity to assess their potential and impact adequately. Accordingly, the costs for due diligence are high e.g. due to the need to hire costly external expertise and a comparatively long moratorium period for green projects.

Lack of thorough climate-risk assessment methodology

A methodology that allows accounting for climate risks that MSMEs and enterprises face and for benefits that green innovations can create in that space is lacking. Therefore, such risks and benefits are not properly included in lending decisions.

By providing a solution for these challenges, the *Green MSME Finance Tool* will support the future growth of climate smart business models as well as the mainstreaming of green finance in commercial banking in India.

APPENDIX I

4 LAST OF OURS – BLOCKCHAIN-BASED CONSERVATION FUND

Hosted by KXmade in PLCF Thailand

4.1. Synopsis of Product Prototype

Last of Ours is a digital mirror on the blockchain where every unique token represents a real endangered animal living in the wild, one-to-one. The tokens are collectible, tradable, and playable in various games (mobile, augmented reality (AR), Virtual Reality (VR)). Users are passively contributing to conservation and reforestation projects solely by participating in this entertainment ecosystem. Users may also actively allocate where their donations go on a fully transparent Kickstarter-like platform which will present the impact they have created.

We are building a fun crypto-collectible game (inspired by CryptoKitties, Pokemon Go and Ready Player One), where each 'Living Animal Social Token' (LAST) is a digital-world champion for their species, helping to build awareness, create engagement, and raise funds for their real-life counterparts. It is a real wild-life-changing game (pun intended).

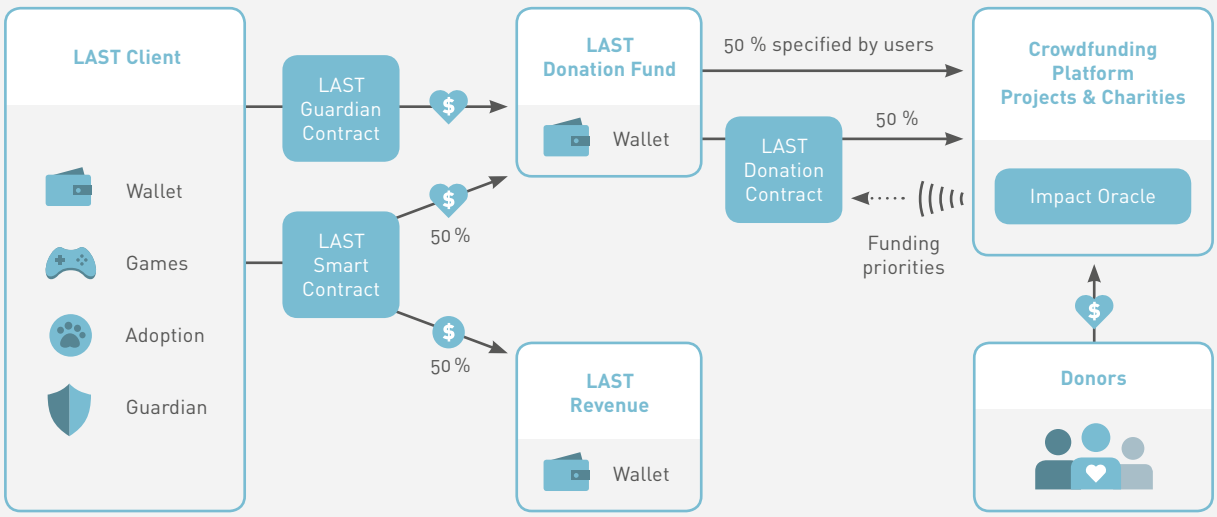
Beyond games, we are also gamifying the donation experience itself with unlockables, challenges, leaderboards, awards, and competitions to empower and mobilise our community of changemakers. We are enabling adoption and engagement for everyone to help protect the Last of Ours.

Some of the features will include:

- **Adopt threatened species:** Purchase "Magic Eggs" that hatch wild animals or visit the "shelter" to bid in auctions to adopt your favourite species others are offering. LAST that you hold will be displayed in a user-friendly wallet, which highlights your existing collection and encourages 'expanding' the collection through gamification.
- **Become a guardian:** Raise awareness and contribute funds to projects and organisations that are helping to protect and grow your favourite species and their habitats.

FIGURE 8

Product design of Last of Ours



- **Earn tokens:** Earn new born animals as their real-world population grows in the wild. By investing in rare and valuable LAST and helping protect and grow their real-life counterparts through various organisations, their new born babies are rewarded to users as a 'return on investment'.
- **Auctions:** Users can put their LAST up for adoption and/or bid in auctions for species they wish to collect.
- **Games:** In collaboration with gaming companies, LAST aims to build our token into various games, allowing users to 'grow' their LAST's experience points while engaging in addictive games for good.

Underlying climate finance challenge

Nature Conservation and Climate Change: Climate change has significantly impacted ecological processes – resulting in loss of wildlife and reduced biodiversity. Species in terrestrial, freshwater, and marine ecosystems are changing genetically, physiologically, and phenologically in response to changing conditions. Deforestation also increases the probability and severity of extreme events such as flooding and landslides, further impacting the distribution and population groups of species. It becomes increasingly important to find ways to adapt to the changing circumstances, increase the resilience of ecosystems and biodiversity as well as reduce the severity of such impacts.

Financing nature conservation: An estimated USD 300 – 400 billion is needed annually to preserve healthy terrestrial and marine ecosystems, clean air, fresh water, and biodiversity on which we all depend. However, only USD 52 billion is currently going towards projects supporting conservation. Protecting wildlife and maintaining their natural habitat provides a multitude of clear benefits, but finance for conserving and restoring wildlife has fallen short of the need.

4.2. Innovative Characteristics

Initial Coin Offerings (ICOs) were fuelled by a cryptocurrency gold-rush mentality that caused harm to many individuals, developers, and organisations. Last of Ours is taking a different approach. We are a purpose-driven social enterprise running on a sustainable revenue-based model. We believe that collectibles, gaming, and charitable giving are some of the most compelling use cases for blockchain technology.

We are creating engagement via entertainment, giving users an avenue to passively create impact solely by participating in social experiences and games for good. Last of Ours is an open economy of unique assets which are truly owned by the individual, and portable across social entertainment applications.

By leveraging second-layer technologies, we are giving users a frictionless experience with lower fees and faster speed, allowing them to benefit from decentralisation without knowing they are interacting with the blockchain at all.

The abovementioned gamification of the donation experience in order to empower and mobilise the community of changemakers is another innovative key element of the approach.

We see popular collectible card games (e. g. Disney's Sorcerers of the Magic Kingdom; Magic: The Gathering; Arkham Horror: The Card Game) as indirect competitors. Crypto-collectible projects (CryptoKitties, Gods Unchained, Etheremon, Axie Infinity) as products most similar to ours with a similar target audience. However, we see a potential for cross-collaboration and partnerships with games in the same field. We are building an infrastructure around our game assets such that they can be integrated with other blockchain games. A major differentiator for Last of Ours is that we are one of the first ever blockchain projects to connect a crypto-collectible game to real world impact, giving users an opportunity to fund conservation projects. Our core game assets (LAST non-fungible tokens) are tied to real life species and conservation data. Additionally, donation transparency will be end-to-end, from donor's pockets to last mile conservationists, scientists, and rangers. Unlike most blockchain projects we are a social enterprise with a sustainable revenue model, not another ICO.

4.3. Target Market

Our immediate customers will be gamers and charities. In the long run, they could also include corporations or educational institutions The global games market is expected to grow from USD 137.9 billion in 2018 to more than USD 180.1 billion in 2021. Out of the 2.3 billion active gamers worldwide, 46 % of them are spending money on games. Collectibles are another huge market but difficult to measure as items are often sold peer to peer; one estimate puts the annual sale of toys and comics at USD 15 billion annually. More recently, the first crypto-collectible on the blockchain was launched and generated over USD 25 million in sales within 6 months with one virtual kitty sold for USD 117,712. Virtual collectibles is a brand new sector which has recently been made possible by blockchain technology, unlocking the 'internet of value'. Last of Ours hopes to tap into these markets to funnel donations to support our world's most precious wildlife and natural zones.

Gamer persona

Initially, we expect mainly the *Generation-Y* cohort with an affinity for cryptocurrencies to download our "Minimum Viable Game".

The goal is to create a user experience that is so easy to use and understand that we can target the general public that plays mostly popular and casual games.

As the long-term goal is to become a platform for games, the target customers will depend on the type of each game. One game might be more focused on reaching a younger audience (although it is designed to reach anyone) whereas other games will be more appealing to an older audience.

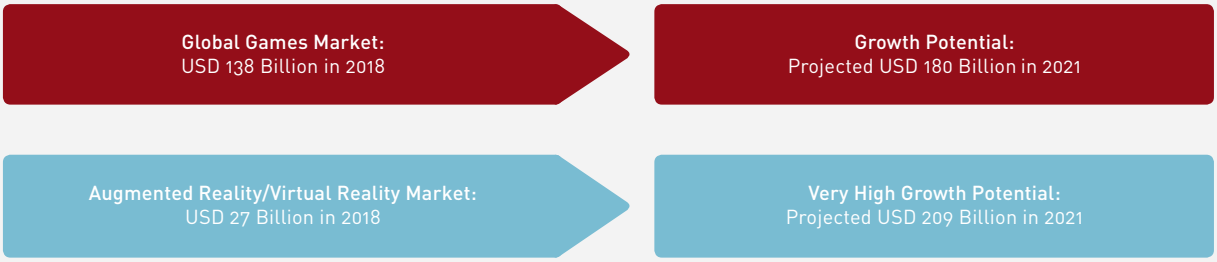
Charity persona

Charities will be grassroots-focused environmental charities that promote preservation, appreciation, and sustainable development for the environment. Besides environmental charities we will also fund wildlife conservation organisations and pet and animal welfare organisations.

We conducted multiple interviews with focus groups to validate that gamers and charities are interested in our product. These include: Helene Marre, Mangroves for the Future (MFF)Programme Assistant, International Union for Conservation of Nature (IUCN); Laura Takenaka, Thailand Country Lead, (NEM); Kyriacos Koupparis, PhD, Technology & Innovation Advisor, United States Agency for International Development (USAID); Pisith Kulkanchanachewin, First Vice President Green Finance Product Development, (Kasikorn Bank); Jeffrey Smith, Vice President Sustainability, (Six Sense); Amornthep Sachamuneewongse, Vice Curator, (Global Shapers Bangkok Hub); Callum Mackenzie, Lead Associate, (Yunus Center at Asian Institute of Technology (AIT)); Elizabeth Song, (Member of Last of Ours Telegram group); Nancy Lynne Gibson, President, (Love Wildlife Foundation); Josh Woodard, Regional ICT & Digital Finance Advisor, (FHI 360).

FIGURE 9

Target market of Last of Ours



4.4. Impact Potential

Last of Ours was created to tackle the imminent issue of climate change and loss of biodiversity. It aims to do so by providing grassroots conservation projects with access to financing from a global market through gaming and entertainment applications in order to enable ecosystems to become more resilient to the impacts of climate change and reduce the severity of respective impacts.

Conservation experts worldwide work to preserve and restore natural habitats that have been negatively affected by climate change and human activity such as unregulated deforestation, urbanisation, and illegal poaching. Grassroots NGOs/charities rely heavily on grants to fund their initiatives, which takes a long time and any grants given may be subject to strict conditions and restrictions. In addition, many charities relying on funding from individual donors often struggle with donor fatigue, where donors either stop or reduce their donations to projects they had been supporting in the past.

In the meantime, we as consumers have easier access than ever before to new content and forms of entertainment, and enjoy an abundance of digital goods and services that are competing for our time, money, and attention. Thanks to technology, the games market is rapidly evolving to accommodate wider audiences and higher quality gameplay.

Every year, thousands of social projects fail due to a lack of funding – leaving vulnerable people, animals, and fragile ecosystems without the support and solutions they need. These problems, wide in scope and diversity, continue to grow at a pace that cannot be matched by resources made available to the social sector.

We will change how charities raise funds for their projects by:

Creating new donations

Most charitable initiatives identify the lack of funding as their number one challenge, which results from the limited nature of donation power. Raising funds through donations today seems to propel competition for the same limited source of funds and much of the success for one organisation comes at the cost of another. We need to come up with innovate solutions that bridge 'consumer spending power' into charitable contributions – allowing people who collect items, play games, and more, to contribute in a seamless manner.

Last of Ours aims to enable wildlife and nature conservation charities to tap into the USD 138 billion games market.

Creating new advocates

Social causes have only been able to attract a niche group of believers, despite billions in investments each year in value-driven projects that raise awareness. For our particular cause, it is even more grim: in the United Nation's (UN) My World 2015 survey which asked almost 10 million people around the world which issues mattered most "Protecting forests, rivers, and oceans" and "Action taken on climate change" both ranked in the bottom 3 of 16 priorities.

On the other hand, in the entertainment industry, The Lion King is the all-time favourite musical (over USD 9 billion in revenue). Our hope is to build upon entertainment successes like these to generate greater interest for wildlife protection and nature conservation. We aim to convert ordinary citizens into advocates for wildlife, starting with greater awareness and connectedness with the animals they hold.

Measuring impact

Our impact would be diverse and specific, as we are raising funds for numerous charities working on specific species and ecosystems. Recipients of funds will each be responsible for declaring their impact metrics, whether this is by greenhouse gas emissions captured, incomes generated for communities, animals rehabilitated, or land area reforested, etc.

The specific impact of each project will be publicly displayed on our website. Users have the ability to assign donations to different projects in two ways; firstly, by assigning where their donations go, and secondly, by voting for a different project to be the recipient of funds for a particular species.

Sustaining and scaling impact

With Last of Ours, conservation initiatives will be given a platform on which to report their milestones, successes, learnings, and further funding needs. This transparency allows donors to realise their impact as well as make informed decisions on the charities towards which they donate.

To preserve the frictionless nature of the value flow from end-user applications (e. g. games), we are implementing an opt-in model where passive users would

still be contributing to charities without participating in the decision making process for where the funds are allocated.

The network effects of social gaming and interactive online experiences will ultimately attract more users to the platform, driving up the demand for LAST tokens, and increase the net funding of charities. Network effects on the donation side can also be leveraged. Users can participate on the donation platform by raising awareness of initiatives they care about on social media platforms, propose that new charities be added to the platform, or actively partake in the decision making process around where the funding pool is distributed to. In return, they will accumulate donation scores which will increase their chances of getting rare in-game items in the future.

The long-term outcome of our products will be:

- Raising awareness of projects among a global audience
- Reducing the time charities need to receive funding
- Being transparent about where donations are going
- Being transparent about what the donations are used for
- Keeping donors in the loop about how their contributions make a difference

4.5. Key Partners & Resources

Conservation NGOs/foundations

They are implementers of the conservation measures. We are starting with Thailand and expanding to a global level later on.

Possible partners

Name	Country
IUCN	Switzerland/Thailand
Love Wildlife Foundation	Thailand
The World Wildlife Fund	Worldwide
Conservation International	Pacific, Asia, America
Wildlife Conservation Society	Thailand
Panthera	USA
Defenders of Wildlife	USA
Royal Society for the Protection of Birds,(RSPB)	International
Wildlife Alliance	Cambodia
International Fund for Animal Welfare	USA
World Society for the Protection of Animals (WSPA)	USA
African Wildlife Foundation	Africa
Animal Welfare Institute	Worldwide
Project AWARE	US, UK, Australia
Marine Megafauna Foundation	USA
Whale and Dolphin Conservation	USA
Sustainable Seas Trust	South Africa
Friends of the Asian Elephant	Thailand
Seub Nakhasathine Foundation	Thailand
Tropical Forest Foundation	Thailand
Wildlife Friends of Thailand	Thailand
Wildlife Fund Thailand under the Royal Patronage of H. M. the Queen	Thailand
Green Fins Thailand	Thailand
Greenpeace Southeast Asia	Thailand

Green World Foundation	Thailand
Plant A Tree Today Foundation	Thailand
Save Elephant Foundation	Thailand
Wild Animal Rescue Foundation of Thailand	Thailand
Bird Life International	Thailand

Organisations we are in active discussions with about our prototype

International Organisations, NGOs & Social Enterprises	Blockchain Projects	Game Companies
IUCN	Ethereum	Decentraland
UN	Rootstock	High Fidelity
Wildaid	Lightning Network	Garena
Freeland	POA Network	
Love Wildlife Foundation	Plasma	
WWF Philippines		

4.6. (Co-)Financing Opportunities

Last of Ours has 6 primary revenue and donation streams, as follows:

Our magic eggs

50 % from Magic Eggs sales will be donated to protect and restore fragile ecosystems. Magic Eggs randomly hatch into different species. This is the primary source of revenue for Last of Ours, receiving 50 % of total sales.

Recurring donations

Users can contribute monthly (donations) to protect the species they have adopted. Donations help grow wild populations and give users a greater chance of receiving the offspring when wild populations grow by increasing 'donation score'. This funds projects that work to protect specific species.

First & LAST auction

Every 1–3 days, we release new species. The first of every species is auctioned to help cover our expenses. The last of every species is auctioned to help a specific charity that is working to help those particular species. One of the species may also be gifted to celebrities, later to be auctioned for their selected charity.

Adoption

Owners can put their LAST up for adoption. Last of Ours charges 2.5 % fee. A variable percentage of bid prices will be donated. Buyers and Sellers who donate more earn 'donation score' that increases their chances of hatching rarer species from eggs.

Corporate packages

Selling eggs in batches to companies (business-to-business (B2B) model) for staff or customer engagement, or special campaigns. Corporations may also donate eggs to various schools to raise awareness and educate kids.

In-game fees

In the long term, when games are developed to use LAST tokens, a portion of transaction fees will be charged, which will raise additional funds for non-profits while users play. The revenue model of these games may enable revenues to come from advertisers, or in-game purchases. In the end, donations are made via a Kickstarter-like platform, with a project for every species, and each charity able to submit their project. Holders of that specific species receive voting rights to choose the project to fund.

Go-to-market strategy

Awareness: Celebrity adoption

We will work with celebrities and influencers to adopt their favourite species, and later, to auction former LAST held by celebrities to users in order to raise funds for charities. This will provide mass media exposure for Last of Ours.

Acquisition: First egg free

In collaboration with various non-profits, schools, universities, and events, we will distribute one egg free to each user. This will introduce thousands of new us-

ers to Last of Ours in a cost-effective but highly attractive way. This programme will be funded by corporate sponsors. Others can simply purchase 'packs' of eggs.

Retention: Wallet & games

Besides collecting LAST, users can grow it, decorate its habitat, and more, all inside the wallet. We will build games that will use LAST as a character in-game. Additionally, by logging in regularly, winning games, and sharing, users can earn 'donation power' which is used to decide which charities receive funds (from 50 % of Magic Eggs sales). We can therefore incentivise desired actions and empower users to decide on donation recipients, while users feel they are earning something (gamification) and donating money (philanthropy).

Referral: Viral loop

By showing off your LAST (sharing) and inviting friends, users also earn 'donation power' which gives them a higher chance of earning rarer animals. Each character has their own referral link/code and raising funds increases their 'alpha score' and gives special statuses e. g. pack leader, benefits, and badges.

4.7. Technical Overview

The token and token functions

Each LAST is a non-fungible token (NFT) with a unique identifier on the Ethereum blockchain. The amount of tokens created upon platform launch and thereafter will depend on the latest population estimates of wildlife species classified as critically endangered (CR), endangered (EN), or vulnerable (VU), giving a one-to-one or one-to-n token to animal relationship. Therefore, each LAST is a digital representation of their real world animal counterparts.

Token ownership is recorded on the blockchain in a transparent manner, and ownership is updated each time a token gets transferred from one Ethereum address to another one. Token owners can utilise these tokens on various social platforms and entertainment applications. For example, they can choose to build a collection of LAST animals where they can seek and obtain different animals either by purchasing "card packs" from the Last of Ours website or participate in activities which gives them a chance of finding more animals. Users can also trade tokens with one another to complement each other's collection.

50 % of the revenue generated from card pack sales as well as transaction fees will go towards the Last of Ours donation platform that distributes funds to various vetted wildlife conservation and habitat protection projects. Each project will be asked to report the utilisation of the funds donated through LAST so that our users can opt to track the impact they have created through their participation on the platform.

The ERC721 (Non-Fungible Token Standard) allows for arbitrary metadata to be associated with each token, giving us an opportunity to give each token a profile and descriptor for the animals they represent. The Last of Ours token can therefore act as educational content to raise awareness about wildlife species, threats, and conservation efforts. For example, users can interact with a Vaquita token in their collection by examining its metadata and learn more about its species – and donate directly to an ocean conservation project using the Last of Ours platform should they wish to.

The application layers

Backend

Ethereum blockchain (Infura, Web3, Solidity), Last of Ours server (NodeJS, MongoDB), endangered wildlife database (IUCN Redlist application programming interface (API))

The Last of Ours token logic (minting, distribution, metadata association, ownership and transaction history) will be stored in smart contracts on the Ethereum blockchain. For our first iteration of the product we plan to utilise population data from the IUCN Redlist database. Over time, we plan to take into account additional endangered species databases and consolidate the data to obtain a more representative sample.

Token metadata will link to the Last of Ours server which contains up-to-date statuses of animals

Frontend

Client-side applications will be available on web (React) and native mobile platforms (React Native). The first application will be a native mobile (iOS, Android) wallet application which can hold ether and display the Last of Ours tokens that a user owns.

APPENDIX I

5 GLOBAL MANGROVE TRUST – A BLOCKCHAIN-BASED CONSERVATION FINANCE INCENTIVE

Hosted by Global Mangrove Trust in PLCF Thailand

5.1. Synopsis of Product Prototype

Underlying climate finance challenge

- Mangroves

  In recent years, mangrove forests have been recognised as not only a highly resilient ecosystem which can physically buffer terrestrial environments against natural disasters and sea level rise, but as a factor making extremely effective positive contribution towards achieving our climate goals. Being situated in a dynamic environment, they protect coastal communities from storms, floods, and soil erosion. Mangroves may be nature's best defence against climate change. They sequester and store CO_2 permanently in the marine realm at much higher rates than dry forests. Oceanic Blue Carbon is responsible for 83 % of global CO_2 sequestration, mostly concentrated along shorelines. Mangrove forest soil alone holds about 2 years of global CO_2 emissions (22 gigatonnes).

- Financing nature conservation

  An estimated USD 400 billion is needed per annum to preserve healthy terrestrial and marine ecosystems, along with the clean air, water and biodiversity on which we depend. However, at this stage only USD 52 billion is currently going towards projects supporting conservation. Despite the facts above, 30 % of mangrove forests have been destroyed in the last two decades. Current funds for mangrove reforestation are insufficient as the current global aid architecture struggles to supply sufficient capital for mangrove forestry. Fees for major carbon registries range from USD 100,000 – 350,000, while project developers and validators charge an additional USD 65,000 – 300,000 for project notes, validations, and verifications. These costs push small-scale projects out of the market and cripple communities' ability to secure funds for land rights, reforestation efforts and livelihood development. Tokenising support for mangrove reforestation can be a way to foster demand for natural capital and increase the speed and scale of mitigation impacts. FIGURE 10

- GMT platform

  A digital platform designed to provide a peer-to-peer architecture that enables households and businesses around the world to undertake direct, transparent, and efficient support for community-based mangrove forest projects.

- Growers

  Users who register on the GMT Platform.

- GMT forest

  The total mangrove forest area sponsored by Global Mangrove Trust (GMT) and the Growers.

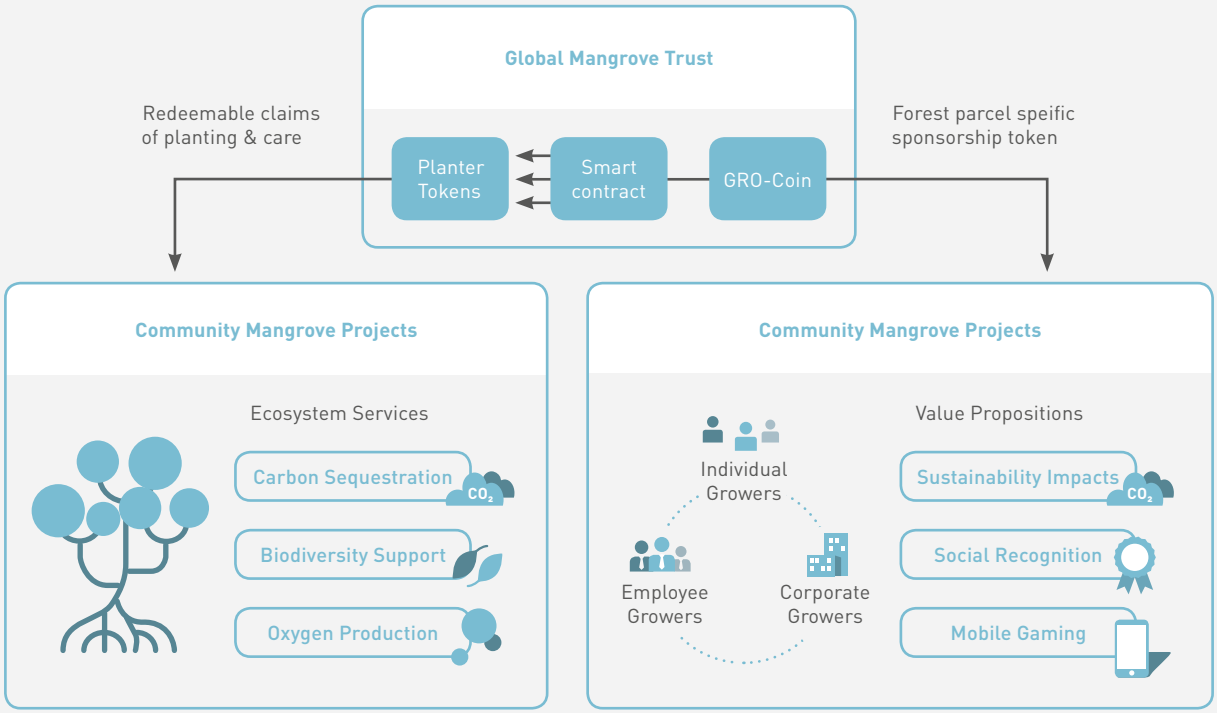
- GRO-coin

  The Global Reforestation Objective (GRO) coin, is a natural-capital backed digital utility token to be deployed on the Ethereum blockchain (ERC-20 Token). The GRO-coin is designed to be a non-speculative token with periodic issuances at a consistent, fixed price. GMT plans to deploy the first issuances of GRO-coin in early 2019.

  The GRO-coin is designed to be geo-intelligent; each token carries a basic level of geospatial data that allows the coin-holder to identify the parcel of forest land her/his coin is sponsoring. Proceeds of GRO-coin sales flow directly and transparently to support nursery development and community mangrove forestry within the GMT Forest.

FIGURE 10

Product design of Global Mangrove Trust



GMT is developing a user interface (UI) with a LOOKUP function that will allow GRO-coin holders to access up to date satellite views of the GMT forest and identify the land area sponsored by their individual coin-holdings. GRO-coin will empower Growers to play a key role in solving the following problems faced by regional mangrove forestry efforts:

- Lack of access to global carbon markets for community-scale mangrove forestry
- Lack of a sustainable commercial business models for communities to invest in mangrove nurseries, hire planting staff, and secure land rights for forestry projects
- Lack of transparent and efficient funding channels linking together international donors and on-the-ground, community-based forestry projects
- Lack of access to the carbon neutrality market for individuals to offset lifestyles

- CBO-tokens

GMT will be collaborating with Singapore University of Technology and Design (SUTD) to build a system for estimating the minimum **C**arbon Sequestration, **B**iodiversity Support, and **O**xygen (CBO) production of the real-world GMT mangrove forest.

Based on these estimates, the GMT platform will generate and distribute CBO-tokens daily to GRO-coin holders. These digital tokens will serve as currency for a series of in-app games to create a fun and social user experience.

- Planter Coin

The non-fungible Planter Coin serves as the 'stake coin' underlying the GMT solution. Like the GRO-coin, the Planter Coin is geo-intelligent. Each Planter Coin maps to a 2-square meter plot of land – detectable from satellite – allowing GMT to make use of Geographic Information System (GIS) mapping/ satellite technologies to verify the mangrove impact. Each Planter Coin will organise community commitments to plant and protect each plot of mangrove forest.

Planter Coin will be issued from GMT to the Nursery Administrator in return for a credible promise to plant and care. The Nursery Administrator receives GRO-coin payments for the community and disburses fiat payments to support the project.

Planter Coin is divided into subunits, which can be shared between the Nursery Administrator(s) (NA(s)), foresters (*optional*) the Community Verifying Agent(s) (CVA), and the landowner with guidance from the GMT "recipe book".

- Data Oracle

  Satellite and on-site monitoring data provide transparency and accountability and activate the smart contracts organising escrow payments from the GRO-coin escrow account to the NA(s) for redemptions of Cash Claims.

- Cash Claims

  Via a process of digitally-assisted verification of impact, Planter Coins are iteratively transformed into Cash Claims. Cash Claims will be redeemable with the NA(s), who act(s) as a community bank. Redemptions of Cash Claims are to be ***verified in-app*** to ensure revolutionary transparency in the real-time transfer of funds.

  For each successful verification of tree survival and growth, the NA(s) will receive payments via an escrow contract attached to each GRO-coin. This enables a seamless and transparent system of verification and reward, while stakeholders receive a durable stream of incentives to care for the forest over time.

- Roles

  Each role has a wallet attached that can receive and return Planter Coins. Planter Coins will be minted for a Cash Claim from the nursery.

- Incentives

  The GMT system supports *both* survival and accuracy of survival accounting to prevent perverse incentives. Verifiers, landowners, and NAs receive bonuses for the accuracy of survival accounting measured by the "closeness" of the machine assisted verifications and the bi-annual ground truthing survival accounting. FIGURE 11

- The Grower model offers a new model,

  whereby the outcomes of the project are transparent and the Growers are able to measure their individual impact on the project, are rewarded for good behaviour and are incentivised to live a philanthropic lifestyle. FIGURE 12

FIGURE 11

Traditional transaction model for donors

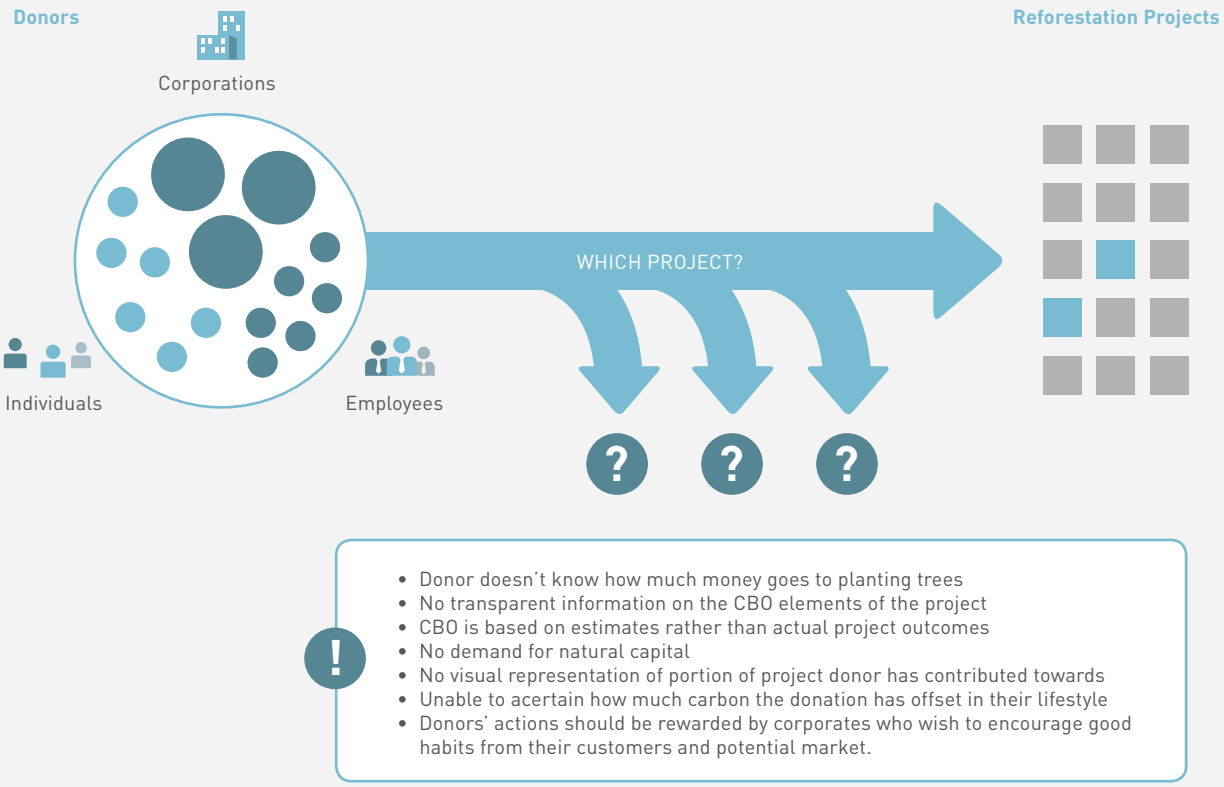
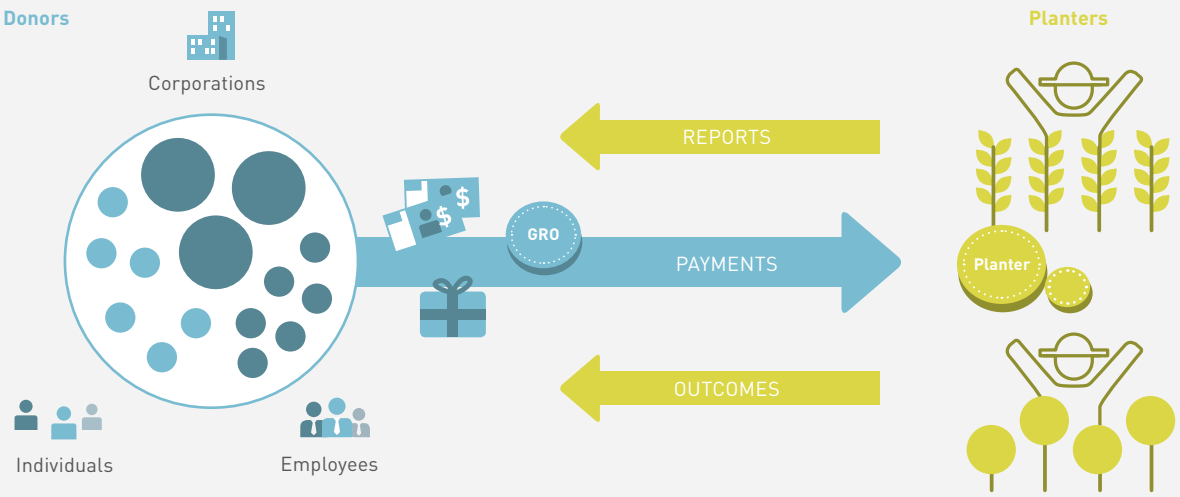


FIGURE 12

Stimulation of new markets through the GRO-coin



5.2. Innovative Characteristics

Blockchain

The suggested blockchain methodology supports a decentralised and non-governmental approach supporting conservation finance. Using cutting-edge technology solutions and blockchain in conservation financing is an innovation that can make funding processes more streamlined, efficient, transparent, and help mobilise new sources of financing.

Research-based mangrove conservation

The mangrove restoration methods pioneered by Worldview International Foundation (WIF) and Pathein University in Ayeyarwaddy are based on three years of intensive applied research in cooperation with the Pathein State Forestry Department, followed by three years test planting with systematic follow-up and research. WIF has reached a record high 86 % survival rate of trees, based on 100 sample plots under constant surveys. WIF has also made pioneering advances in recording biodiversity gains from mangrove restoration, by establishing a mangrove gene bank with 64 species of flora (some on the IUCN list of endangered species), new safe habitat for endangered wild elephants, and the first ocean conservation zone in Myanmar for the protection of endangered dugongs, sea turtles, sea grass meadows, and coral reefs.

Social impact

Our overall focus is to strive for the wellbeing of our global village local communities. This is prominently reflected in the urgent need to mitigate CO_2 to combat climate change, as well as providing maximum benefit to vulnerable coastal communities for protecting the forest. This is our winning formula.

Impact verification

By combining mobile based and satellite technologies, impact on the ground can be verified and corroborated by multiple sources. This will be achieved by combining aerial drones, satellites, distribution ledger technology, artificial intelligence, remote sensing, and citizen science.

Holistic triple bottom line impact

Every tree we plant is for a long life of at least 100 years. In addition, every partner community is involved from the start to secure maximum benefits in livelihoods and sustainable development. Community benefits guarantee safety and long life of the forest.

Incentive system for local communities to plant mangrove trees

Through Planter Coin, communities will be rewarded in planting mangroves using their own land and maintaining trees on an ongoing basis.

5.3. Target Market

Community Mangrove Projects (CMPs)

CMPs will be invited to submit proposals to GMT for a forestry contract. GMT will review proposals for preliminary funding for approval by GMT's Advisory Board. On approval, nurseries may register as a CMP and upload community documents to the GMT website and public register.

Each CMP establishes at least one NA to organise Planter Coin wallets with stakeholders and coordinate redemptions of Cash Claims.

The NA(s) receives initial cash payments via bank transfer for the nursery set-up. This process of initial funding creates an opportunity to partner with a microcredit operation, bank or NGO to advance small start-up loans against GRO-coin payments.

How to become a CMP – set up process:

STEP 1:

Upon GMT approval, CMPs register with GMT, identify their NA(s), and upload community documents to the GMT website for posting in a public register.

STEP 2:

The CMP, with the support of GMT, finalises land area for inclusion in the GMT Forest. Based on maps, GMT issues Planter Coins to the NA for the functions central to the operation of replanting, restoration and monitoring of land suitable for mangrove reforestation.

STEP 3:

GMT issues GRO-coins onto the GMT platform to raise funds to support the expansion of the GMT forest via the inclusion of the new CMP. Each GRO-coin has a unique identifier linking it to a specific set of Planter Coins in the CMP. Funds from the GRO-coin issuance are held in an escrow wallet in the GMT master wallet.

Based on the initial sales volume of the new GRO-coin issuance, GMT disburses a set-up payment to the NA in fiat currency. The NA retires an initial portion of Planter Coins to GMT in exchange for this disbursement.

STEP 4:

Once seedlings are large enough to transplant and land has been prepared, Foresters plant to expand the GMT Forest. Escrow payment outbound to the NAs on Proof of Planting to support redemptions of Cash Claims.

STEP 5:

CVAs verify survival via app at point of impact (human output) to complete a geocoded survival accounting. Data oracle confirms proof of care, and escrow payment outbound to the Nursery Administers on Proof of Planting to support redemptions of Cash Claims.

STEP 6:

CVAs ground truth the GMT Forest on a biannual basis to confirm Proof of Care. Escrow payment outbound to the Nursery Administers on Proof of Planting to support redemptions of Cash Claims.

STEP 7:

Using Data Oracle, in-app surveying, and the use of interactive mapping, remote sensing and artificial intelligence (AI) technologies, GMT updates CBO outputs on a continual, rolling basis.

Grower platform

Mangrove is the platform on which global sponsors of mangrove forestry can interact socially, cooperatively, and competitively to enrich their collective experience as peer-to-peer philanthropists. It forms the core of GMT's software development efforts and will draw on the SUTD capstone for design and development of key portions of its middle-office and data integration and manipulation capabilities.

The front office of the platform serves GRO-coin holders with essential functions ranging from the organisation of user accounts and reward tokens to the display of sponsored mangrove forests.

The mid office provides data integration and management capabilities for interacting with the selected blockchain (GRO-chain) and calculating and distributing reward tokens to GRO-coin holders (sponsors).

The back office captures real time data from CMPs and distributes escrow payments on verified proof-of-planting planter forest and proof-of-care. Back office monitors and reports data on survival account (verifier results) and redemption confirmations from the nursery administrator.

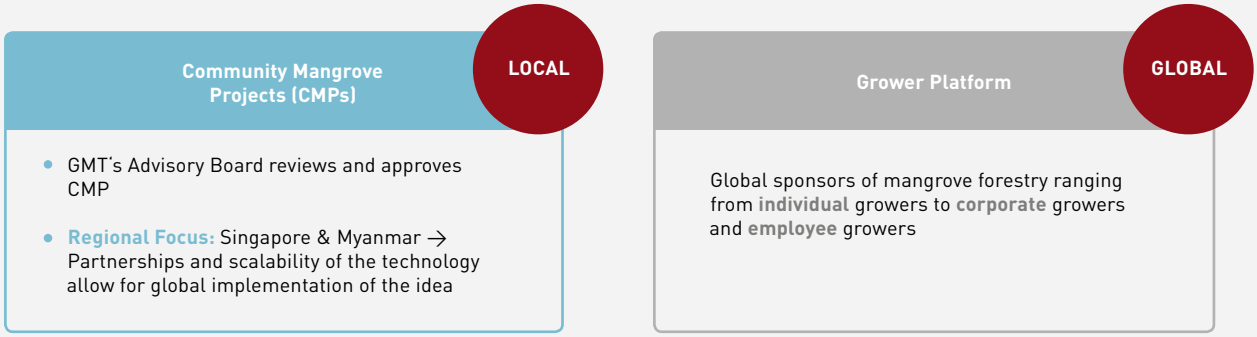
Buyers of the coins – Suppliers of Finance

Engage different financers as buyers of the coin to support restoration measures:

- International donors supporting local conservation measures
- National governments supporting local conservation measures
- Foundations and philanthropies supporting local conservation measures
- Individuals interested in mangrove restoration

FIGURE 13

Target market of Global Mangrove Trust



5.4. Impact Potential

Climate impacts of mangrove forestry

- Mitigating up to 5 times more CO_2 than terrestrial trees
- Storing CO_2 permanently in the ground
- Protecting lives and properties from cyclones
- Improving climate with more rain
- Reducing danger of coastal erosion due to sea level rise
- Maximising cost efficiency against global warming
- Cleaning run-offs and water pollution for sea grass and coral reefs
- Deters land clearing for unsustainable activities e. g. charcoal harvesting or shrimp farming

Ecosystem services

- Exceptional high carbon stocks with mitigation capacity up to 5 times higher than terrestrial trees
- Protecting lives and properties from cyclones and other extreme weather
- High production of oxygen and other life bearing services
- Cleaning run offs from floods to protect sea grass meadows and coral reefs
- Prevents erosion of shorelines due to sea level rise
- Cooling air equal to 3 room sized air-conditioners
- Securing bio diversity, medicinal plants, flowering trees for bee honey production and fruit
- Provide communities with livelihoods and sustainable development
- Produce moisture for clouds and rain
- Linking coastal habitats to terrestrial habitats to buffer against sea level rise

Disaster prevention

- Mangroves protect lives and properties from cyclones and other extreme weather
- Protect shorelines from erosion due to sea level rise
- Protect rice crops on neighbouring land from sea water and salt water inundation caused by typhoons
- The platform can offer growers insurance for the life of the forest

Food security

- Mangroves increase sea food resources with up to 50 %
- Produce fruit and facilitate for salicornia salt water soy beans and flax seed production
- Produce high quality honey
- Protect rice crops on neighbouring land from sea water and salt water inundation caused by typhoons

Livelihood creation

- Reforestation projects provide employment opportunities for both men and women
- Projects provide scholarships for local children and youth in communities
- Mangroves produce natural medicine in support of livelihoods
- Provides natural colours for textile dyeing and cottage industry cloth production
- Sea weed, oyster and clams production for sustainable income generation
- Deters land clearing for unsustainable activities e. g. charcoal harvesting or shrimp farming

Poverty reduction

- Mangrove forests mitigate CO_2 for carbon trading with long-term income to communities
- Provides new opportunities in sustainable job creation.
- Ideal environment for mangrove eco-tourism

5.5. Key Partners & Resources

Global Mangrove Trust: Global Mangrove Trust is a non-profit organisation based in Singapore, led by a team of multidisciplinary innovators, educators, and environmentalists; and supported by an advisory.

Key Partners

U Aye Lwin

Chairman Worldview International Foundation and Former Director General of Association of Southeast Asian Nations (ASEAN) Yangon, Myanmar

WIF

Worldview International Foundation (WIF) works with local communities to reforest and conserve mangroves in Myanmar and across the Bay of Bengal. GMT works in a strong partnership with Worldview International Foundation (www.wif.care), a non-government organisation based in Yangon working with local communities to reforest mangroves. Worldview has successfully restored large tracts of degraded mangrove forests in the Ayeyarwaddy Delta region of Pathein state since 2012. As of January 2018, Worldview has planted over 3.4 million mangrove trees. Having developed best-in-class techniques for community-based mangrove forestry, Worldview is working to scale their operations to Yangon city, where 22,000 hectares are being allocated for government land grants, and across the Bay of Bengal into Sri Lanka, Bangladesh, and the Indian state of Andhra Pradesh.

CMCN

China Mangrove Conservation Network (CMCN) is dedicated to establish a platform with integrative and open resources, and cooperate with governments, corporations and other civic powers to promote prosperity of Chinese coastal wetlands, especially mangrove ecosystems.

SUPKids

SUPKids is an educational entity which teaches children education programmes in marine environments whilst stand up paddling (SUP). The programmes have been developed for kids age 5 – 12 to teach them about water safety & environmental education. The programme is run in an inclusive, non-competitive environment with a focus on building self-esteem. They use games, drills & SUP activities to ensure that the SUPKids walk away with vital water safety skills that will stay with them for life.

Gen Blue

Generation Blue is building an innovation platform to be nature's pioneering investment bank that connects eco-heroes to capital markets.

Singapore University of Technology and Design

The **SUTD** have partnered with GMT to set up a Capstone programme as a multi-discipline, senior-year design team based project undertaken by undergraduate students ("the student team"). The integrative Capstone projects aim to give students a holistic design experience by working on real-world challenges. In addition, the Capstone project must fulfil university-learning objectives.

5.6. (Co-) Financing Opportunities

Sembcorp

Sembcorp is receiving cutting edge executive training focused on emerging leadership patterns in corporate sustainability and the promise of blue carbon and mangrove reforestation to lead the fight against global climate change. The exact contents of the workshop will be discussed in advance with the Sembcorp Corporate Social Responsibility team to ensure alignment with the organisation's stated and emerging goals and objectives.

Programme Lead, Clean Energy Programme at Apple

Apple is investing an undisclosed amount to protect and restore mangroves in a 27,000-acre forest. By investing, [Apple] opened the door for others to also think about blue carbon as a viable way to sequester carbon and reduce emissions globally.

5.7. Challenges in Implementation

Periodic resupply of coins lead to volatile value of care tokens

The care tokens will be issued quarterly based on the number of planted mangrove trees. The additional regular supply of mangrove trees will lead to volatility in the market at the moment of provision.

Community engagement and awareness

It will take time to explain the concept of the GRO-coin to the communities and landowners.

Dispute resolution and species calibration:

Based on the local circumstances and lessons learned, different mangrove species will be planted. This difference needs to be taken into account when issuing a Planter Coin.

Protocol frameworks will need to be established to address issues regarding identity, key management, organisational management, and arbitration (in the case of disputes regarding escrow payments for instance). Where possible, we will leverage efforts by existing projects in these spaces such as Sovrin for identity and key management or Aragon for arbitration.

APPENDIX I

6 SMART-IRRIGATION-AS-A-SERVICE FINANCING VEHICLE

Hosted by UNFCCC RCC Bangkok / IGES in PLCF Thailand

6.1. Synopsis of Product Prototype

The prototype of a *Smart-Irrigation-as-a-Service Financing Vehicle* in Thailand directs deal flow to climate-smart irrigation systems to improve productivity and climate adaptation capacities of small-scale agri-businesses. Investment in irrigation systems reduces the dependency of smallholders on unpredictable and less climate-resilient, rain-fed production or pipe irrigation while significantly increasing crop yields and commercialisation potential.

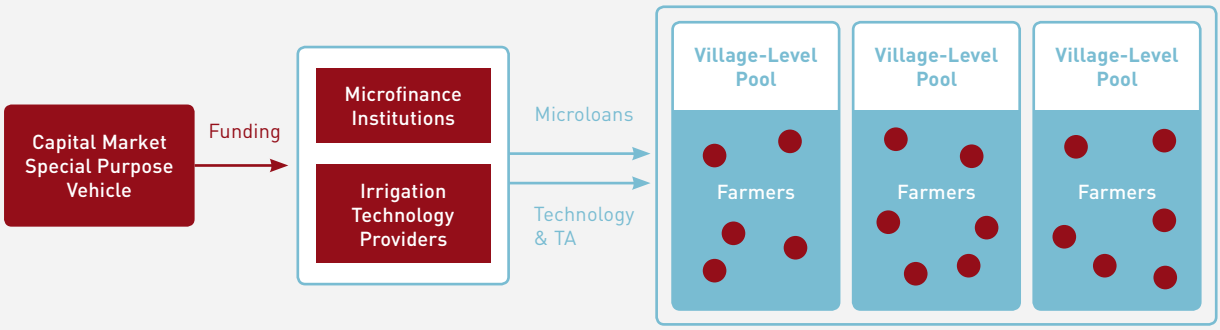
This innovative product offers microfinancing solutions to mitigate investment risks in agricultural process improvements for both farmers and financial institutions. MFIs will leverage funding from a capital market special purpose vehicle to provide financing to agri-SMEs through microloans. The capital market special purpose vehicle could include a first loss default guarantee for the MFIs mitigating their investment risks. A first loss default guarantee covers part of the first tranche of losses, e. g. 100 % of losses up to a value of 10 % of the portfolio as a whole. A 'second loss' guarantee would cover a second tranche of losses, e. g. 90 % of losses between 10 % and 20 % of the portfolio.

The MFIs will work in conjunction with irrigation technology providers which will provide the technology and technical assistance to agri-SMEs. This will facilitate an effective and efficient implementation of the smart irrigation systems and a long-term sustainable impact. Agri-SMEs will be pooled together on a village-level to implement the financing vehicle on a larger scale. FIGURE 14

It is estimated that the needs of these individual agri-SMEs are between USD 1000 and USD 5000 in short-term capital to enable smallholder farmers to adopt climate-smart practices. Through a combination of increased access to capital and technical assistance, the solution will seek to improve farmer productivity through drip irrigation systems while also supporting diversification and changes to agricultural cycles.

FIGURE 14

Product design of Smart-Irrigation-as-a-Service Financing Vehicle



6.2. Innovative Characteristics

The Smart-Irrigation-as-a-Service Financing Vehicle is equipped to improve market penetration of smart irrigation in Thailand through its following characteristics:

Offers an all-in-one solution for small-scale agribusinesses

Partnering with both MFIs and technology providers, the model allows small-scale agribusinesses to finance smart-irrigation technologies through microloans and receive technical assistance by technology providers. Funding is provided by a First-Loss Default Guarantee Fund that pools funds for 10 MFIs.

Provides smart-irrigation as a service

The smart-irrigation technology is offered as a service as you go instead of buying investment-heavy equipment upfront. This overcomes the main risks for agribusinesses in taking up smart-irrigation. Climate-smart agriculture solutions are bundled with other agro-inputs like water tanks, crop nutrients or seeds/seedlings.

Aggregates smallholder farmers at village level

Microloans are provided to farmer organisations at the village level. Implementation of these large-level schemes allows for a high climate-smart impact through the large-scale smart-use of water and arable land.

6.3. Target Market

The *Smart-Irrigation-as-a-Service Financing Vehicle* will connect small-scale agribusinesses with MFIs and irrigation technology providers.

Small-scale agribusinesses

The agri-SMEs will be aggregated at village level to reach the minimum size to implement a drip-irrigation system. The minimum size is about 500 hectares. Agri-SMEs across ASEAN countries will be targeted starting with agri-SMEs in Cambodia, Myanmar and Thailand.

Microfinance institutions

10 MFIs will be financed by a Capital Market special purpose vehicle (SPV) and supported with technical assistance by technology providers. Thereby, the SPV incentivises MFIs to focus more on green investments.

Capital market SPV

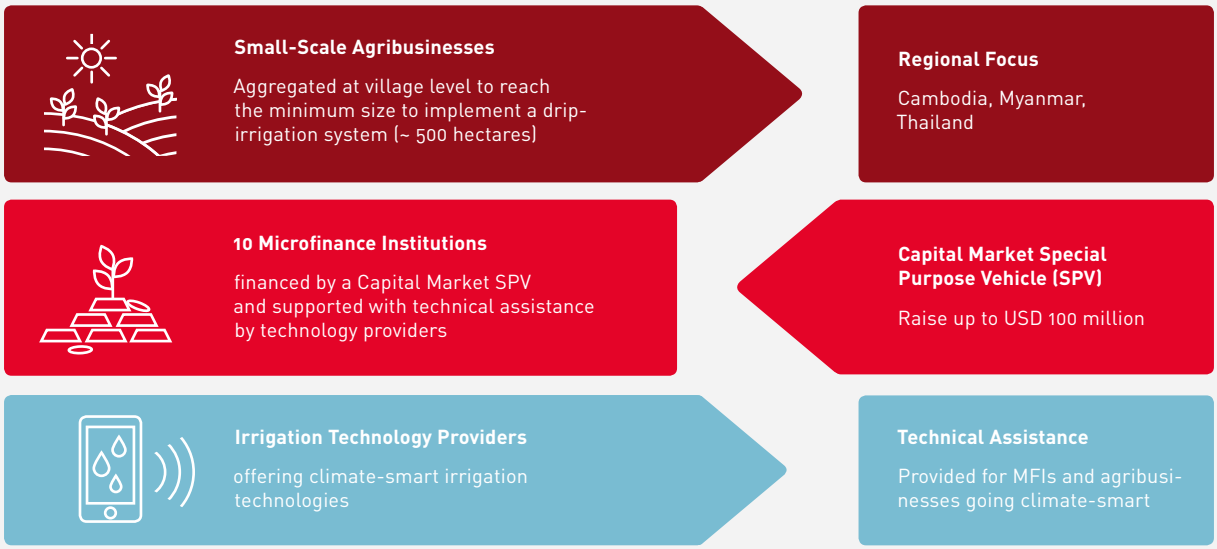
The capital market SPV will raise up to USD 100 million.

Irrigation technology providers

The irrigation technology providers will offer climate-smart irrigation technologies and provide technical assistance for MFIs and agribusinesses to go climate-smart. The pay-as-you-go cost of the smart-irrigation technology would be approximately USD 50 per month per smallholder farmer. FIGURE 15

FIGURE 15

Target market of Smart-Irrigation-as-a-Service Financing Vehicle



6.4. Impact Potential

The *Smart-Irrigation-as-a-Service Financing Vehicle* will leverage partnerships on the levels of MFIs and smart-irrigation technology providers to boost climate-smart impact.

Facilitates finance provision towards smallholder farmers going climate-smart

The prototype bridges the gap for smallholders to access climate-smart agriculture technologies and finance. Specifically, the pay-as-you-go mechanism mitigates the need for high-upfront investment for smallholder farmers and the SPV umbrella provides liquidity for financing institutions wishing to participate in the scheme.

Access to finance for smallholder farmers

- Farmers gain access to finance / get included in the financial system

Increased resilience & climate change mitigation

The vehicle facilitates adoption of climate-smart technologies, moving away from flood irrigation towards smart land use, water-use efficiency, and crop diversification. This also leads to a higher quality of products with increased commercialisation and export potential.

Smart land use

- Improved farm output per unit, increase in yields and farmer incomes
- Enhanced resilience to droughts, pests, and diseases

Water-use efficiency

- Reduced farm water losses
- Reduction in irrigation water demand

Increasing volume of export products

- Farmers have increased quality of products
- Enhances volume of crops sold to foreign markets

Technical Assistance for MFIs and smallholders

The prototype enables knowledge transfer between technology providers, MFIs and smallholder farmers towards product and financial scheme adaptation

Adaptation of climate-smart agriculture practices by smallholder farmers

- Scalability/outreach to more smallholders
- Hectares of land under climate-smart practices
- Farmers trained

6.5. Key Partners & Resources

Netafim

Netafim is one of the world's largest drip irrigation equipment providers offering affordable, state-of-the-art drip irrigation systems for 250 square meter, 500 square meter, and one-acre models for smallholder farmers. Its products provide an all-in-one solution that includes the turbulent flow drip system, a water tank, crop nutrients, crop protection products, sprayers, seeds/seedlings, installation, training, and after-care customer support. The Netafim system uses a low volume drip-irrigation technology that is effective for all types of crops, suitable for small plots, and has been shown to more than double yearly farmer income.

Distributor/vendors: The distributor will be primarily responsible for distributing the irrigation systems and delivering technical assistance to smallholders. The distributor will focus on building community outreach through organisations already involved with smallholders.

The provider of the microfinance product

The financing product aims to increase Thai smallholder farmers' access to drip irrigation systems by providing the systems a financial service package. Potential options could be Bank for Agriculture and Agricultural Cooperatives (BAAC) or innovative Fintech companies like Ricult.

The guarantee fund providers

Through the provision of the guarantees, local financial institutions will be able to insure their risks with the smallholder product portfolios. Potential guarantee providers could be Bank of Thailand, Ministry of Agriculture, and Ministry of Finance.

Providers of technical assistance for smallholder farmers

To support the implementation of the drip-irrigation systems and the financial management capacity of the loan receivers some additional technical assistance might be needed. Potential partners might include: Thai Banker Association, FAO, UN, World Bank, Sustainable Rice Platform, Rice Exporters Association, and BAAC.

6.6. Challenges in Implementation

Competition

Higher costs than current equipment for farmers. Available offer of other irrigation products below the price point, although with less service provided.

Critical mass of smallholder farmers

Size of plot to implement the drip irrigation systems is at a minimum size of 500 hectares. It is therefore critical to engage a pool of smallholder farmers using a contract farming model. It is then important to get community consensus so they plant the same crops at the plots.

Capabilities of smallholder farmers

Farmers often do not have the necessary knowledge to run drip irrigation systems, they also lack the experience and record-tracking skills in working with microloans.

Incentives

MFIs and irrigation technology providers need to be incentivised to work with smallholder farmers.

6.7. Market Analysis for Smart Irrigation

Overview of challenges in Thailand

Climate change adaptation

Climate change has had a significant impact on Thailand, including higher temperatures and variability in precipitation – shorter, more intense wet seasons, and longer, warmer dry seasons. Key determinants such as the amount and intensity of rainfall, and the rate of evaporation, affect surface water flow and water availability. In Thailand, this has translated into greater frequency and intensity of flooding during the wet season and extended drought periods during the dry season. This context creates great challenges for effective water management.

Climate-smart agriculture

Agriculture is one of the key sectors in the country's economic and social development and is also the source of raw materials for various downstream industries. Thesector is mostly comprised of small-scale farmers and accounts for approximately 10 % of GDP (CIA World Factbook), but is one of the country's largest consumers of fresh water. Agriculture is one of the sectors most vulnerable to climate change. The droughts in 2015 and 2016 affected hundreds of thousands of people and forced the Government of Thailand to spend huge amounts on farmers in the form of soft loans to mitigate the impact of the water shortage on the agricultural sector.

Financing climate-smart agri-SMEs

Agri-SMEs in Thailand have difficulties in securing commercial financing because the financial institutions that service this sector do not offer products tailored to the needs of agricultural producers experimenting in order to allow adopting new innovative technologies or expanding their operations.

Reducing water use

At present, Thailand consumes the largest parts of its fresh water for agricultural activities. Improved water efficiency is needed to better respond to climate change – to prepare for times of drought and to ensure more efficient use of water resources.

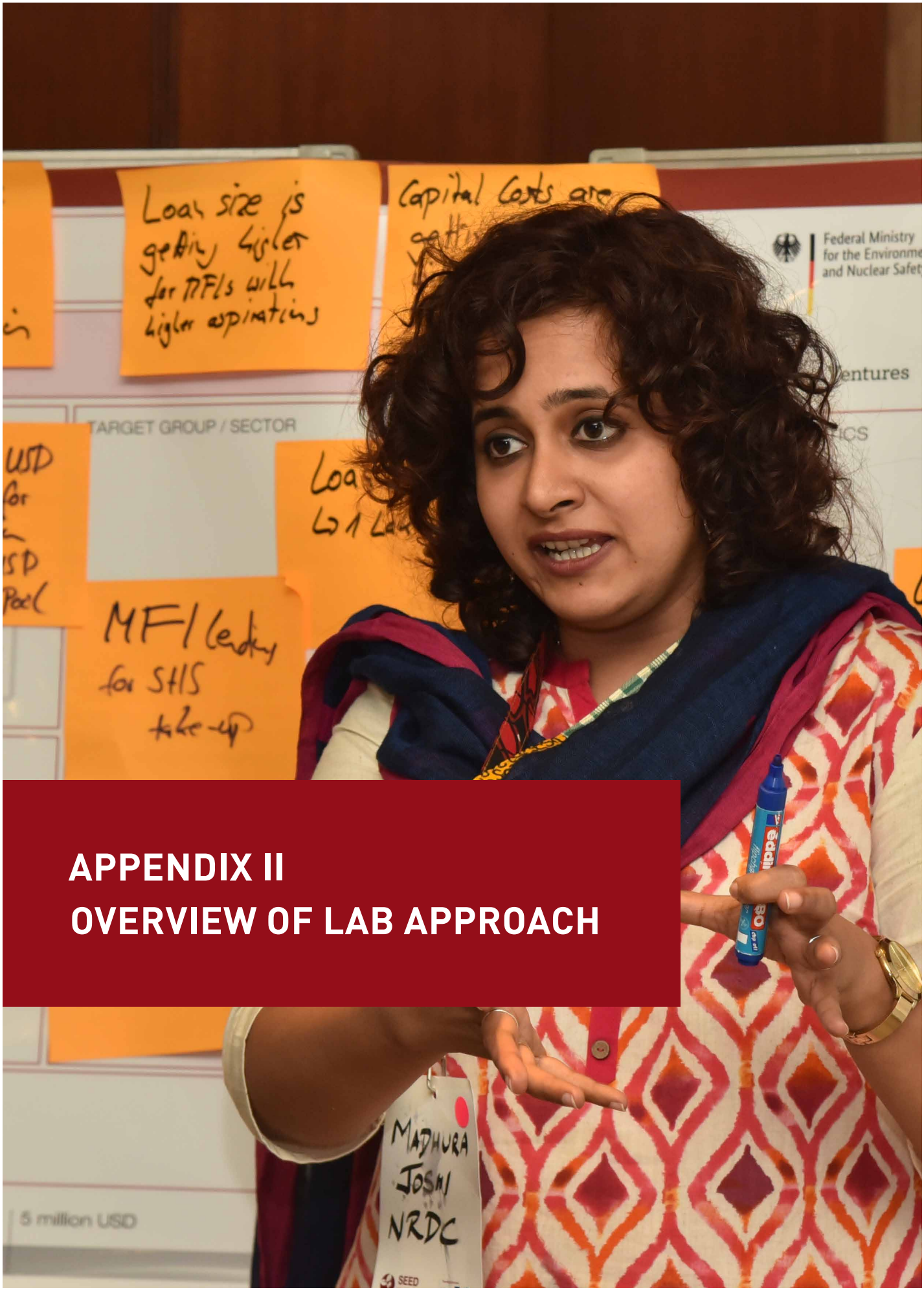
By providing smallholder farmers with drip-irrigation systems and innovative financing all of these challenges will be addressed.

Financial market in Thailand

In terms of its financial sector, Thailand has a strong, developed, commercial banking sector that puts little focus on microfinance. The large commercial and industrial sectors are a much more profitable market for the banks.

The political process in Thailand strongly supports the financial needs of the poor, the rural population, farmers and those who live outside Bangkok. This emerges both from cultural values and a political system in which politicians often promote greater access to low-cost credit for their constituents. Consequently, formal government mechanisms have generally dominated provision of financial services to the poorer parts of the country. This has been done through large and influential government banks (specialised financial institutions – Specialised Financial Institutions (SFIs) like BAAC in agricultural finance) and the Village Fund, a 2001 government-initiated programme that provides rotating credit to villagers.

While some SFIs offer the same deposit-taking and loan products as the commercial banks, these subsidised and closely controlled government banks are generally considered a policy vehicle to bring economic and social benefit to villagers through loan, savings, and insurance programmes etc. SFIs have a greater presence than commercial banks in rural and remote areas. Village Funds penetrate further into rural areas than both commercial banks and SFIs and bring microfinance services in the form of loans to the lower income population. NGOs also play a role in promoting financial services to the poor but they are very small in scale compared to the government's own activities and play a very limited role relative to NGOs in other countries.



APPENDIX II
OVERVIEW OF LAB APPROACH

Who participates?

Participants come from a wide set of organisations such as microfinance institutions, commercial banks, development finance institutions, impact investors & philanthropic institutions, NGOs, corporate social investors, venture capital & angel investors, and government authorities.

There are different levels of how participants engage in the Labs:

1. Challenge Hosts

   Each Lab has 3–4 parallel thematic streams facilitated by designated Challenge Hosts. Out of these, there have been one or two dedicated adaptation streams in each Lab of the 2018 cycle. The adaptation streams were jointly facilitated and moderated by an adelphi focal point from the finance stream in the adaptation component of the SPA project and a designated Challenge Host. The Challenge Host and adelphi focal point guided the groups throughout the process and provided the overall structure, framing the group-specific challenges throughout the discussion together. In preparation for the actual Labs, the Challenge Hosts and the adelphi focal point have jointly identified and defined one country-specific challenge per Lab.

2. Prototype Developers & Advisors

   Each group has developed at least one prototype throughout the process. Some group participants have taken a stronger lead or co-lead for the development of a specific prototype as Prototype Developers. The remaining participants of the group acted as Advisors. Their role was to ask questions, provide initial ideas, and provide feedback to refine and advance the prototypes.

How does it work?

The Lab process consists of four major phases that build the basis for desirable wider long-term changes in the respective sectors or organisations. These phases are spread across two on-site Labs per country as well as webinars and online meetings between the two Lab events. FIGURE 16

In the **first phase**, participants work on identifying key challenges for their sector which acts as a starting point for the Lab process. This builds on a mapping exercise of the landscape of country-specific sector challenges and further key actors with a potential interest in developing solutions.

In the **second phase**, the actual lab process starts with gathering feedback and lessons from other lab participants that are sharing similar challenges. This feeds into the joint creation of actual prototype innovations based on the initial challenges identified. During the development process, prototype ideas are constantly refined based on the insights and input from peers in the specific working group and the lab as a whole.

The **third phase** focuses on the refinement of prototype innovations at the organisational or sector level. As refinement can happen individually or in partnership with other participants and organisations, exploring collaborations and partnership opportunities for the implementation through exchanges within or across working groups is a crucial part of this phase. As in the previous phase, continuous refinement of prototypes along the way of the implementation through additional feedback from the working groups remains an integral part of the process.

In the **fourth and final phase**, we prepare the scale-up of the prototypes and showcase initial results of prototype implementation. The participants share

FIGURE 16

Phases of the Lab process

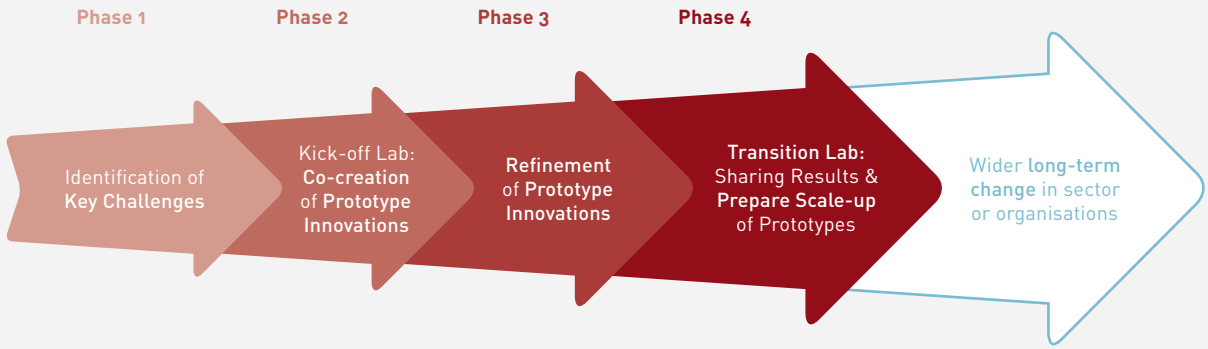
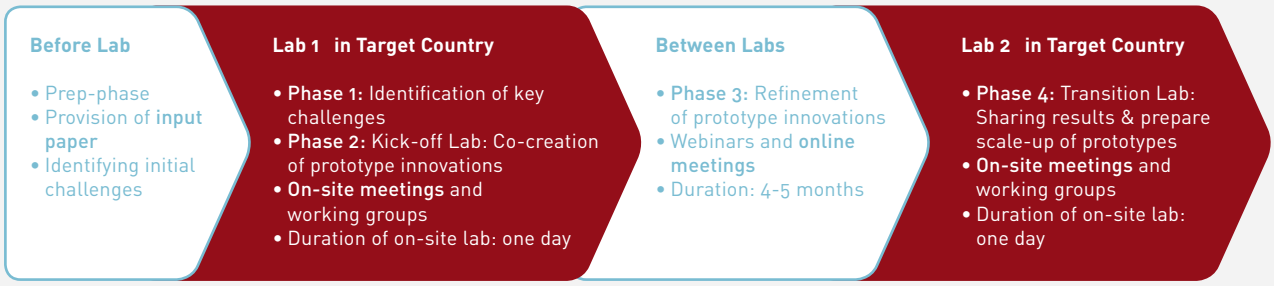


FIGURE 17

Detailed Lab cycle



success stories and lessons learned from the implementation with peers and sector stakeholders to provide concrete evidence on how the initially identified challenges can be tackled. The aim of this step is to build the groundwork for the scale-up of the prototype within the organisation, the partnership or the sector.

FIGURE 17

To ensure that developed solutions are sufficiently specific, the overall group of lab participants establishes smaller working groups on the identified challenges of five to ten participants each. The working groups offer an open learning space setting and allow members to test, present, and refine their individual prototypes as well as to reflect on the learning process and share best practices among its peers. A combination of different meeting settings is used. On-site face-to-face meetings are used to support the building of networks, create a platform of trust and inspiration, identify collaboration opportunities, align agendas, and reflect on joint action plans. Webinars and online meetings accompany the knowledge exchange and peer-learning process by creating a structure and learning mechanism closely aligned with the face-to-face meetings.

Initial challenges and prototype ideas

Initial adaptation finance challenges have been jointly identified in the preparation of the lab by the selected Challenge Host and the adelphi focal point for the lab. The challenges have been further defined and disaggregated into specific key sub-challenges by the working group participants at the beginning of the lab. Challenges are country-specific and build the basis for the prototype solutions that have been developed in the subsequent steps. Each challenge represents an issue explaining the lack of financing for climate change adaptation in a particular context. In the following, we present the initial challenges for adaptation finance that had been identified before the Labs.

Uganda

1. Microinsurance delivery through weather indexing
   hosted by FSD Uganda
   - Microinsurance for crops and harvest losses could play an important role in making farmers more climate-resilient
   - High costs of insurance claims processing and verification for small holder farmers
   - Mobile phones not yet leveraged for insurance pay-outs and premium payments
   - Can automation improve adoption of insurance?
2. Climate resilient agriculture through financing irrigation systems
   hosted by Swisscontact
   - High costs of irrigation equipment, especially for smallholder farmers
   - Lack of accessible financing mechanisms, suitable for financing climate resilience
   - Lack of linkages between financial institutions and input suppliers
   - Limited distribution channels for irrigation equipment
   - Limited knowledge and information on irrigation farming (its value added) in the financial sector

India

1. Mainstreaming green and adaptation finance in commercial banking
   hosted by TARA (combines adaptation and mitigation)
   - Lack of blended instruments that reduce the cost and risk for green enterprises
   - Lack of information on including climate risks in risk assessments and climate-proofing of portfolios
   - Lack of frameworks and parameters to assess performance of green enterprises
   - Lack of capabilities in assessing green enterprise projects

Thailand

1. Conservation finance and blockchain
   hosted by KXmade and Global Mangrove Trust
   - Mismatched investment in mangrove restoration
   - Unclear distribution of responsibilities of conservation issues at community level
   - Financing only available for the most profitable species which lead to monoculture
   - Unclear/inaccurate data leads to unusable information
2. Irrigation financing through green bonds
   hosted by UNFCCC RCC Bangkok
   - Difficulties in meeting green bond requirements
   - Difficulties in accessing global capital markets

Based on the initial challenges, prototype drafts have been developed during the Kick-off Labs by the Lab participants in a full day creative process. These initial drafts were further refined over the 4–5 months in the follow-up phase as well as finalised and showcased in the Transition Labs in November 2018. For some of the prototype ideas there already was a clear plan for how they can be driven beyond concept phase and various businesses, organisations, and donors have mentioned that they are interested in potentially implementing, funding or supporting such pilots. Strengthening these partnerships and engaging further partners for the off-take and scale-up phase was a key priority for the months between the Kick-off Lab and the Transition Lab.

Review of Completed Lab Cycle

Based on the methodology presented above we conducted the Kick-off Labs in all three countries between June and July 2018 and the Transition Labs in November 2018. The specific dates were:

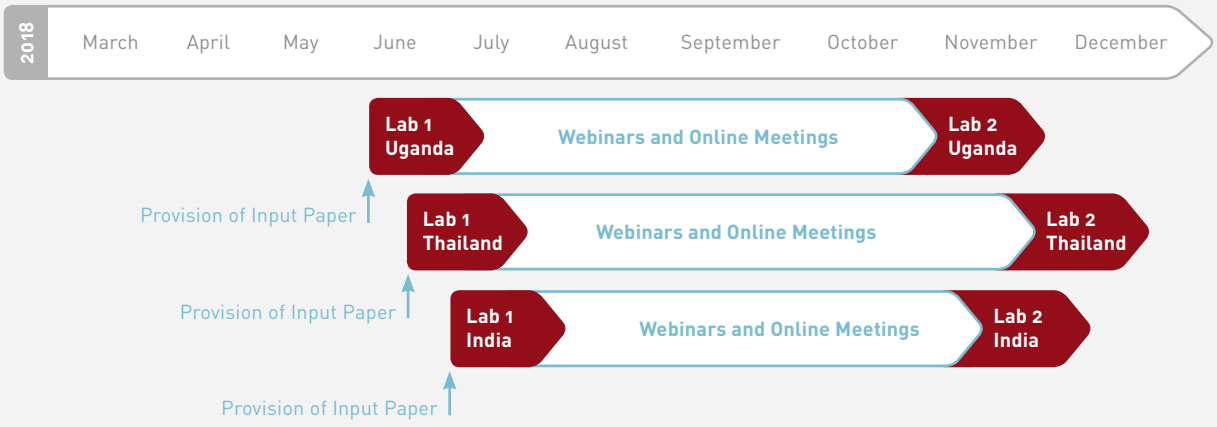
Uganda
- Kick-off Lab 19 June 2018
- Transition Lab 13 November 2018

India
- Kick-off Lab 3 July 2018
- Transition Lab 20 November 2018

Thailand
- Kick-off Lab 29 June 2018
- Transition Lab 29 November 2018

FIGURE 18

Timeline of the Lab cycle 2018



In each of the completed Labs the Lab team gathered between 40 and 60 participants in the Kick-off Lab. Throughout the subsequent refinement phase and in the Transition Labs, smaller and more focused core groups evolved out of the larger groups, drove the creative process and took stronger leadership roles in the prototype development process. This enabled those players with a real interest and stake in the respective models to work in a more practice-oriented and nuanced manner and properly prepare the roll-out of the instruments. The involvement of the remaining participants from the larger group increasingly focused on providing feedback and supporting the process through questioning the models, giving feedback, and providing additional inputs.

In line with the approach of focusing on models and instruments that really matter to the organisations involved in the working groups, we observed changes in the compositions of the core groups and leadership roles. For instance, one group in Thailand that worked on a conservation financing challenge split up in the Kick-off Lab to develop two different instruments, whereas in other groups some organisations decided to join the initial Challenge Hosts in order to share the group leadership with them.

Based on the initial five challenges presented above, the participating Challenge Hosts and working groups developed a total of six adaptation-specific prototypes throughout the Kick-off and Transition Labs in Uganda, Thailand and India:

Uganda

1. Mobile-Enabled Microinsurance
   hosted by FSD Uganda
2. Irrigation System Microleasing for High-Value Crops
   hosted by Swisscontact

India

3. Green MSME Finance Tool
   hosted by TARA and Grameen Capital

Thailand

4. Last of Ours – Blockchain-based Conservation Fund
   hosted by KXmade
5. Global Mangrove Trust – A Blockchain-based Conservation Finance Incentive
   hosted by Global Mangrove Trust
6. Smart-Irrigation-as-a-Service Financing Vehicle
   hosted by UNFCCC RCC Bangkok/IGES

Despite a standardised methodological approach in all three countries and across all working groups, including a dedicated roll-out roadmap development process, the pace, progress made, and level of actual implementation/roll-out of the developed instruments differs significantly. Even though it will take much more time to see which models have the potential to really make an impact and properly go to market, some of the developed approaches have already created traction (e.g. *Last of Ours* in Thailand).


SEED
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for sustainable development
SEED Practitioner Labs Clima
Transition Lab: Blockchain and Innovation for
29 November | Bangkok, The Knowledge Exchange
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