



CLIMATE-SMART SOLUTIONS IN AGRICULTURAL VALUE CHAINS



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01

INTRODUCTION

02

DIFFERENT TYPES AND EXAMPLES OF
CLIMATE-SMART SOLUTIONS

ENVIRONMENTAL ANALYSIS

The link between value chains and environment/climate change

Agricultural value chains may...		
...cause negative i environment	... be affected by climate ch environmental degrad	... to positively to climate (3)
<ul style="list-style-type: none"> • Co • V • Pa • Redu • Deforestan • Increased soil erosion 	<ul style="list-style-type: none"> • Climate migration 	<p>Mitigation: An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases (IPCC, 2001a).</p> <p>Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2001a)</p>
VC strategies: CC mitigation , e.g. circular economy measures, environmental benchmark practices (reduce environmental impacts)	VC strategies: CC adaptation , e.g. environmental benchmark practices, circular economy measures (adapt to environmental degradation and CC)	

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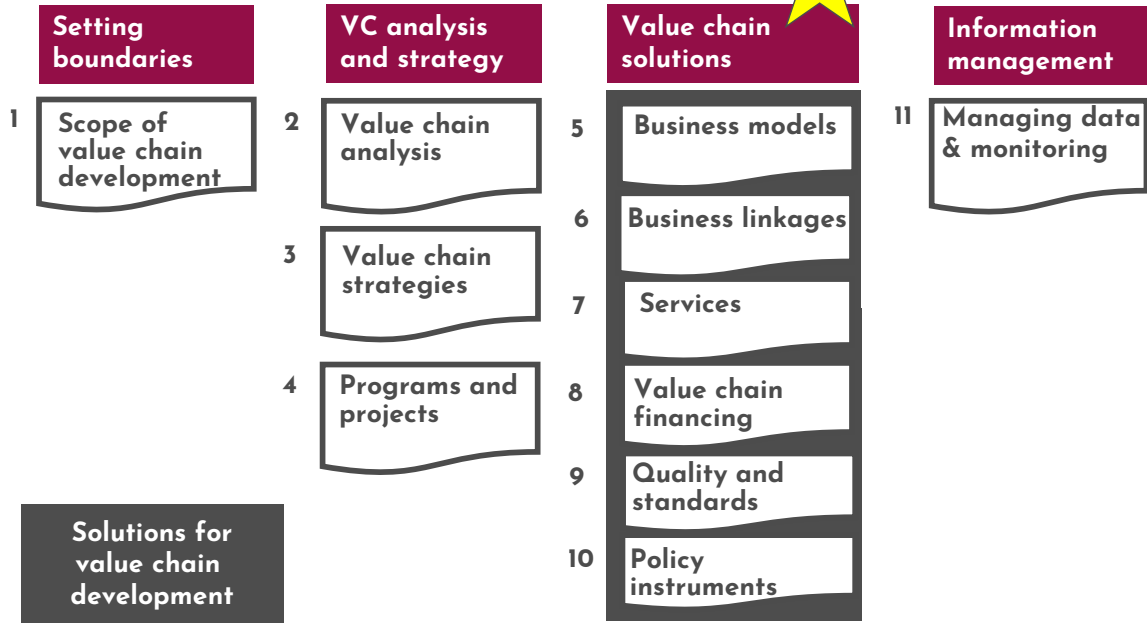
DISCUSSION

- According to you, what are important solutions for climate change adaptation and mitigation in typical agricultural value chains?
- Do you have any particular experience with solutions for climate change adaptation and mitigation? In case, which ones?
- What key challenges do you see to promote climate-smart solutions in agricultural value chains?

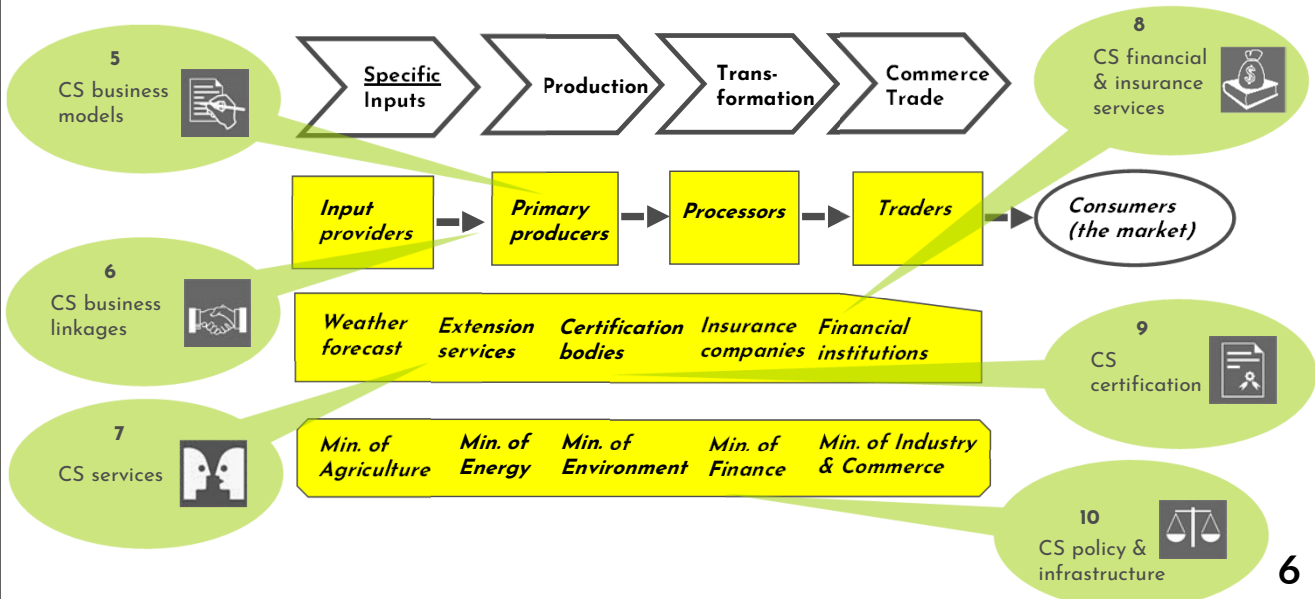
Question:
In food VCs, is **CC adaptation** more related to agricultural production or to processing and trading companies?

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STRUCTURE OF VALUELINKS 2.0



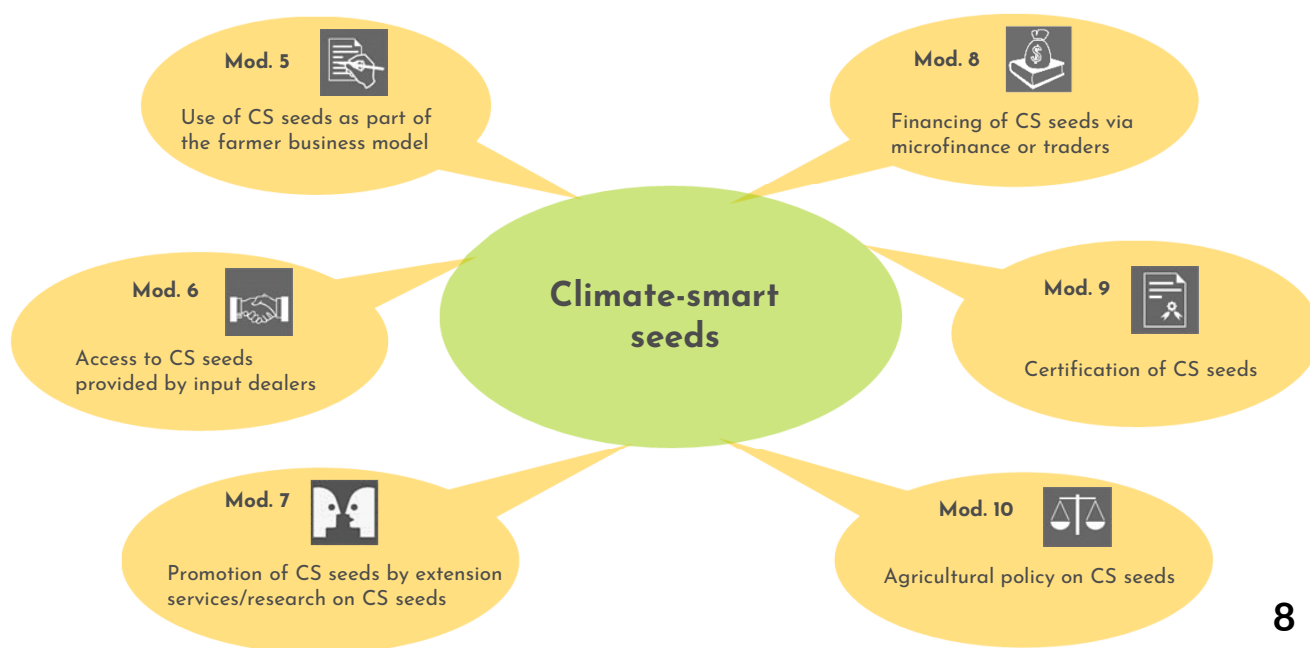
CLIMATE-SMART VC SOLUTIONS



CLIMATE-SMART VC SOLUTIONS

Climate-smart business models (VL 5)	Climate-smart business linkages (VL 6)	Climate-smart services (VL 7)
<ul style="list-style-type: none"> ➤ Climate-smart agriculture ➤ Climate-smart processing and trading 	<ul style="list-style-type: none"> ➤ Climate-smart input supply ➤ Deforestation-free supply chains ➤ Regional marketing 	<ul style="list-style-type: none"> ➤ Climate information services ➤ CC-adapted extension services ➤ Digital and innovative technology-driven services
Climate-smart financial services (VL 8)	Climate-smart certifications (VL 9)	Climate-smart policies and infrastructure (VL 10)
<ul style="list-style-type: none"> ➤ Sustainable finance ➤ Payments for ecosystem services ➤ Weather index-based insurance ➤ Carbon credit trade 	<ul style="list-style-type: none"> ➤ Sustainability and organic certification ➤ Climate standards, CO2 footprint 	<ul style="list-style-type: none"> ➤ Climate management laws, e.g. EU supply chain law ➤ NAPs and NDCs ➤ Ecosystem-based Adaptation (EbA) & disaster risk reduction

CLIMATE-SMART (CS) SOLUTIONS



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CLIMATE-SMART AGRICULTURE AS A BASIS FOR A SUSTAINABLE BUSINESS MODEL

VL Mod. 5

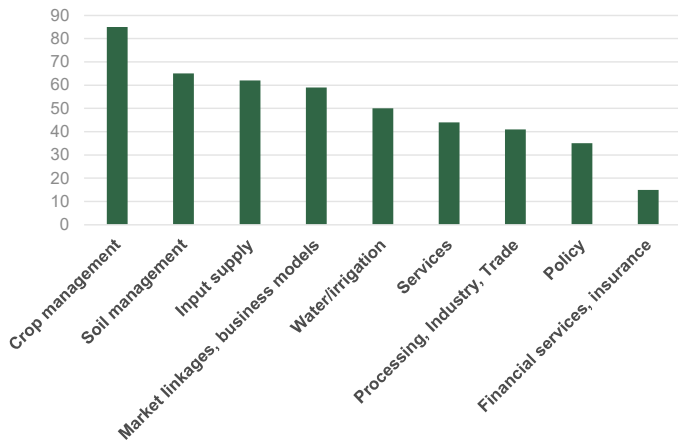
- **Crop management** (GAP, integrated pest management, intercropping, diversification, crop rotation, agroforestry, rotational grazing etc.)
- **Soil management** (terracing, no tillage/less tillage, mulching, conservation agriculture with minimum soil disturbance, permanent soil cover etc.)
- **Water management** (water level management, drip irrigation, water buffering zones etc.)
- **Use of innovative inputs** (C-adapted seeds, plants, animal breeds, heat-tolerant varieties, digital tools/devices for precision farming)
- **Use of renewable energy**, reduction of waste and food losses, use of by-products
- **Use of agrometeorological data**, modified crop calendars
- **Physical risk management** (wind-/firebreaks, flood control dykes, water tanks, generators)
- **Post-harvest management** (drying/storage facilities, on-farm value addition like first processing)
- **Environmental certification** (greenhouse gas emissions, carbon sequestration, increased biodiversity, organic)
- **Risk reduction by diversifying production**, improving food security and income sources
- **Improved market linkages**, e.g. contract farming for stable market access
- **New value proposition**: Environmentally-friendly produced food

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CLIMATE SMART AGRICULTURE – GIZ SNRD ASIA SURVEY AUG/SEPT 2022

VL Mod. 5

Area of intervention (% of projects)



- **Main hazards cited:** Pests and diseases, heavy rain/floods and/or erratic rainfall, drought, heat, higher temperature

- Crop management is the most often cited area of intervention (85%) followed by soil management, input supply, market linkages/business models, water/irrigation
- Most projects use a combination of different interventions areas
- Important topics are GAP, reduction of waste/losses, renewable energy, standards, digital tools, organic production
- Market linkages, business models: mostly realized with DPPs
- Financial services/insurance are only mentioned by 15%
- Based on data from 34 GIZ projects

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CLIMATE-SMART AGRICULTURE IN MADAGASCAR

VL Mod. 5



Farafangana, Southeast of Madagascar: High yield pepper plantation



Farafangana, Southeast of Madagascar: Climate change adapted pepper plantation

Can you spot the difference?

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THE TRIPLE WIN OF CLIMATE-SMART AGRICULTURE

Increased productivity

- Produce more and better food to improve nutrition security and boost incomes

Enhanced resilience

- Reduce vulnerability to drought, pests, diseases and other climate-related risks and shocks; and improve capacity to adapt and grow in the face of longer-term stresses like shortened seasons and erratic weather patterns.

Reduced emissions

- Pursue lower emissions for each calorie or kilo of food produced, avoid deforestation from agriculture and identify ways to absorb carbon out of the atmosphere

Source: <https://www.worldbank.org/en/topic/climate-smart-agriculture>










CLIMATE SMART TRADER/PROCESSOR BUSINESS MODELS

- Use of green energy/energy saving models for reduced greenhouse gas emissions
- Improve water efficiency/water storage
- Use ecological packaging material
- Reduce losses and waste production, use of by-products
- Avoid use of harmful/poisonous/polluting substances
- Shorten transport ways, optimize transport means
- Benefit from environmental standards and labels
- Re-location of processing industries (e.g. flood-safe)

- GIZ's Climate Expert Tool can be used for company-specific climate sensitivity analyses of SMEs in the value chain: <https://www.climate-expert.org/en/home>
- Development Partnerships with the Private Sector can be powerful to support SMEs in realizing innovative, climate-smart business models

CLIMATE-SMART BUSINESS MODEL OF A COOPERATIVE IN VIETNAM



Key Partners  <i>09 cooperative members, particularly minority women with traditional farming methods; 50 mango farmers applying GAP practices Local extension workers for FFS training on vietGAP; Experts from Fruit Research Institute GIZ</i>	Key Activities  <i>Production and sales of fresh fruit Production and sales of dried fruits, avoiding food losses</i> Key Resources  <i>Personnel Storage facilities Short-term capital Factory building Solar drying dome</i>	Value Proposition  <i>Sales of fresh fruit (mango, longan, ...) High quality, food safety-certified, solar-dried fruit (banana, ginger, longan, mango) with attractive environmentally-friendly packaging</i>	Customer Relationships  <i>Informal/loose linkages with local collectors, no linkages with exporters Promote brand identity, repeat sales and formal contracts</i> Channels  <i>Direct sales to local collectors. Online marketing via Facebook/social media, conferences, trade fairs</i>	Customer Segments  <i>90% local market, 10% Chinese market Specialty shops, high value urban markets, tourist markets in Vietnam.</i>
Cost Structure  <i>Investment in storage facilities and short-term capital for trading fresh fruit Investment in factory building and solar drying dome, cost of packaging material, food hygiene and safety certification cost</i>		Revenue Streams  <i>Margins from seasonal sales of fresh fruit Year-round sales of high value, processed and certified green products</i>		

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CLIMATE-SMART INPUT SUPPLY BUSINESS LINKAGES

Introduction of climate-smart seeds & varieties

Key interventions	<ul style="list-style-type: none"> ▪ Supporting public research ▪ Developing input supply capacity ▪ Creating awareness and training for use of adapted varieties
Important to consider	<ul style="list-style-type: none"> ▪ Private sector-based input supply with 3 layers: <ul style="list-style-type: none"> ➢ Research ➢ Breeding new varieties ➢ Multiplication of seeds
Impact	<ul style="list-style-type: none"> ▪ Can be key for CC adaptation and VC competitiveness ▪ High potential impact

➢ High potential for Development Partnerships with the Private Sector

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EU DEFORESTATION REGULATION

VL Mod. 6

- The European Parliament adopted a so-called “Deforestation Regulation” in September 2022.
- The regulation applies to palm oil, cattle, soy, coffee, cocoa, timber and rubber as well as derived products.
- All companies have to conduct strict due diligence if they place such products on the EU market. EU importers become responsible for deforestation-free supply chains and have to ensure and control traceability at all stages of the value chain.
- The regulation is expected to enter into force in May/June 2023, followed by an 18-month implementation period for larger stakeholders and a 24-month period for small and medium-sized enterprises (SMEs).

- INAtTrace/GIZ: Tool to collect information on production conditions along the supply chain, retrieve data entered in real time and evaluate it, <https://www.nachhaltige-agrarlieferketten.org/en/about-ina/>
- High potential for Development Partnerships with the Private Sector

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CLIMATE SMART SERVICES

VL Mod. 7

Operational services

- Digital services, e.g. for precision farming, access to information
- Fee-based services, e.g. Smart-Irrigation-as-a-Service Vehicle
- Embedded service provision through contract farming (e.g. inputs, weather information, safe housing)

Meso-level support services

- Research on new varieties, farmer-led research on climate adaptation options
- Climate and weather information system, agro-meteorological data
- Extension services using agro-ecological/climate-smart GAP

- High potential for Development Partnerships with the Private Sector to introduce service innovations

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MARKET DEVELOPMENT: INTERVENTIONS ON DEMAND AND SUPPLY SIDE

VL Mod. 7

Demand side analysis ..

VC operators	Service needs	Characterization of the services needed (e.g. volume, frequency of demand)	Obstacles of access to the services
Farmers	to be specified	to be specified	to be specified
...			

Supply side analysis ..

Service needs	Existing or potential service providers	Obstacles of service provision
(taken over from the demand analysis)	to be specified	to be specified

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CLIMATE INFORMATION SERVICES FOR AGRICULTURE

VL Mod. 7

1. Demand assessment

- What information, e.g. rain, wind, hazards, diseases etc. is needed by whom?
- Short-term or long-term forecasts, e.g. for investment decisions
- Constraints using the services



2. Supply assessment

- What information is already provided by whom?
- How reliable are the data, how satisfied are users?
- Which communication technologies are used?
- Constraints improving the services



3. Solutions

- Which climate information products can be developed or adapted?
- How to reach out to beneficiaries?
- How to finance service provision long-term?

Remarks

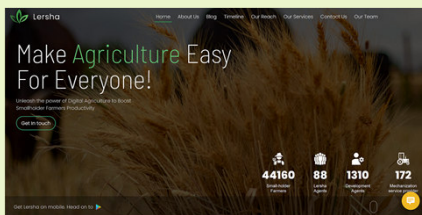
- Development of databases/data modelling require a lot of resources; are thus less feasible for most VC projects
- Define technology broadly according to devices used by the target group
- Develop a communication chain with intermediaries, think of the last mile communication
- For impact-based multi-hazard early warning systems better connect with external sources/specialized organisations

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CLIMATE INFORMATION AS AN EMBEDDED SERVICE (LERSHA)

Lersha.com, Ethiopia

- One-stop farming solutions (digital platform, mobile applications, callcenter agents, voice messages) reaching out to 60,000 farmers (August 2022)
- In addition to generating revenue from selling inputs and services, Lersha provides agro-climatic advisory services every 10 days for free as an embedded service
- Information is collected from well-trusted sources like CIAT and the Agriculture Ministry
- Example: Alert for desert locust spreading, recommend to plant early this year, Protect against fungus type at high threat



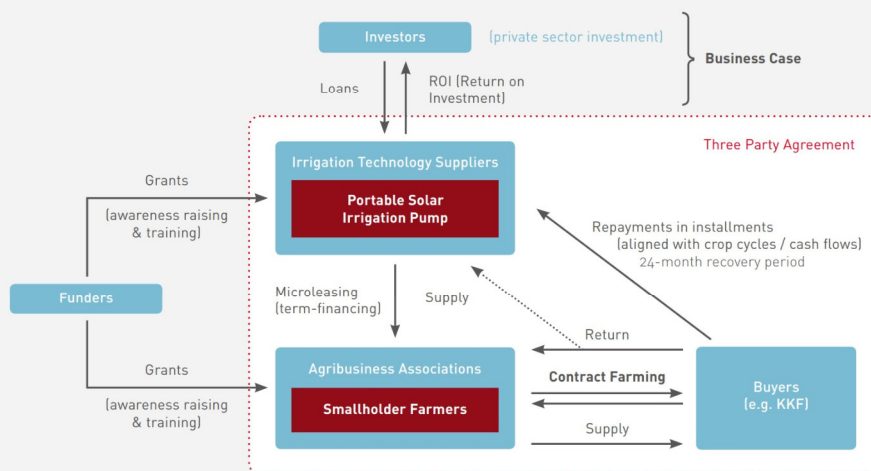
Agro-Climate Advisory & Crop Extension

Lersha aims to solve inadequate advisory services leading to poor agronomic practices and slow reaction towards changes. The advisory content is provided or verified by the Ministry of Agriculture. Through our Lersha Agents, every farmer can get this advisory access on time and on point.

EXAMPLE SUSTAINABLE FINANCE: TRIPARTITE LEASING ARRANGEMENTS

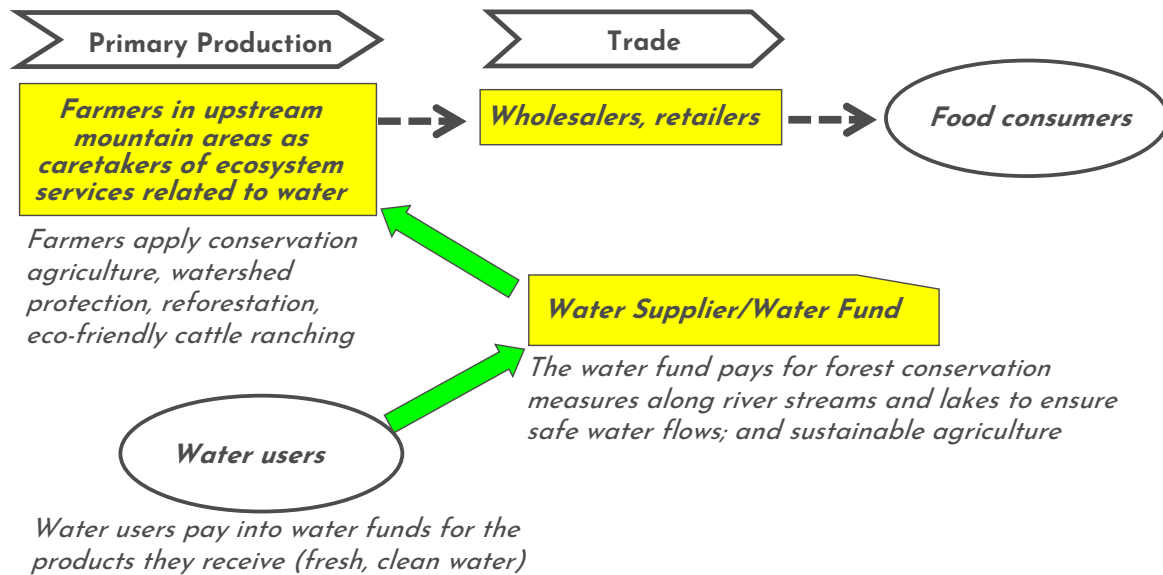
FIGURE 4

Product design of Irrigation System Microleasing for High-Value Crops



Source: Adelphi, 2019, Bottom-up Innovation for Adaptation Financing

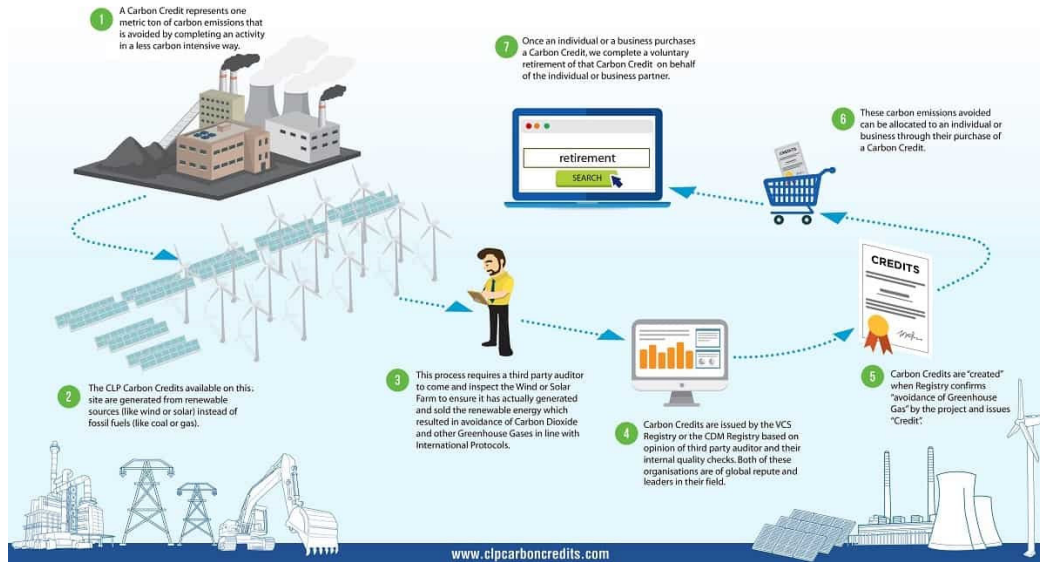
PAYMENTS FOR ECOSYSTEM SERVICES – WATER FUND



WEATHER INDEX-BASED INSURANCE

- For disaster risk reduction in commercial crop VCs, e.g. in case of severe drought.
- Introduced in cooperation with interested insurance companies.
- Mobile-enabled microinsurance: Using mobile technology and pay-outs based on reliable weather indexing rather than proof of actual losses.
- Can be part of contract farming where the lead firm buys the insurance package and includes the cost in the contract farming scheme.
- Cooperatives or sustainability standards can also include insurance models.
- Open-source weather information software like CHIRPS can be used for measuring damage, whereas automatic or manual rain gauge is more expensive.
- Good potential is seen for livestock insurances.
- Can be introduced with public support, e.g. rice farmers buy an insurance of 10\$ to receive a maximum support of 100\$, but only pay 5\$ as the government contributes 5\$ (Cambodian example)

WHAT IS A CARBON CREDIT?



Source: www.clpcarboncredits.com

CARBON FINANCING SCHEMES

- Voluntary carbon credits markets and carbon farming are considered a longer-term option for VC promotion but less promising in the short run.
- Recent research in Kenya (2020) indicated an annual mean carbon revenue of 0.33 \$ per household and year only
- Payments for CO₂ emissions are rather low (10-30 €/ton), not offering reasonable side income yet.
- Some funds have pro-smallholder focus but require extensive baseline and monitoring to proof real emission reduction
- Quite long and costly process as farmers have to be visited, GPS points taken, trees measured, calculations handed in
- The potential to mitigate GHG emissions by reforestation/afforestation is almost double the potential by agriculture.

CLIMATE STANDARDS

Sustainability certifications	     
Climate labels	     

PROJECT CERTIFICATIONS FOR CARBON CREDITS

- Verified Carbon Standard (VCS) Program
- The Climate, Community & Biodiversity (CCB) Standards
- REDD+ SES (Social & Environmental Standards)
- The CarbonFix Standard (CFS)
- SOCIALCARBON
- Gold Standard




EU SUPPLY CHAIN LAW 2025

- The draft European supply chain law (Corporate Sustainability Due Diligence Directive) obliges EU companies to check their suppliers along the entire global supply chain, including all direct/indirect suppliers.
- Companies have to comply with human rights standards and climate protection: Companies must reconcile their internal policies with the 1.5-degree target of the Paris Agreement which includes an engagement for decarbonization.
- All suppliers (direct and indirect) must identify actual or potential climate impacts and risks, in order to take appropriate action to prevent, mitigate and remediate.
- The supplier due diligence requirements must be integrated into corporate management systems.
- For companies with 500+ employees and +€150 Mio turnover starting in 2025, for companies with +250 employees and +€40 Mio turnover starting in 2027. The German supply chain law start already on 1.1.2023 (for companies with +3,000 employees).

NATIONALLY DETERMINED CONTRIBUTIONS (NDC)

- Nationally Determined Contributions (NDC) are the intended climate action plans per country as committed in the Paris Agreement 2015 and stipulate the intended greenhouse gas emission reductions in a given period. NDCs include the earlier term National Adaptation Plans (NAP).
- All countries have to report annually about their NDCs.
- **Strategies for nationally important VCs should be linked to NAP and NDC targets**

Example Rwanda: Rwanda's NDC is built on the Green Growth and Climate Resilience Strategy (GGCRS) and focuses on adaptation and mitigation and includes VC specific action.

With Domestic finance		Description
Crops and managed soils 	Soil and water conservation (crop rotation).	Continuous crop rotation of up to 600,000 Ha, leading. (Reduction of CO ₂ and N ₂ O + increase carbon sequestration in soils).
	Improved fertilizers	Increased use of organic waste in soil fertilizers, apply composting, and more judicious fertilizer use.
	Soil and water conservation (terracing).	165,000 Ha land protection terracing structures. Improve and stimulate irrigation practices.
	Soil and water conservation	Mixed cropping of coffee and bananas of up to 40,000 Ha.
	Promote use of climate resilient crops.	Introduction of climate resilient crop varieties.

Source: Cordaid Rwanda, Conference Reader 2022

ECOSYSTEM-BASED ADAPTATION (EBA)

Ecosystem	Activities
Improving livelihoods and agro-forestry in Nepal	<ul style="list-style-type: none"> ▪ Community forestry to empower local people to manage, protect and benefit from forests and adapt to climate change ▪ Protection of farmland from floods by planting trees, stabilization of riverbanks with stone walls and bamboo ▪ Income generation from mango, lychee and honey production
Building resilient communities in dryland areas of Ethiopia	<ul style="list-style-type: none"> ▪ Reducing overgrazing, protecting natural assets, water harvesting, ▪ Mobilize community groups, building skills in governance and problem-solving ▪ Linking smallholders to profitable value chains
Sustainable wood energy management in Cameroon	<ul style="list-style-type: none"> ▪ Eco-system-based reforestation by individual farmers ▪ Charcoal production from sawmill waste ▪ Introduction of improved cooking stoves

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POLICIES FOR ECOSYSTEM-BASED DISASTER RISK REDUCTION

Ecosystem	Hazard Mitigation Possibilities
Mountain forests, vegetation on hillsides	<ul style="list-style-type: none"> ▪ Vegetation cover and root structures protect against erosion ▪ Forests protect against rockfall and stabilize snow, reducing the risk of avalanches
Wetlands, floodplains	<ul style="list-style-type: none"> ▪ Wetlands and floodplains control floods in coastal areas/river basins ▪ Wet grasslands store water and release it slowly, reducing speed and volume of runoff after heavy rainfall or snowmelt in spring
Drylands	<ul style="list-style-type: none"> ▪ Natural vegetation with trees, grasses and shrubs conserve soil, retain moisture and reduce desertification. ▪ Shelterbelts, greenbelts and other types of living fences act as barriers against wind erosion and sandstorms.
Coastal (Mangroves, coral reefs, etc.)	<ul style="list-style-type: none"> ▪ Coastal ecosystems protect against hurricanes, storm surges, flooding and other coastal hazards

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