Climate KIC Academy

Adaptation and Resilience:

Introduction and Business Models

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

Licensing & Attribution

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

SESSION RULES

A face to a name

Please have your video on if you can.

Microphone etiquette

Please mute when you are not speaking.

Conversation style

Feel welcome to raise your hand and we will come to you for questions/comments.

AGENDA

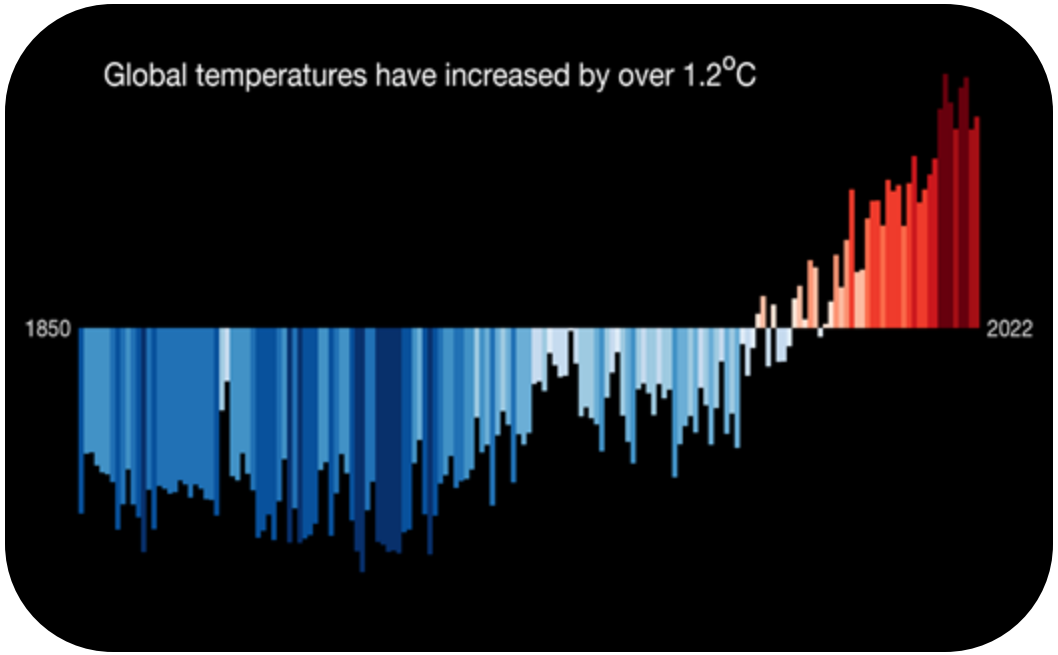
Introduction

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

The world is warming rapidly

- Currently at 1.2°C above pre-industrial global temperatures
- Individual months in 2023 shattered previous records
- 2023 set to be warmest year on record, exceeding 1.5°C
- We will consistently breach this threshold by 2030s



Warming is making many climate hazards worse

HEAT EXTREMES

DROUGHT

WILDFIRES

STORMS

FLOODS

SEA-LEVEL RISE

With intensifying **impacts** on

- Water supplies
- Ecosystems
- Agricultural production
- Supply chains
- Disaster risk
- Infrastructure
- Health

Intensifying hazards

RAINFALL VARIABILITY

DROUGHT

HEAT EXTREMES

WILDFIRES

STORMS

FLOODS

SEA-LEVEL RISE

Primary impacts

- Water stress + demand
- Heat stress (plants, animals, people, infrastructure)
- Agricultural yields
- Pests & diseases

Forest & ecosystem loss
Damage to agriculture
Damage to infrastructure
Transport, comms disruption
Shifts in ecological ranges
Loss of settlements

Erosion, inundation, salinization

Secondary impacts

Increased costs

Income & livelihoods

Supply chain disruption

Food prices & insecurity

Increased poverty

Worsening health

Migration

Insecurity

This action is supported by the European Institute of Innovation and Technology (EIT).
A body of the European Union

High temperatures exacerbated by climate change made 2022 Northern Hemisphere droughts more likely

Drought & wildfire, Bolivia (Source: WWA & EU)

Drought, Southern Ethiopia, 2022 (Source: EU/Flickr)

Sources: World Weather Attribution, EU Civil Protection & Humanitarian Aid

This action is supported by the European Institute of Innovation and Technology (EIT).
A body of the European Union

Climate change increased heavy rainfall, hitting vulnerable communities in Eastern Northeast Brazil

Climate change likely increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan

Climate change exacerbated heavy rainfall leading to large scale flooding in highly vulnerable communities in West Africa

World Weather Attribution

Home About Analyses News Peer reviewed

Reducing vulnerability and improved land management needed with increasing heavy rainfall in Mindanao Island, southern Philippines

Sources: World Weather Attribution, Oxfam East Africa/Wikimedia Commons

EXERCISE 1 – Hazards & impacts

- Identify one or more key climate **hazards** that affect the sector, context, or geographical area in which you live and work – are these changing?
- What **impacts** are associated with these hazards – what problems do they cause for your sector, business, community, or other stakeholders?

EXERCISE 1 – Hazards & impacts

Hazards	**Impacts**
Increased rainfall variability	Shifts & unpredictability in start & end of rainy seasons, increased risk of dry periods within growing season – seed & crop losses
Higher temperatures & lower rainfall	Increased evapotranspiration, reduced soil moisture – reduced productivity
More intense rainfall	Crop damage, soil erosion, flooding, infrastructure damage

Adaptation & Resilience
in detail

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

Importance of Climate Adaptation and resilience

*Without adaptation and resilience, communities can face **severe disruptions**, ranging from extreme heat waves to flooding. By planning and taking action, we can mitigate the risks and protect our future.*

Reduces Vulnerability & Builds resilience

- Enhances ability to cope with climate impacts
- Promotes flexibility to unexpected changes

Protects Livelihoods & Ecosystems Supports Economic Sustainability

- Safeguards agriculture, biodiversity, and natural resources.
- Safeguards infrastructure and industry

Improves Public Health

- Minimizes climate-related health risks

Encourages Proactive Planning

- Allows for anticipating and planning for future challenges

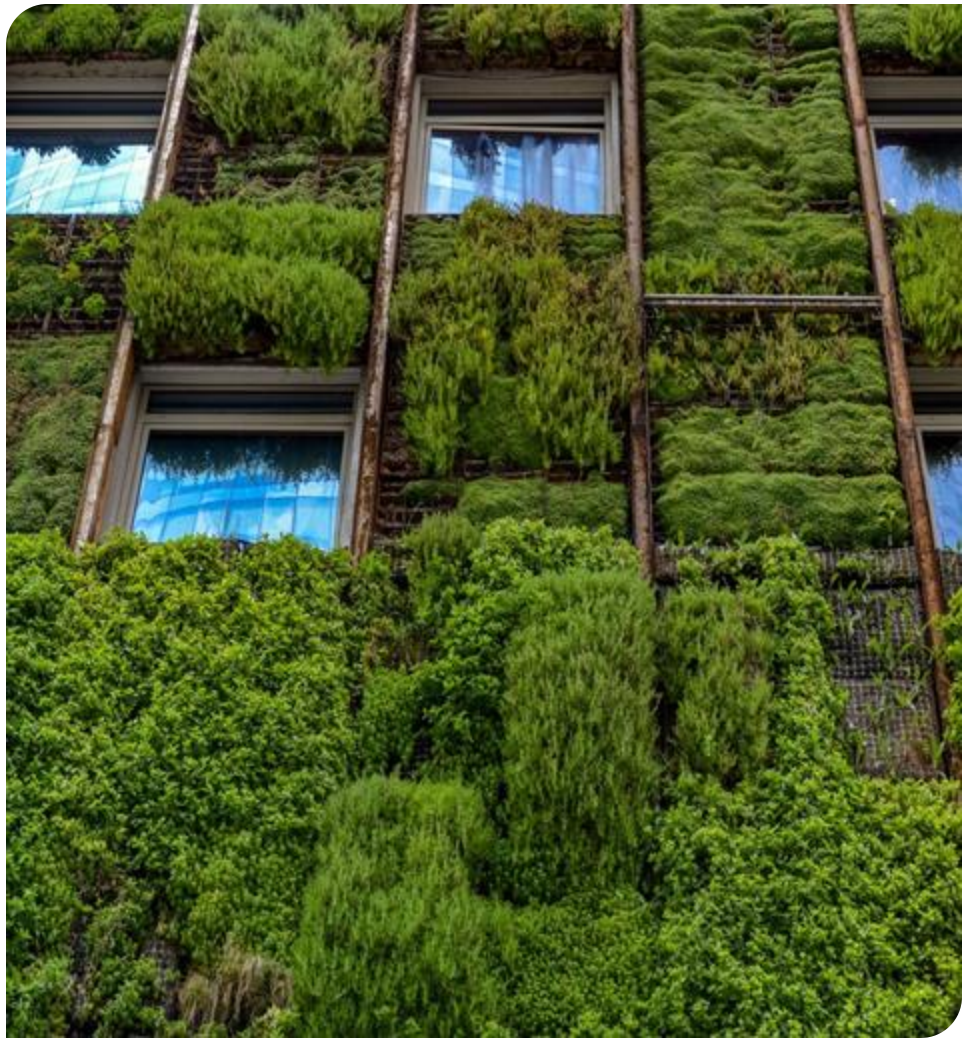
Importance of Climate Adaptation and resilience: **Preparedness**

Drought-Resistant Crops

Selectively bred crops can survive with less water and high temperatures.

Vertical Farming

Growing crops in stacked layers indoors allows for year-round farming with controlled water and light, which is useful in regions with extreme weather.



Importance of Climate Adaptation and resilience: **Resilient Agriculture**

Early Warning Systems
Warn of imminent extreme weather events, allowing people to prepare or evacuate.

Floating Architecture
In flood-prone regions, buildings and even farms are being designed to float.

Green Roofs and Walls
Absorb heavy rainfall, reducing flood risks, and also provide insulation, reducing energy costs.

Importance of Climate Adaptation and resilience: **Water systems**

Rainwater Harvesting

Simple systems to collect and store rainwater can help communities become more resilient to droughts. Reuse of stormwater, reducing the risk of flooding and soil erosion.

Managed Aquifer Recharge (MAR)

Involves storing excess water (from rainfall, treated wastewater, or other sources) underground in natural aquifers for later use. This water can be pumped back to the surface when needed.

Desalination Technology

Removing salt and other impurities from seawater to produce freshwater.

Importance of Climate Adaptation and resilience: **Nature-based solutions**

Mangrove forests

Natural barriers against coastal erosion and flooding. They absorb and disperse the energy from storm surges and even tsunamis, providing a protective buffer for coastal communities.

Agroforestry

combines agriculture and forestry practices to create more diverse, productive, and sustainable land-use systems. Trees are planted alongside crops or pastureland to provide shade, improve soil quality, and reduce erosion.

Oyster beds

Natural barriers that stabilize shorelines and reduce the impact of waves and storm surges. Like coral reefs, they also act as natural water filters, improving water quality.

Risk, Resilience & Adaptation

Understanding key terms and concepts & their relevance in terms of business

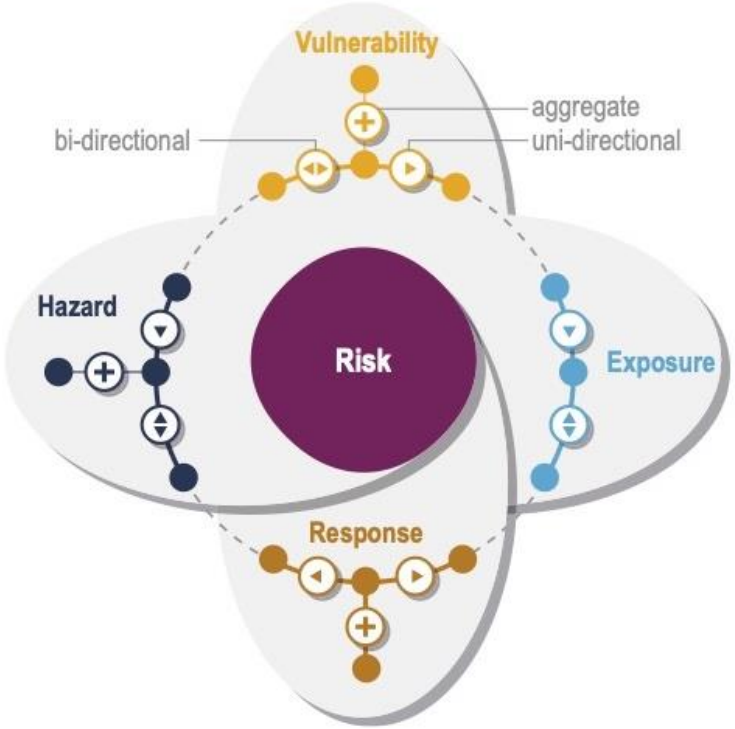
This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

Worsening impacts mean increasing risks

Vulnerability: Susceptibility of population/system to harm when exposed to a hazard

Hazard: Potentially harmful manifestation of climate change (shock, stress, extreme, trend), reduced through mitigation



Exposure: Number of people, amount/value of assets in an area affected by a hazard

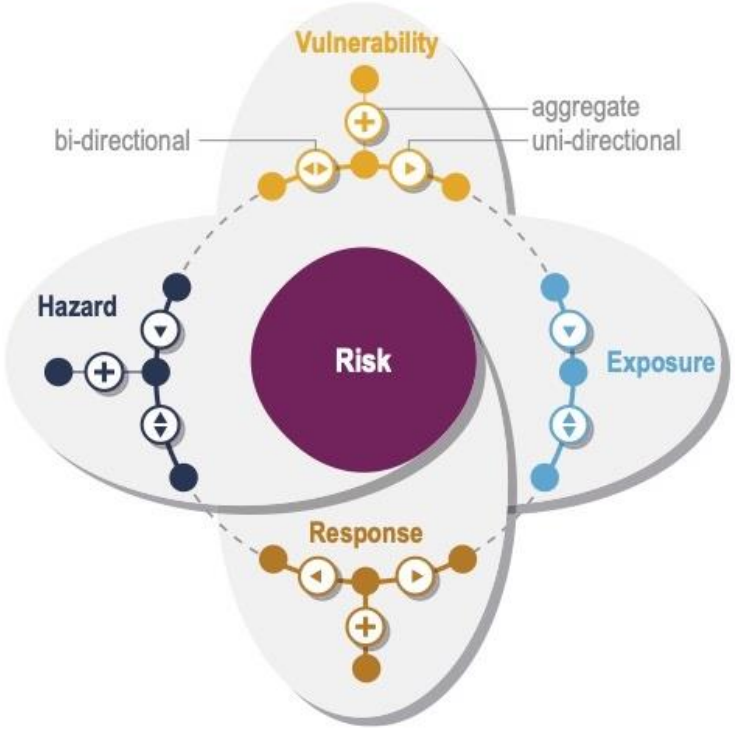
Response: Actions taken to address hazards that might reduce or inadvertently increase risk – responses themselves can be/create risks

Image from IPCC 2022, WGII, Ch.1, p147

Reducing climate change risks

Reduce vulnerability - Improve ability of people, organisations, systems, to cope with & adapt to climate change impacts

Key adaptation & resilience building opportunities for businesses



Reduce hazards

Reduce emissions (mitigation)

Reduce likelihood & magnitude of floods, landslides, etc. through local physical interventions

Reduce exposure

Relocate settlements, people, infrastructure, economic activity - away from high-risk areas – winners & losers, can increase risk for some

Better responses - Ensure short-term responses provide foundation for effective, sustainable & equitable adaptation in longer-term

Image from IPCC 2022, WGII, Ch.1, p147

Different ways of reducing risk

Mitigation

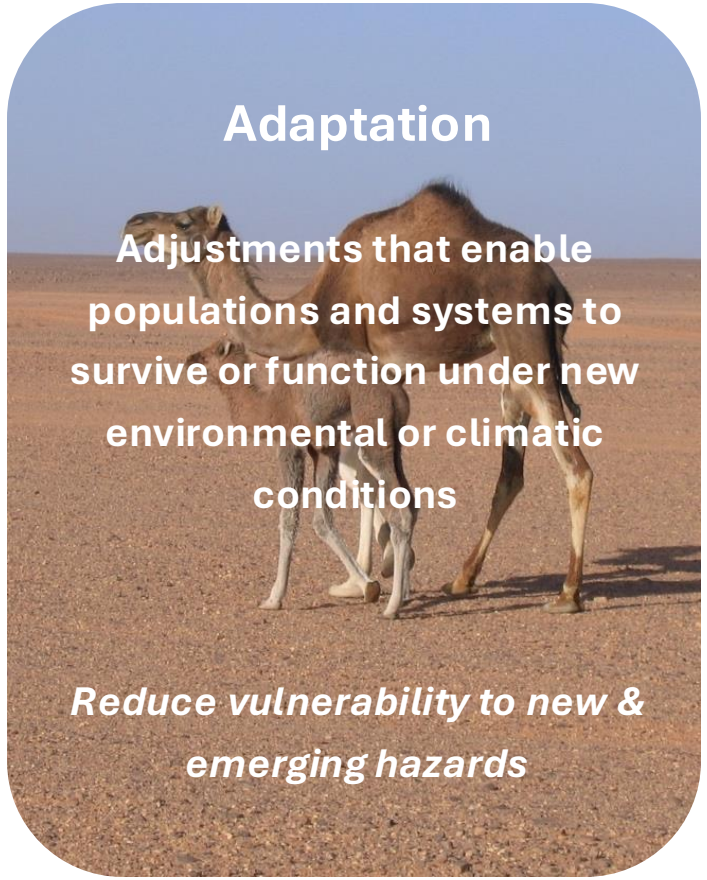
Avoiding and reducing emissions of heat-trapping greenhouse gases & enhancing sinks to sequester & store them.

Addresses root causes of climate change & reduce hazards

Resilience

Capacity of people or systems to anticipate & absorb shocks & recover from their impacts

Reduce vulnerability to a range of often familiar hazards



Adaptation

Adjustments that enable populations and systems to survive or function under new environmental or climatic conditions

Reduce vulnerability to new & emerging hazards

RELATIONSHIP BETWEEN ADAPTATION & RESILIENCE

Resilience building activities generally focuses on existing hazards and risks, albeit ones that are most likely evolving due to climate change; often pays little or no attention to specific future risks

BUT

Difference between adaptation & resilience

Resilience to climate change necessarily involves adaptation to new hazards & risks

Resilience as capacity to **anticipate** hazards, **absorb** & **recover** from their impacts, **adapt** to new hazards & risks, and **transform** where existing systems and behaviours are unviable under climate change

Important to specify risk, vulnerability, resilience and/or adaptation ***of whom*** *(population or system)*, ***to what*** *(hazard)*, in relation to ***what impacts,*** and over ***what timescale(s)***?

AVOIDING MALADAPTATION

Maladaptation: actions that may lead to increased *risk* of adverse climate-related outcomes, including via increased *greenhouse gas (GHG) emissions*, increased or shifted *vulnerability* to *climate change*, more inequitable outcomes, or diminished welfare, now or in the future (IPCC 2022: 2915)

Avoid actions that displace risks, create new risks, increase the vulnerability of other (non-target) populations & systems, and deliver short-term benefits at expense of longer-term sustainability

- Consideration of maladaptation addresses 'response' element of risk

E.g., irrigation to address increasing water scarcity that is not sustainable and depletes groundwater reserve to point where agricultural systems collapse

EXERCISE 2 – ADAPTATION & RESILIENCE APPROACHES

Hazards	Impacts	Adaptation/resilience approaches
Increased rainfall variability	Shifts & unpredictability in start & end of rainy seasons, increased risk of dry periods within growing season – seed & crop losses	
Higher temperatures & lower rainfall	Increased evapotranspiration, reduced soil moisture – reduced productivity	
More intense rainfall	Crop damage, soil erosion, flooding, infrastructure damage	

- What approach(es) might we use to address the risks identified in Exercise 1?
- Are there any risks of maladaptation? If so, how would you address them?

EXERCISE 2 – ADAPTATION & RESILIENCE APPROACHES

Hazards	Impacts	Adaptation/resilience approaches
Increased rainfall variability	Shifts & unpredictability in start & end of rainy seasons, increased risk of dry periods within growing season – seed & crop losses	Resilience of existing agricultural systems through forecasts, insurance, water storage, irrigation Adaptation – drought tolerant & short-season crops
Higher temperatures & lower rainfall	Increased evapotranspiration, reduced soil moisture – reduced productivity	Resilience through systematic irrigation Adaptation – drought tolerant crops
More intense rainfall	Crop damage, soil erosion, flooding, infrastructure damage	Resilience - flood early warning systems, resilient infrastructure, land cover Adaptation – relocating infrastructure & activities away from high-risk areas

Maladaptation risks: sustainability of irrigation under scenarios of lower rainfall, higher temperatures and declining groundwater; risks livelihoods, food security & local economies reliant ay become reliant on unsustainable irrigated agriculture that is liable to future collapse.

Potentially reduced by ensuring irrigation is highly efficient, assessing conditions under which it fails, & regularly monitoring groundwater resources

The Climate Causality Framework

From impacts to opportunities

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

Adaptation/resilience as an opportunity for business

- Intensifying climate change hazards and impacts pose severe risks to ecosystems, livelihoods, food production, water security, infrastructure, health, economy
- These risks need to be addressed through resilience & adaptation
- This means opportunities for the private sector to drive adaptation innovation, often with support from donors & multilateral climate funds that recognize limits of conventional projects
- Taking these opportunities requires understanding of what is needed to address impacts

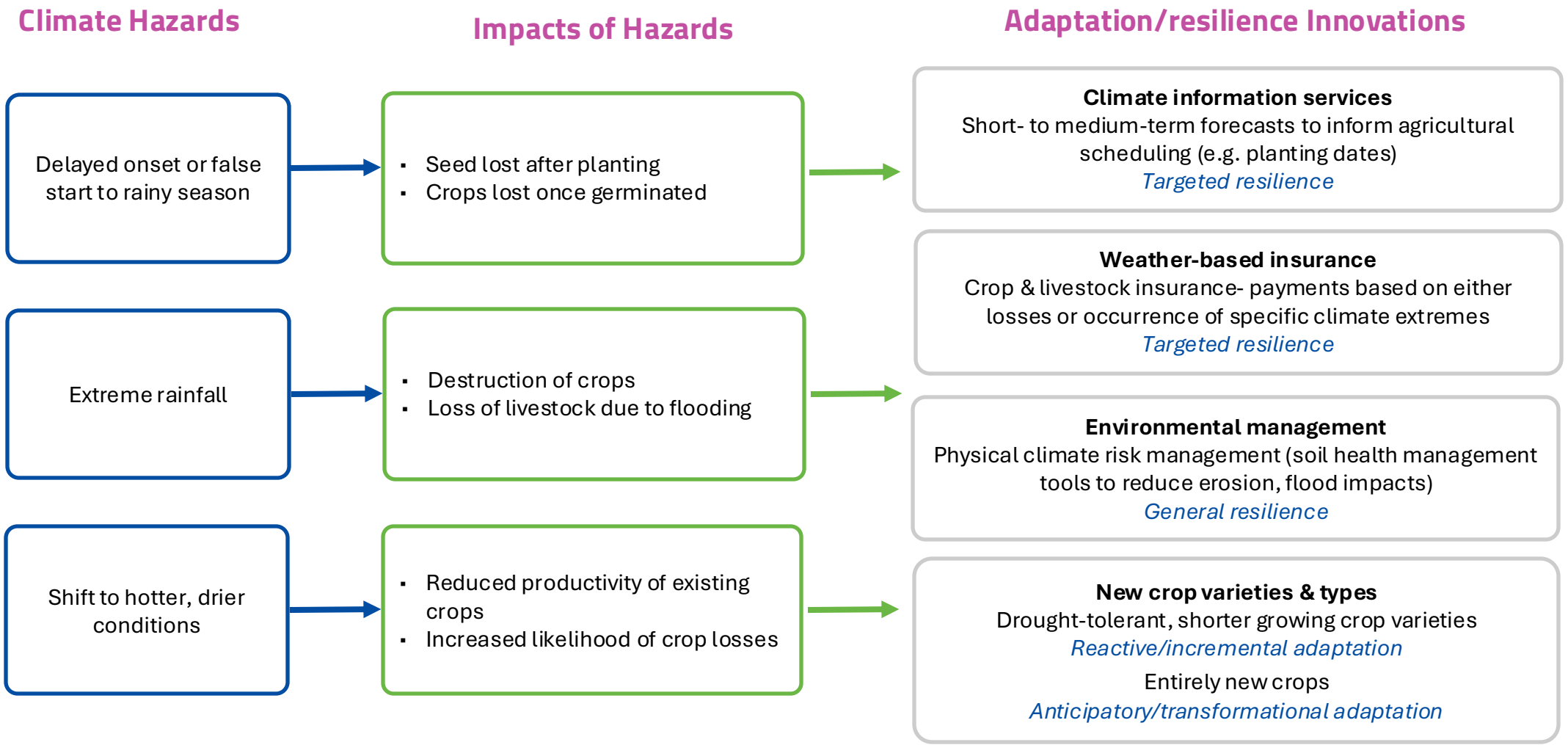
eit Climate-KIC
Co-funded by the European Union

Adaptation & resilience
as an opportunity for business

Sub-section title to go here.

- Intensifying climate change hazards and impacts pose severe risks to ecosystems, livelihoods, food production, water security, infrastructure, health, economy
- These risks need to be addressed through resilience & adaptation
- This means opportunities for the private sector to drive adaptation innovation, often with support from donors & multilateral climate funds that recognize limits of conventional projects
- Taking these opportunities requires understanding of what is needed to address impacts

CLIMATE CAUSALITY FRAMEWORK – AGRICULTURE EXAMPLE

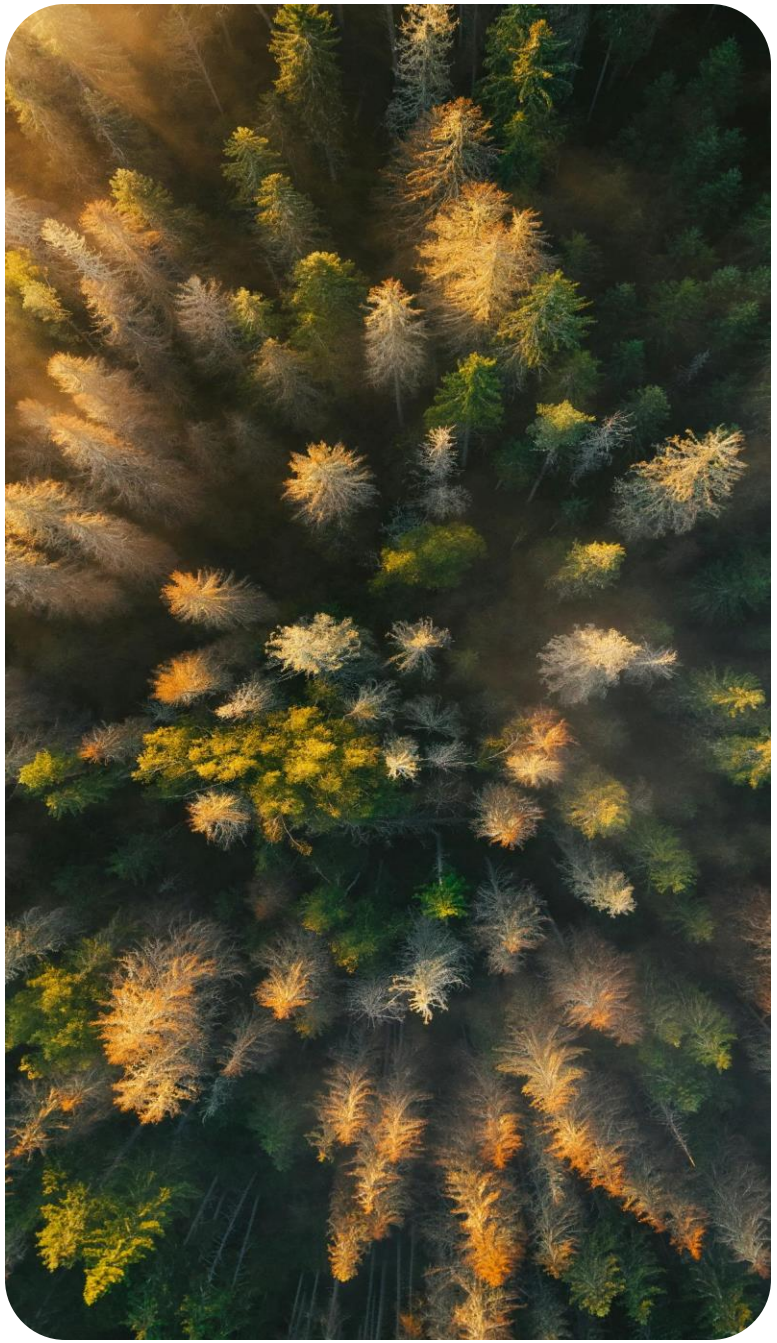


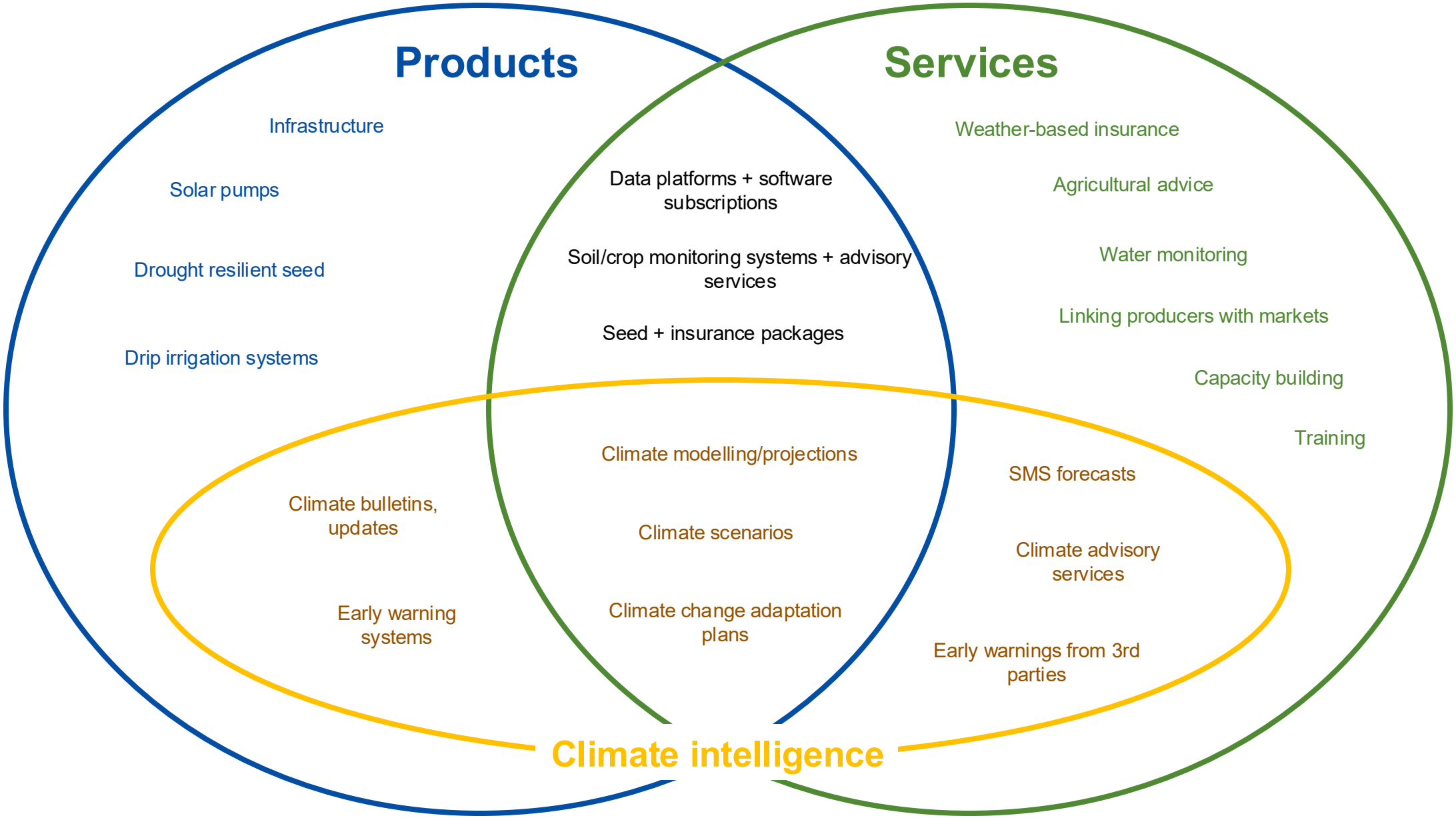
PRODUCTS AND SERVICES FOR ADAPTATION & RESILIENCE

- **Products** - tangible items that a company offers to consumers / physical items that a company can make for someone; ownership rights can be established, might be traded or exchanged

- **Services** – intangible item arising from the output of one or more individuals that is consumed at the same time it is produced; provided or performed for another person or organisation

- **Climate intelligence** – most commonly a subset of services relating to data & information that enable the identification, monitoring & assessment of climate hazards, impacts, risks & adaptation options

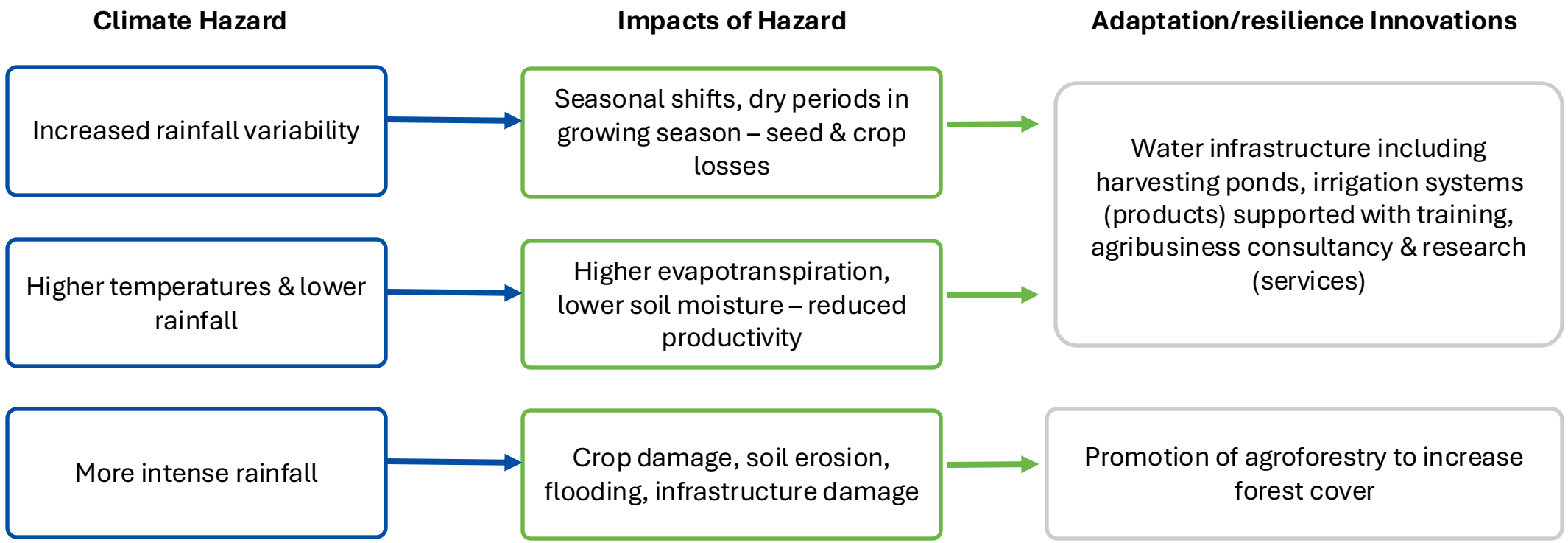



Products
Infrastructure
Solar pumps
Drought resilient seed
Drip irrigation systems
Services
Weather-based insurance
Agricultural advice
Water monitoring
Linking producers with markets
Capacity building
Training
Data platforms + software subscriptions
Soil/crop monitoring systems + advisory services
Seed + insurance packages
Climate modelling/projections
Climate bulletins, updates
Climate scenarios
SMS forecasts
Climate advisory services
Early warning systems
Climate change adaptation plans
Early warnings from 3rd parties
Climate intelligence

Example – Framework application, Kenya

MajiAgri – Water supply & irrigation infrastructure

Products & services



https://www.facebook.com/MajiAgri/ | https://ke.linkedin.com/company/majiagri-solutions

Adaptation & resilience
Business models

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

What is an A&R business model?

A&R business models are about more than 'going green'

- Not focused on reducing emissions and not linked to carbon markets
- However, may generate mitigation 'co-benefits' that can help leverage finance
- Instead, focus is on addressing hazards, risks and impacts

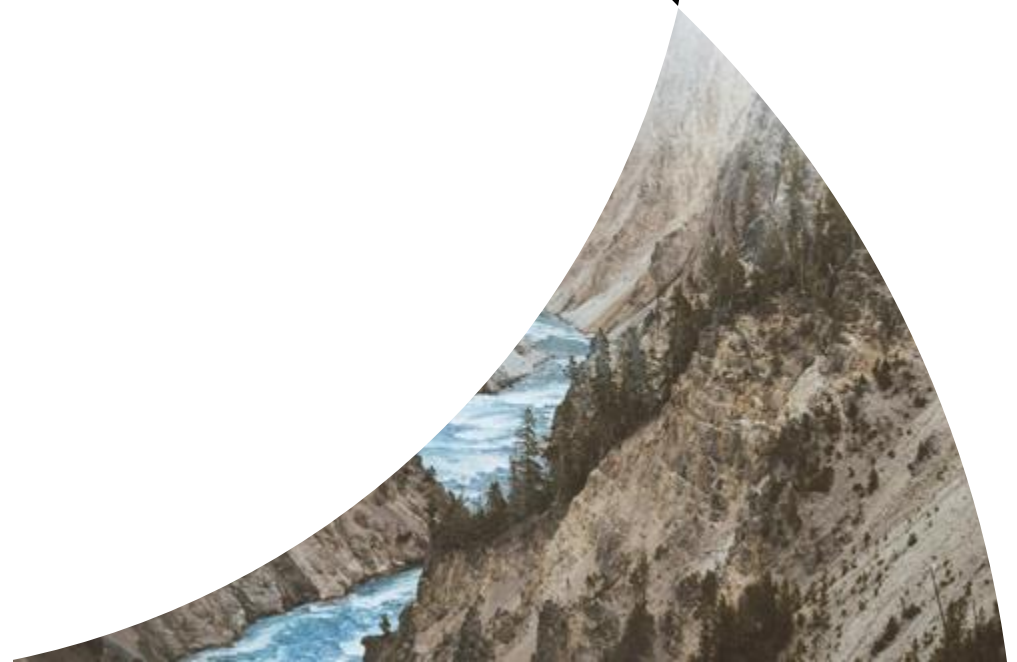
Adaptation business models help people and organizations survive and navigate climate change by reducing the risks and costs associated with climate change hazards and impacts

An A&R business is a company providing technologies, products, or services that:

Address systemic barriers to adaptation by strengthening users' ability to understand and respond to climate change risks and impacts (enabling adaptation)

AND / OR

Prevent or reduce physical climate risk or impacts on assets, economic activities, people, or nature (direct adaptation)



When is a business an A&R innovation business?

When it increases the following resilience capacities of its clients

Anticipatory

E.g. forecasts for planning, agricultural scheduling.

Absorptive

E.g. drainage for better floodwater accommodation

Adaptive

E.g. water storage or irrigation systems for increased drought

Transformative

E.g. new production systems for novel climatic conditions

Resilience to existing hazards & risks

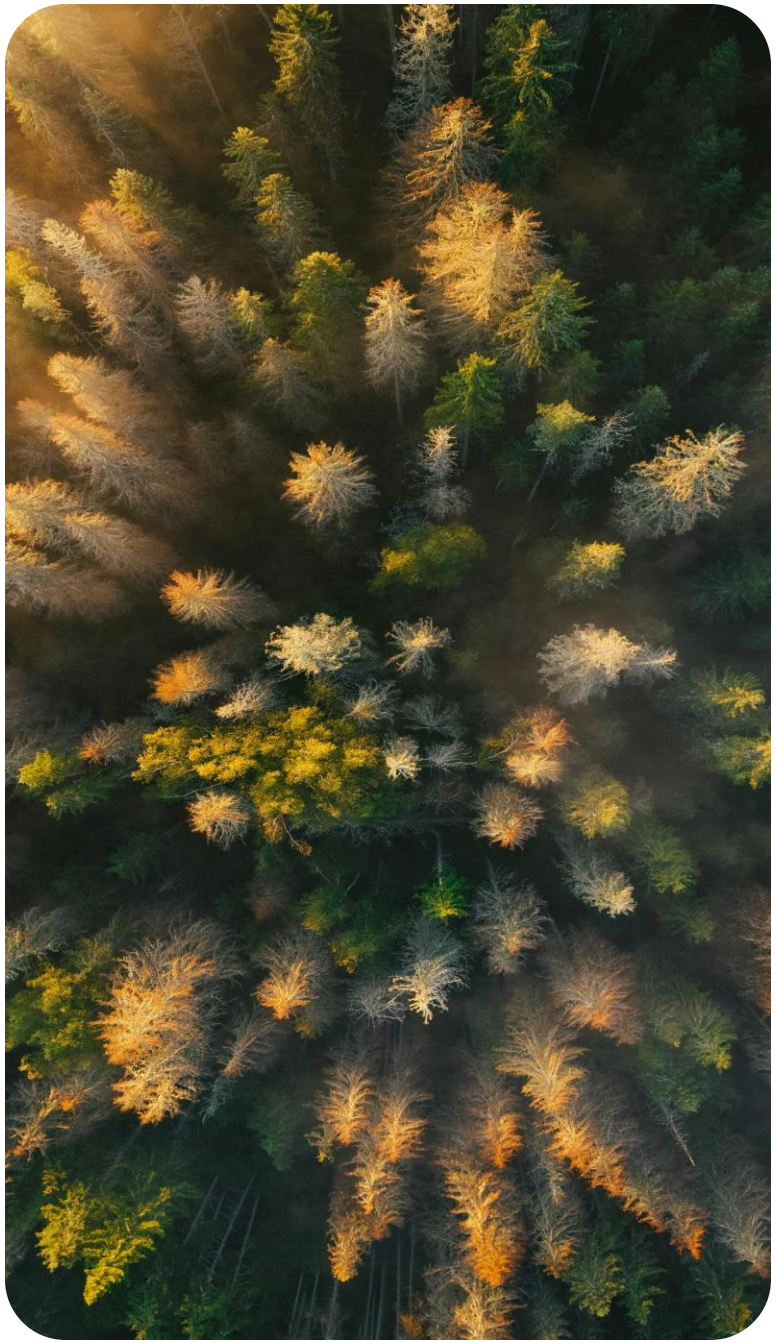
Resilience & adaptation to new/evolving hazards & risks

WHEN IS A BUSINESS AN A&R INNOVATION BUSINESS?

When it reduces the impacts and costs of climate hazards

- What climate hazards is it helping customers adapt to?
- What costs & impacts (associated with these hazards) is it reducing?
- How is it reducing these costs and impacts (through what mechanisms)?
- *If it is enabling adaptation rather than targeting direct adaptation, how is it doing this and which hazards, costs & impacts are most relevant?*

Refer to the Climate Causality Framework as a rationale for the business model



Example – Framework application, Kenya

MajiAgri – Water supply & irrigation infrastructure

Products & services

- *Social enterprise with goal of transforming rain-fed farming to irrigated agriculture*
- *Water infrastructure (harvesting ponds, irrigation), training, agribusiness consultancy*
- *Blends products and services; spans resilience & adaptation categories*

Absorptive – irrigation allows farmers to absorb/cope with impacts of droughts, longer dry periods in the growing season & unpredictable rainfall

However, note risks of maladaptation if irrigations leads to adoption of more water-intensive crops in area with declining rainfall and water resources, including groundwater

https://www.facebook.com/MajiAgri/ | https://ke.linkedin.com/company/majiagri-solutions

Examples of A&R innovation businesses

Real world case studies

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

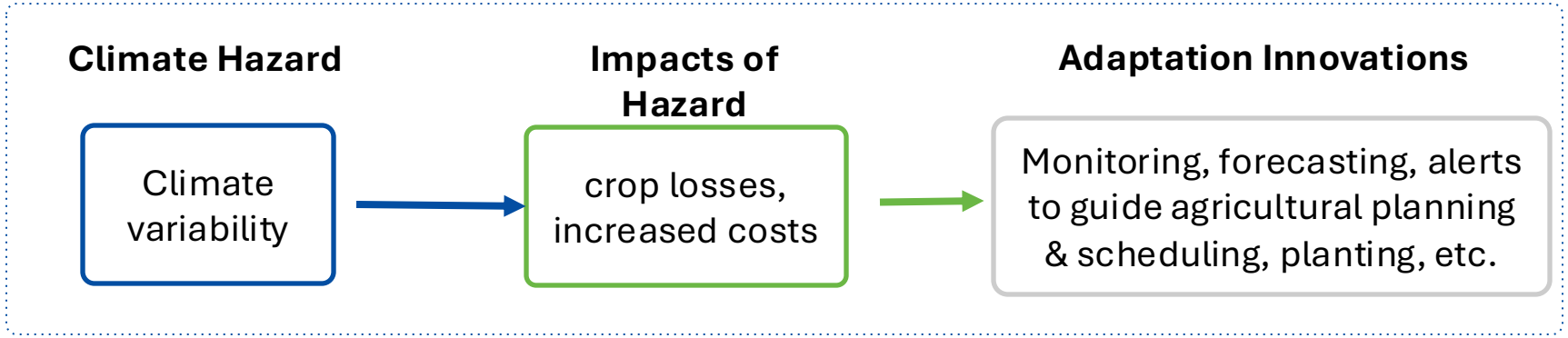
AGROSMART (BRAZI)

Data services for agriculture

Capacities supported: Anticipatory, absorptive **Provides:** services/Climate intelligence

Data platforms and apps for agricultural & climate intelligence

- ”brings together the main data, information and indications for your crop”
- Integrates forecasts, custom alerts, sensor telemetry, digital field notebook, irrigation management, reports
- Rainfall & vegetation maps, spraying scheduling (wind), farm-level forecasts
- Targeted resilience across 9 countries in Latin America, 48 million ha, >100,000 farmers



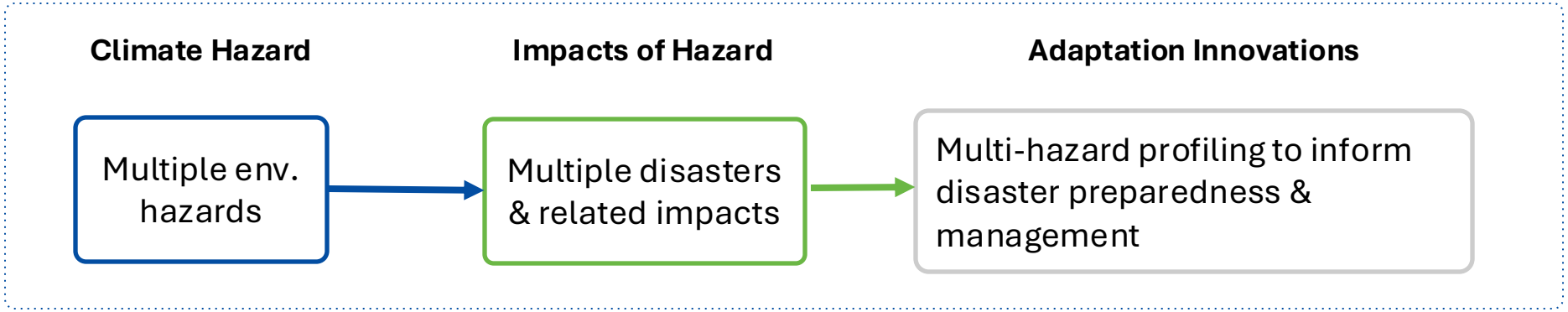
INTEGEMS (Sierra Leone)

Integrated geo-information and environmental management services

Capacities supported: Anticipatory, adaptive **Provides:** services

Environmental & climate information services

- Hazard and risk mapping, climate information disaster management, early warning systems, data collection
- Provision of expertise through consultancy activities
- Multiple partners & clients, including government departments & development agencies
- E.g. national M&E systems, EIAs, development of data dashboards,



https://seedbombstanzania.org/

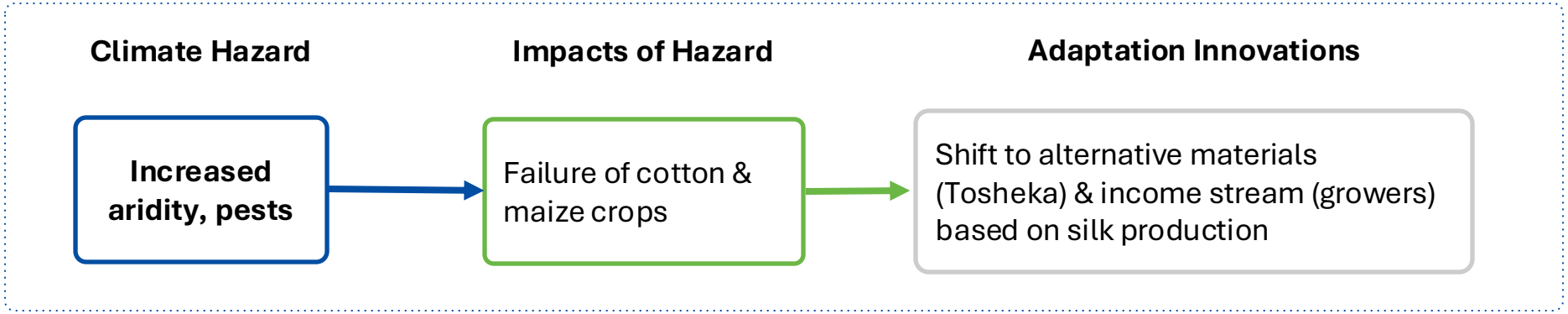
TOSHEKA TEXTILES, MAKUENI, KENYA

Social enterprise for silk production & garment manufacture

Capacities supported: Transformative **Provides: products &** services

Contract farming of silk via social entreprise

- Tosheka provides materials for rearing *eri* moth, whose cocoons provide raw material for silk
- Caterpillars feed on native castor plant, which is more resilient to increasingly frequent drought and pests than cotton & maize, thus providing the basis for livelihoods that are better adapted to emerging climatic conditions
- Tosheka markets textiles from silk nationally & internationally, while growers enjoy reliable, climate resilient income



https://www.facebook.com/ToshekaTextiles/

Adaptation & resilience

Customers & business modelling

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

TYPES OF CUSTOMERS

Individuals/ Households

Affordable products, services – small-scale equipment, insurance, seeds, SMS forecasts, food products, etc.

Other Bodies

Multilateral orgs, NGOs, research bodies, projects

Research, data, engagement, implementation, materials, equipment, aggregation (micro-insurance, contract farming, etc.)

Other businesses

Consultancy services, data, materials, equipment, supply chains, market access, processing

Governments

Consultancy, data, implementation, Public goods (early warnings, utilities infrastructure & services, etc.)

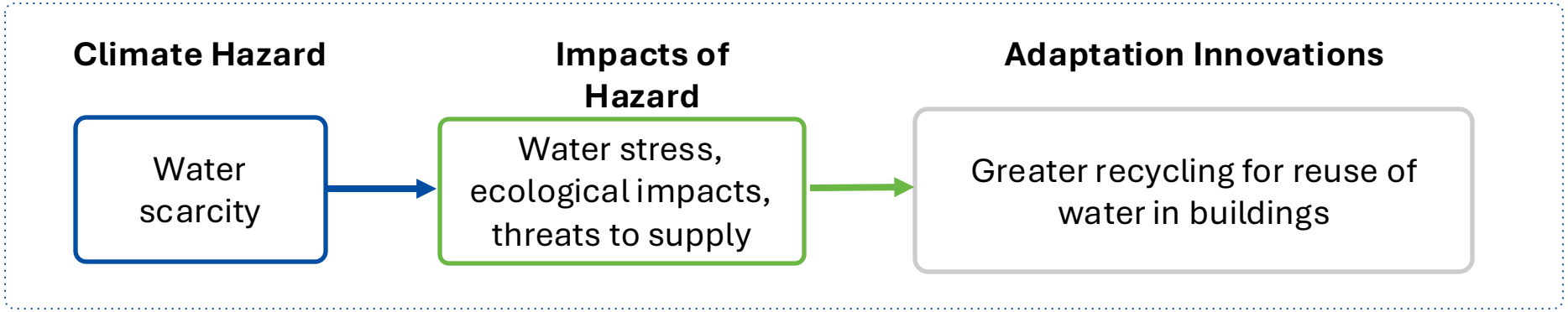
Alis Algae Innovation Solutions (Mexico)

Environmental bioremediation

Provides: Products **To** Businesses **Capacity:** absorptive, adaptive

Water treatment for reuse

- Microalgae for removal of nitrogen & phosphorus from water bodies & industrial/wastewater
- Low cost, circular, no chemical inputs, odourless; produce water for irrigation feedstock
- Microalgae extracts for food and cosmetics



https://www.alismty.com/

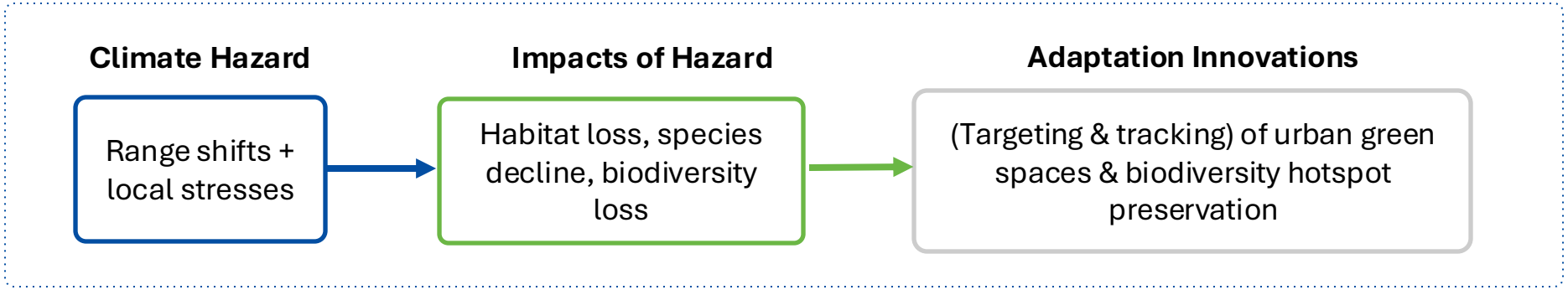
Gentian (UK)

Precision monitoring for biodiversity

Provides: Services **To:** Private sector/government **Capacity:** Adaptive

Machine learning & remote sensing to

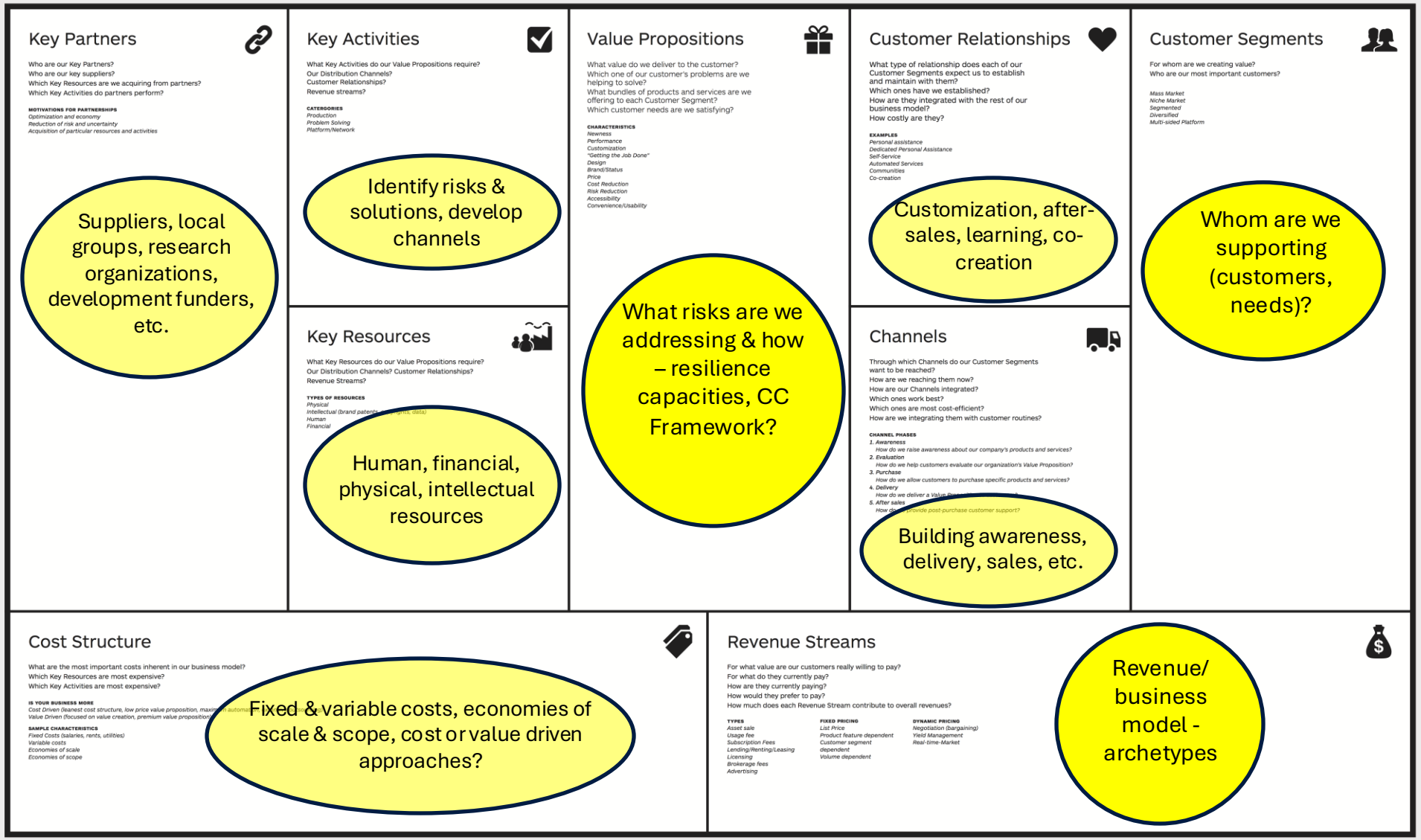
- Map habitat types using AI algorithms + satellite data to measure & predict biodiversity based on vegetation
- Assess urban green infrastructure for adaptation & identify buildings for green roof retrofitting
- Biodiversity baselines & tracking land use change, e.g. for compliance with biodiversity legislation
- Provides services for developers, landowners, municipalities, real estate agents, large corporations
- Reduce costs, increase transparency & scalability of assessments, which are done remotely



https://www.gentian.io/

Adaptation & Resilience in the

Business Model Canvas



This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

Business model archetypes

What archetypes are most relevant for adaptation & resilience businesses?

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

BUSINESS MODEL ARCHETYPES

- Provide on Demand
- Razors & blades
- Product Financing
- Hidden Revenue
- Subscription
- Freemium
- Franchise
- Marketplace
- Social Enterprise
- Aggregators
- Cooperative
- Public Good

This action is supported by the European Institute of Innovation and Technology (EIT).
A body of the European Union

SOME COMMON ARCHETYPES (1)

Provide on demand

Produce products or services continuously or when demand is expressed & extract value from direct sales

Equipment, seeds, advisory services, etc.

Razors & blades

Sell core product at low price & extract value from sale of non-durable parts for use with core product

Equipment with non-durable components or that requires servicing

Product financing

Lease or rent a product – part of lease or rent is a fee, part down-payment

Equipment, micro-finance bundling

Hidden revenue

Main revenue from 3rd party that cross-finances provision of product or service to potential buyers

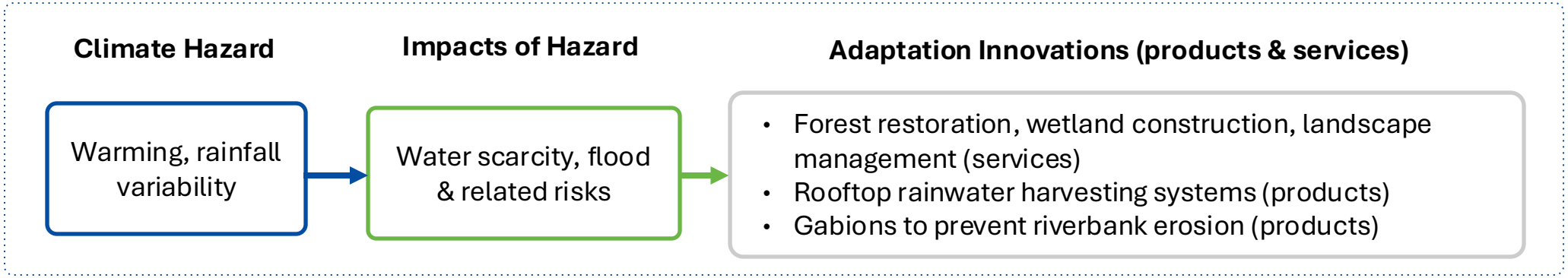
Public goods paid for by government, donors, MDBs, provided by business

RENAR (MEXICO)

Nature based solutions for sustainable water management

Model: Provide on Demand **Capacity:** Absorptive **Provides:** Products & services **To:** Companies, govts.

- Adaptation & resilience needs addressed – see above
- Customers: large-scale interventions – companies, govts.; smaller – communities, households
- Revenue model: direct selling through provide on demand model
- Engagement: private sector, local govt., communities in areas subject to interventions
- Evolving needs: risks may change due to evolution of hazards, settlement, economic activities
- Keeping pace: track hazards through climate data, maintain engagement with stakeholders



This action is supported by the European Institute of Innovation and Technology (EIT).
A body of the European Union

SOME COMMON ARCHETYPES (2)

Subscription

Recurring revenue via a regular fee for products or services

Weather & climate forecasts, advisories

Freemium

Offer basic product or service at no cost and charge a premium for more advanced features

Equipment with non-durable components or that requires servicing

Franchise

Franchisee pays fee to use larger business' (franchisor's) trade name & operating system

Resilience products, consultancies

Marketplace

Physical or virtual space (or platform) where buyers meet sellers

Adaptation marketplaces linking providers & customers

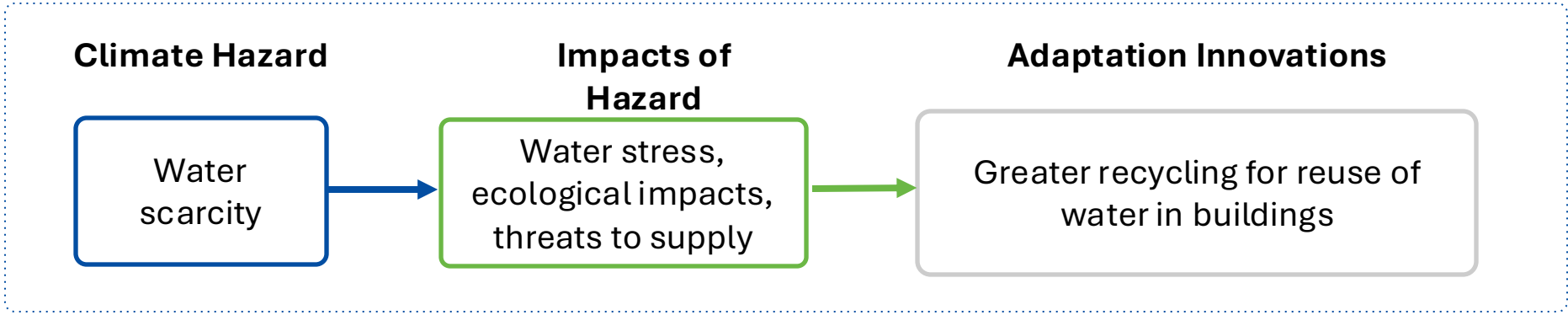
Water Offsets (UK)

Greywater recycling

Business model: Provide on demand+ **Capacity:** Absorptive, adaptive **Provides:** Products, services **To:** Households. businesses

Water Neutrality software & hardware

- Water reduction, reuse and offsetting, using technology such as Hydraloop with complementary monitoring
- Efficiency, metering, recycling, offsetting within same catchment (water bank)
- Trialled in UK and deploying in Monterrey & São Paulo to reduce water consumption by 25%



https://www.wateroffsets.co.uk/

This action is supported by the European Institute of Innovation and Technology (EIT).
A body of the European Union

SOME COMMON ARCHETYPES (3)

Social enterprise

Sell products and/or services to serve a useful social purpose, e.g. provide employment, livelihoods.

Products derived from resilient & sustainable materials

Aggregators

Brining together small producers to increase efficiency, access to markets, services, etc.

Micro-finance, smallholder insurance, contract farming

Cooperative

Business owned & operated by its members (individuals, households, businesses, etc.)

Resilient production with profits invested in adaptation

Public goods

business provides public goods that are paid for by government or other source (*cf* hidden revenue)

Early warning systems, information gathering, extension services

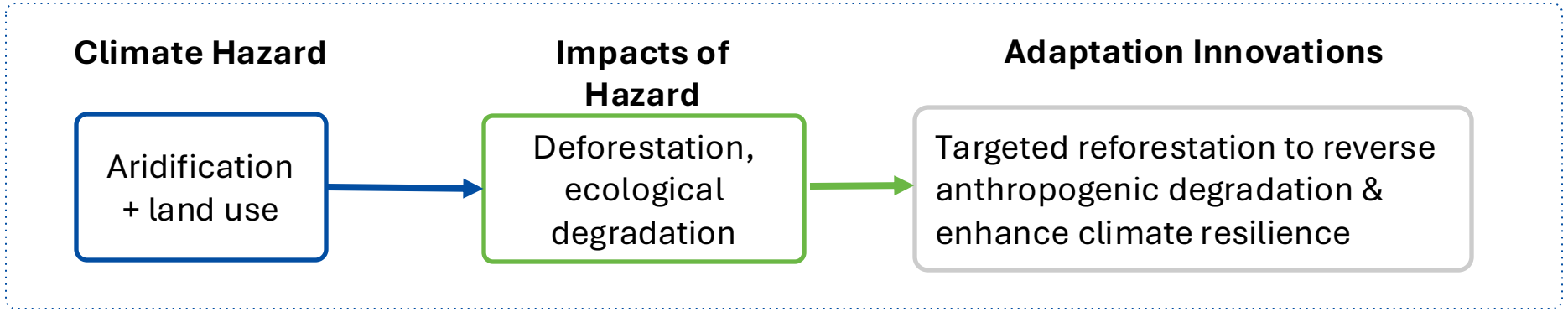
Seed Bombs Tanzania

Supply chain traceability

Business model: Public good | **Capacity:** Absorptive, adaptive | **Provides:** Products & services | **To:** Communities

Training students in conservation & reforestation via seed bombs

- Training programs targeting teachers & students who then distribute tree seeds via Seed Bombs
- Leverages indigenous knowledge & community involvement
- Climate change mitigation via carbon sequestration in new tree cover
- Supported by various partners including national & local government, private sector, non-profits



https://seedbombstanzania.org//

BUSINESS MODEL ARCHETYPES

- Provide on Demand
- Razors & blades
- Product Financing
- Hidden Revenue
- Subscription
- Freemium
- Franchise
- Marketplace
- Social Enterprise
- Aggregators
- Cooperative
- Public Good

BUSINESS IMPACT

At Climate KIC, we use the Adaptation and Resilience assessment tool to empower start-ups to articulate the impact of their adaptation innovations with confidence, equipping them with a foundational set of key performance indicators (KPIs). It offers a tailored approach to gathering both quantitative and qualitative data, transforming them into actionable insights.

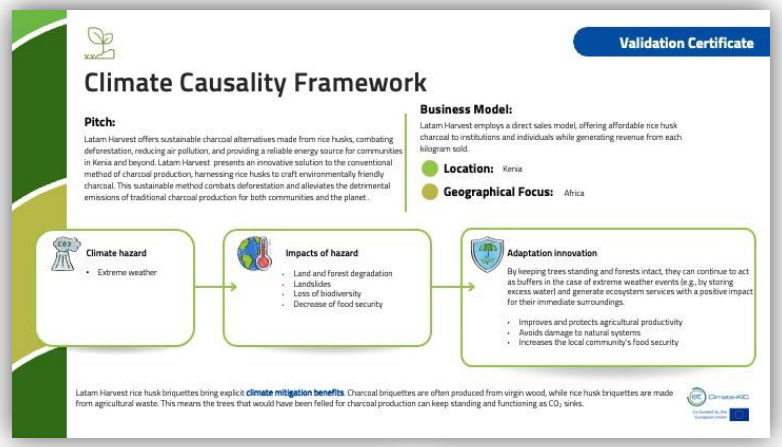
Our three indicators are:

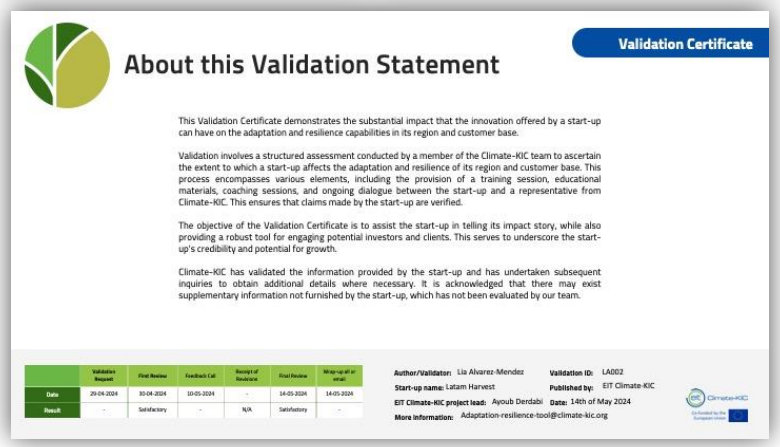
People
How many people are directly and indirectly impacted by your innovation?

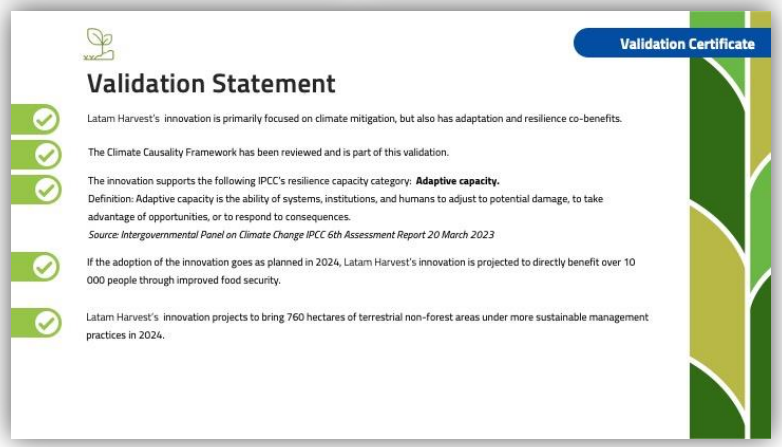
Planet
How many hectares of natural resource areas are being brought under climate-resilient management practices with or due to your innovation?

Economy
What is the value of physical assets your innovation makes more resilient to the effects of climate change?

ADAPTATION & RESILIENCE REPORT

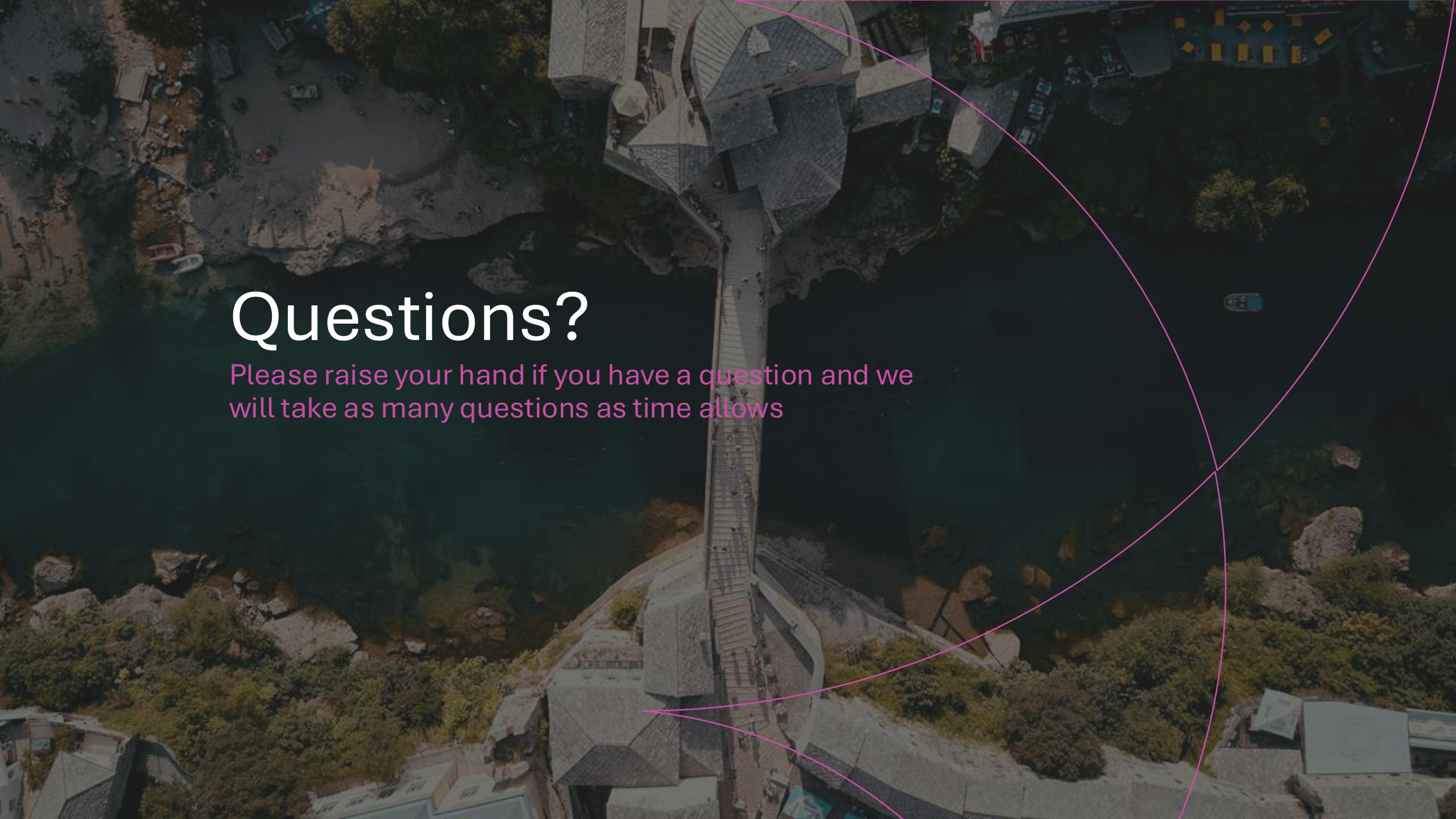






KEY LERNINGS

- Climate change is **intensifying climate hazards & impacts -** adaptation & resilience are key
- Businesses can help reduce these impacts & the associated risks & costs by supporting the **resilience capacities** of their customers to anticipate, absorb, adapt & transform
- Adaptation & resilience businesses can use the **Climate Causality Framework** to identify innovative **products and services** that enhance these capacities for their customers
- Products & services can be delivered using a multitude of **business model archetypes**
- All archetypes are relevant to adaptation & resilience, but some less common archetypes are especially relevant, e.g. for hard-to-reach customers & delivering public good
- Businesses need to **demonstrate impact** - how will they build resilience capacities?



Questions?

Please raise your hand if you have a question and we will take as many questions as time allows

Thank you!

This action is supported by the European Institute of Innovation and Technology (EIT).

A body of the European Union

FEEDBACK

Please scan the following QR code or use the link to access the feedback questionnaire. We would be grateful if you could take 5 minutes to complete it, so that we can improve the learning experience.

https://t.ly/pdvl8