



INTEGRATED POLICY PRACTITIONERS' NETWORK

(IPPN)

Connecting knowledge and practitioners to lead integrated approaches to the SDGs

**Knowledge Café: Climate Risk Toolbox
Designing Climate-resilient Agricultural Investments**

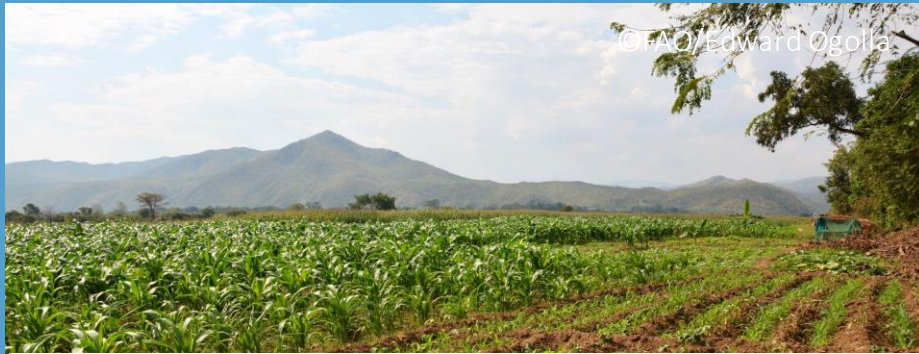
Wednesday, 18 January 2023

Building Resilience of Agricultural Investments through a Holistic Climate Risk Management

Lev Neretin

Environment Workstream Lead, UN Food and Agriculture Organization (FAO)

Climate Risks and Agriculture

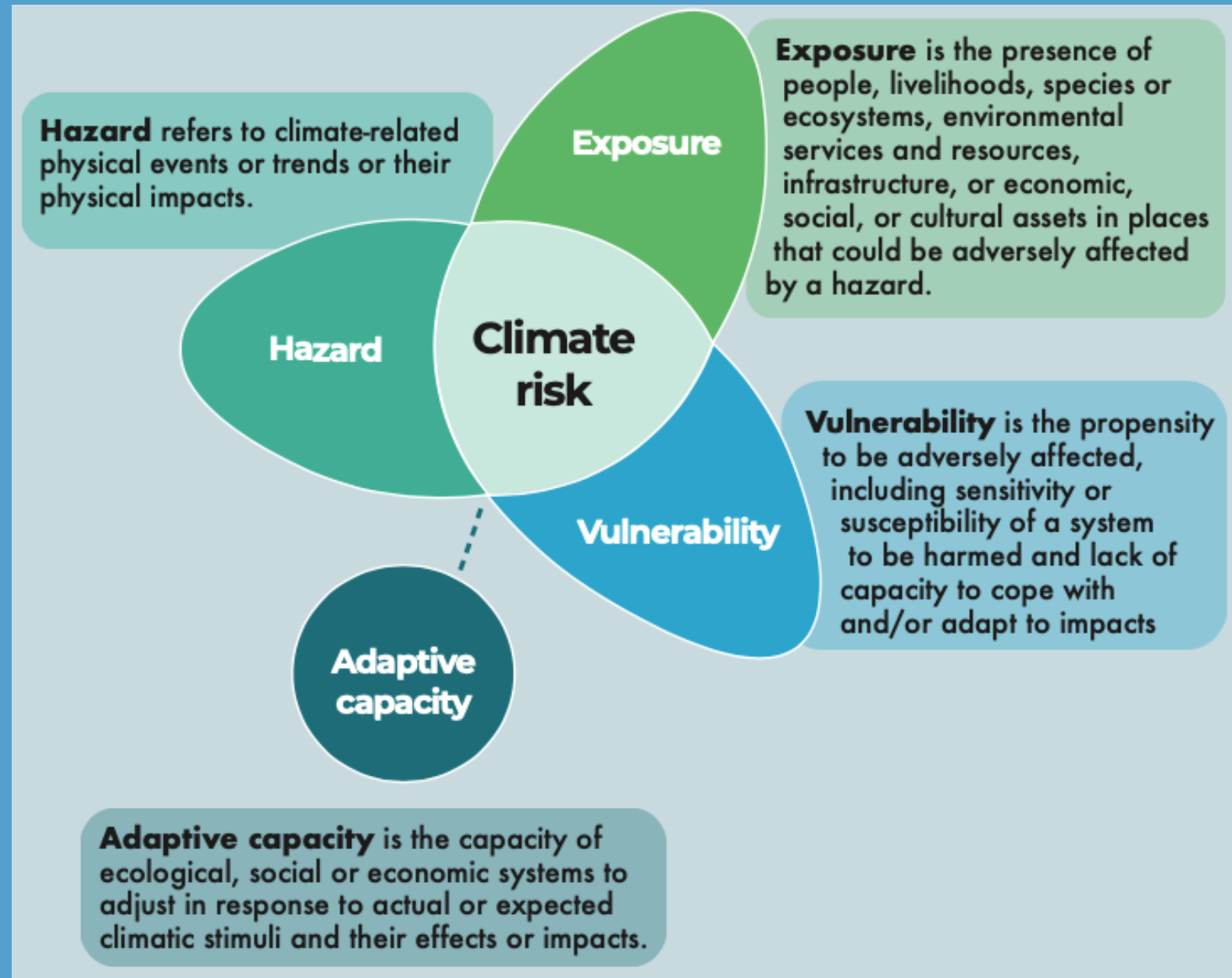


Changes in climate variability, seasonality, and extremes have impacted agriculture and food systems resulting in acute food and water insecurity among millions of people worldwide (IPCC, 2022).



Source: Intergovernmental Panel on Climate Change (IPCC), 2022: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/>

Climate Risk Conceptual Framework



Conceptual Framework

Climate resilience

the ability of agricultural-related social and ecological systems to anticipate and prepare for, as well as adapt to, absorb, and recover stronger from climate and extreme weather impacts.

Climate risk management

ensures that climate risks are identified and assessed at each stage of projects and policies, including the identification of climate change hotspots, the vulnerability of agricultural systems and targeted communities, and finally by integrating proposed policy and project interventions to increase resilience

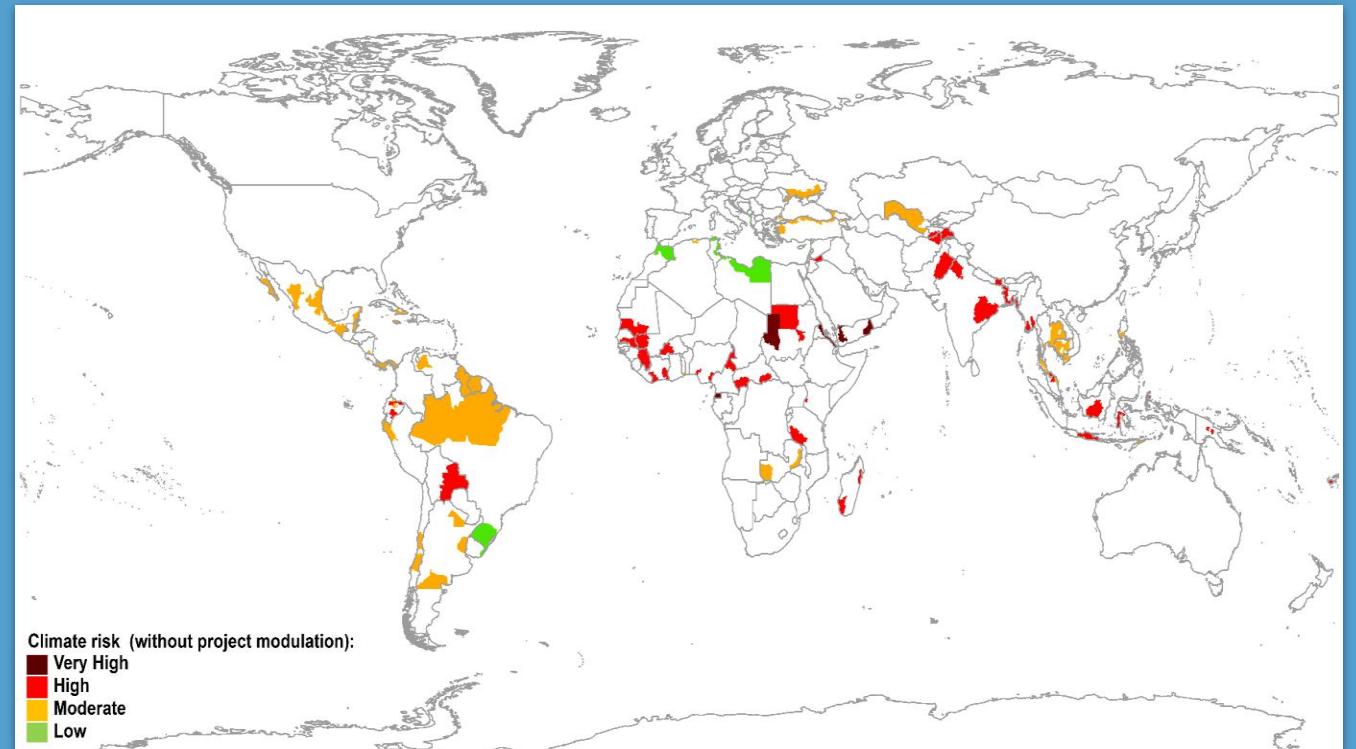
Integrating climate risk management with agricultural finance and policy at FAO

FAO Climate Change Strategy 2022-2031:
Mainstreaming climate risk management into FAO programming

Application of the climate risk framework in climate and environment finance (e.g., **FAO - Global Environment Facility - GEF project pipeline**)

Climate change and disaster risk reduction standard of **FAO's Framework for Environmental and Social Management (FESM)**

Development of climate risk profiles to inform **Common Country Analysis (CCA) and the UN Sustainable Development Cooperation Framework (UNSDCF)**, forthcoming

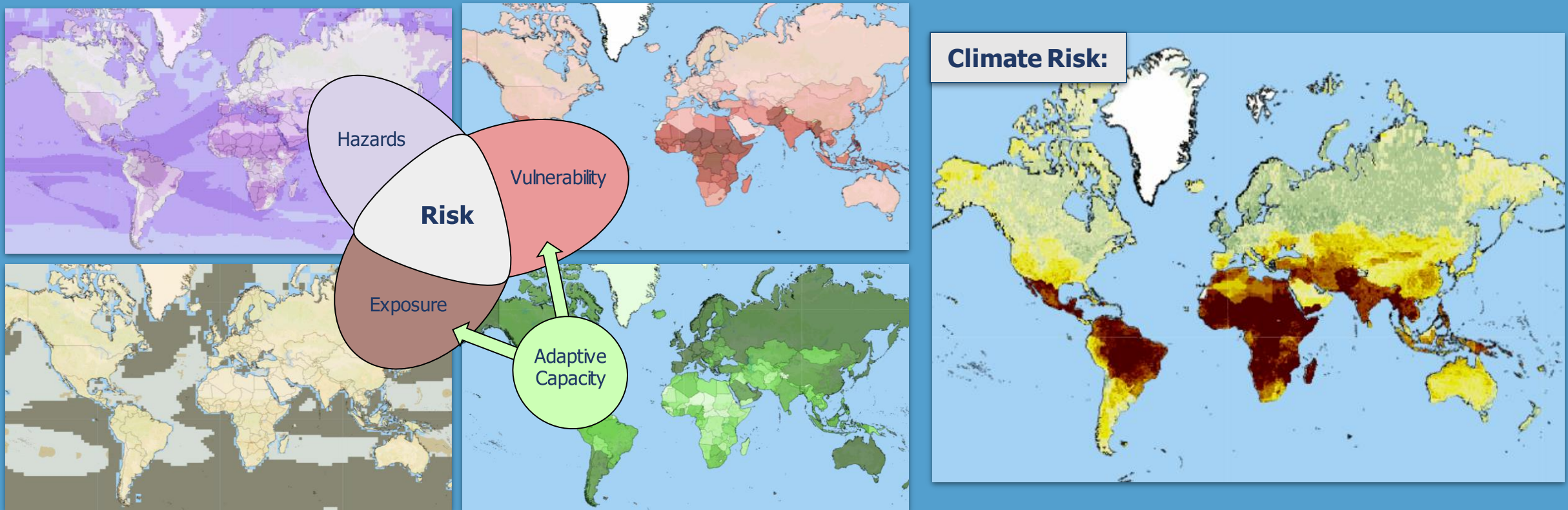


Climate Risk Toolbox (CRTB): A Tool for Designing Climate-resilient Agricultural Investments

Arianna Galletti

Climate Risks and Value Chains Specialist, FAO

Climate Risk Toolbox (CRTB)

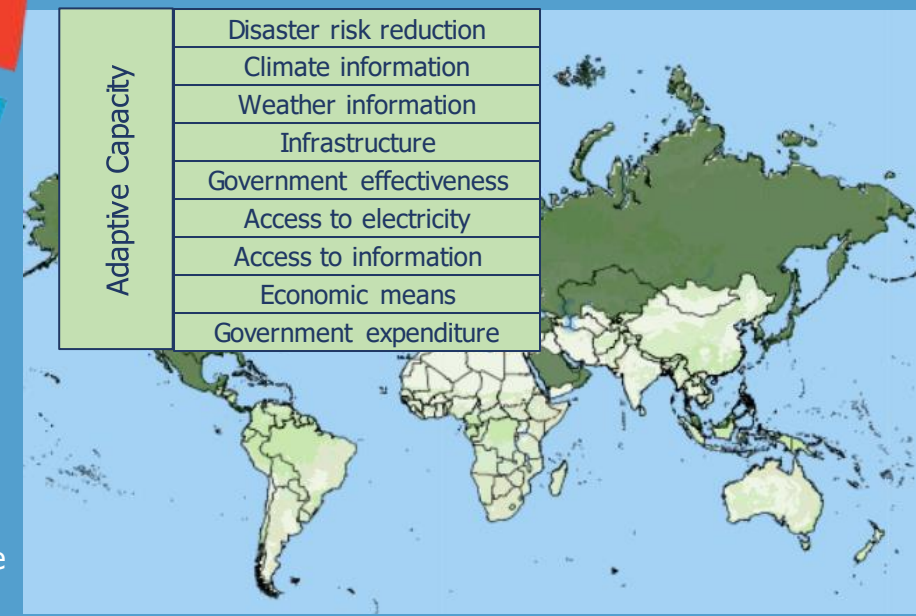
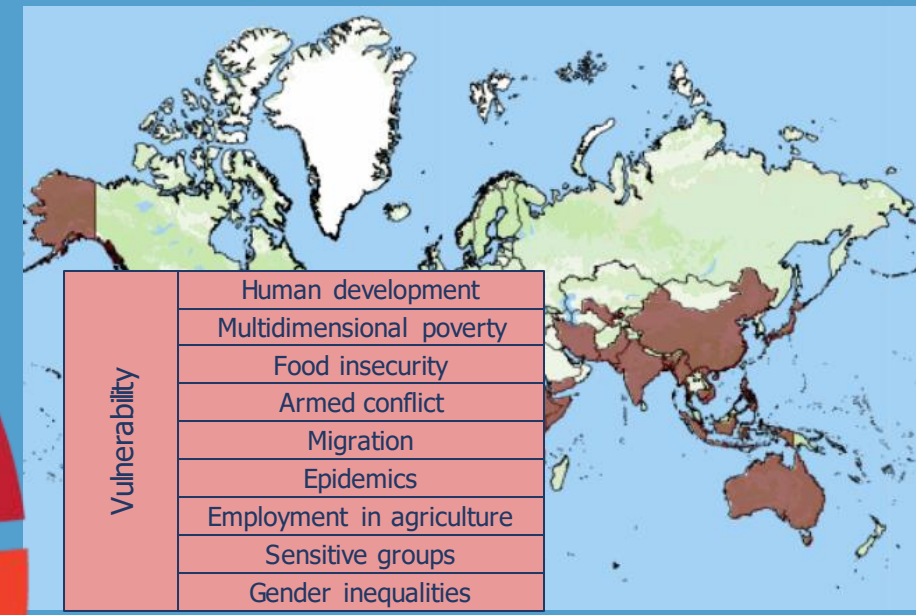
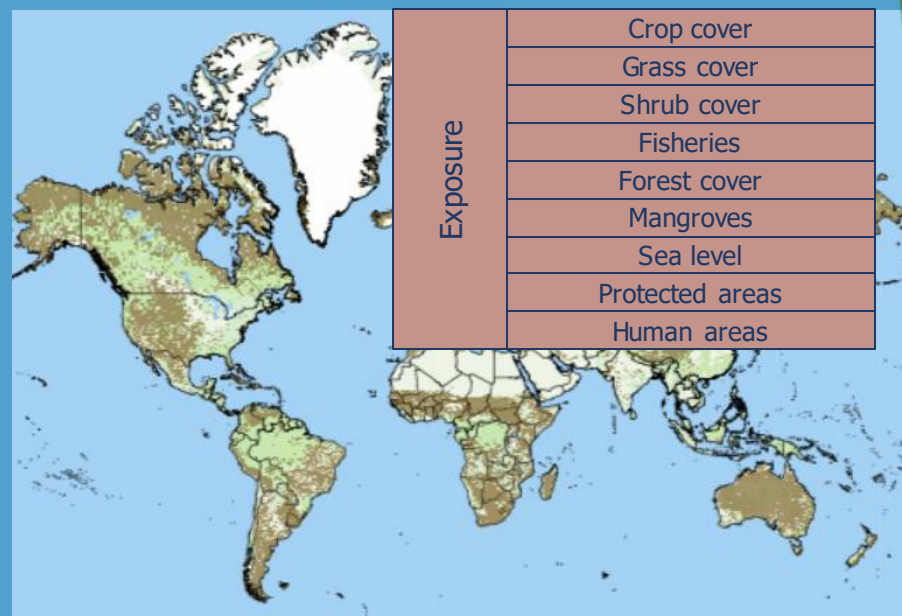
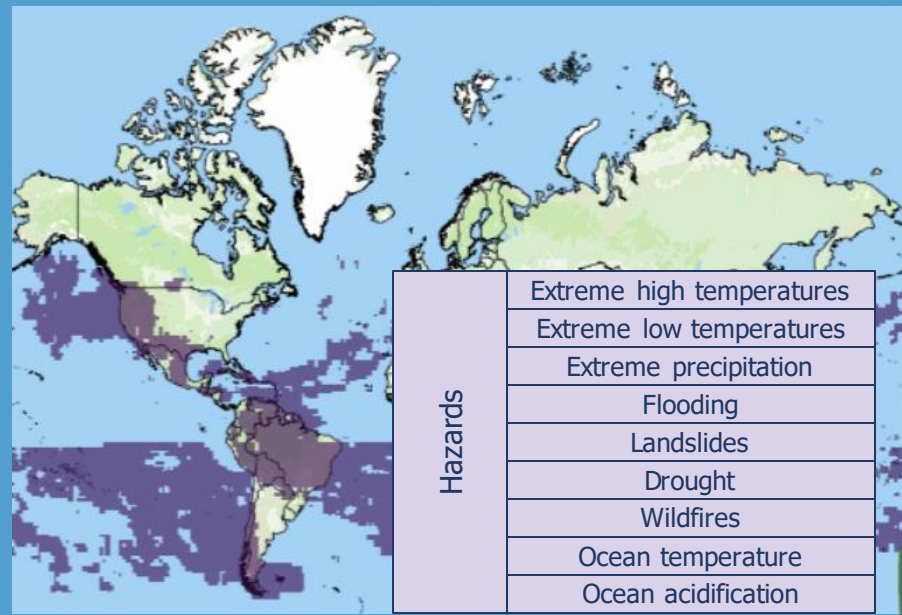


FAO, 2022. Climate Risk Toolbox. In: FAO. Rome. <https://data.apps.fao.org/crtb/>

FAO, 2022. FAO Hand-in-Hand (HIH) Geospatial Platform. In: FAO. <https://data.apps.fao.org/>

FAO, 2023. Climate Risk Toolbox – Guiding material for climate risk screening. Rome. <https://doi.org/10.4060/cc2909en>

CRTB for Sustainable Development Goals



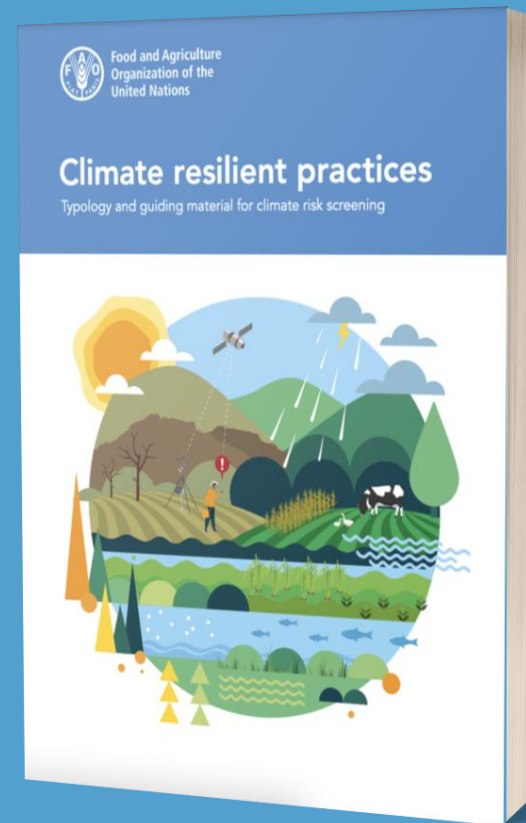
FAO, 2023. Climate Risk Toolbox – Guiding material for Climate Risk Screening. Rome. <https://doi.org/10.4060/cc2909en>

CRTB for Climate Risk Screenings

Aim: to ensure that climate risks are fully identified and addressed at early stages of designing FAO projects and programmes to strengthen climate-resilient development.

Structure

- Hazard screening: climate baseline, past and future climate trends;
- Exposure & vulnerability screening: climate impacts to agricultural-related social and ecological systems;
- Adaptive capacity screening: national adaptation framework;
- Tailored recommendations to project interventions;
- Results of the climate risk screening checklist;
- Modulation of climate risks by the project/policy
- Overall risk calculation



HAZARDS	PRACTICES	DESCRIPTION AND ADAPTATION/MITIGATION BENEFITS
 EXTREME HEAT	Heat tolerant crops (e.g. quinoa, pearl millet, sorghum) or crop varieties	<ul style="list-style-type: none">■ Promote crops and/or crop varieties with a higher heat tolerance and/or optimal heat range.■ Enhance yields in areas where temperatures are expected to exceed heat thresholds that are harmful to existing cropping systems.
	Short cycle varieties	<ul style="list-style-type: none">■ Reduce the effect of heat stress at key phenological phases (germination and flowering) and improve final yields.■ Reduce plants' exposure to heat by shortening the growing cycle.■ Reduce the total water requirements during the growing season.
	Optimizing crop calendars	<ul style="list-style-type: none">■ Optimal crop calendars based on historical climate data and seasonal forecasts support decision-making, avoiding heat-stress conditions at crop's sensitive phenological phases, and increasing yields.
 WILDFIRE	Firebreaks (e.g. rock walls, roadways, high moisture and low resin plants, flame-retardant plants)	<ul style="list-style-type: none">■ Limit the spread and impact of wildfires on crops.■ Reduce social, environmental, and economic losses deriving from wildfires.■ Decrease air pollution by reducing black carbon emissions.
 STRONG WINDS	Windbreakers	<ul style="list-style-type: none">■ Rows of trees can protect crops by breaking strong winds, reducing soil erosion, increasing crop yields, and protecting livestock from heat and cold conditions.
 COLD, FROST & HAIL	Frost protection (e.g. plant row covers, irrigation, anti-frost candles, mulching, wind machines)	<ul style="list-style-type: none">■ Row covers increase downward long-wave radiation at night and reduce heat losses by convection and advection.■ Frost protection irrigation allows the release of latent heat fusion when water turns into ice, protecting the plant's canopy from extreme cold temperatures.■ Anti-frost candles can increase the air temperature and reduce the plant's exposure to frost.■ Low or walk-in tunnel greenhouses warm the soil and protect plants from frost and wind.■ Canopy cover can provide protection against frost damages by reducing net radiation losses.

Major Steps of the CRTB

Draw an area
Click to add another point

Done

Climate Risk Toolbox

Parameters Hazard Exposure Vulnerability Adaptive Capacity

Time horizon

Baseline (1981-2010) Near-term (2021-2040) Mid-term

Shared Socio-Economic Pathway (RCP)

Low Emission Scenario (SSP1-2.6) High Emission Scenario (SSP5-8.5)

Available Data (Baseline)

Available Data (Near-term - SSP1-2.6)

Available Data (Near-term - SSP5-8.5)

Available Data (Mid-term - SSP1-2.6)

Available Data (Mid-term - SSP5-8.5)

My Data

Name	Area 1 - Baseline	Area 1 - Near-term - RCP_2.6	Area 1 - Near-term - RCP_8.5	Area 1 - Mid-term - RCP_2.6	Area 1 - Mid-term - RCP_8.5
Hazard	0.22	0.22	0.22	0.22	0.22
Exposure	0.67	0.67	0.67	0.67	0.67
Vulnerability	0.33	0.33	0.33	0.33	0.33
Adaptive Capacity	0.11	0.33	0.33	0.33	0.50
Climate Risk	0.67	0.89	0.89	0.89	1.06

Open: Area 1 - Climate Risk Report

Data URL

Download the currently selected data in CSV format

Give Feedback

Major Steps of the CRTB: Automatic Report



Food and Agriculture Organization of the United Nations

Climate Risk Screening

Office of Climate Change, Biodiversity and Environment (OCB)

Project title: Area 1 - Climate Risk

Country: _____

Project area: Area 1

Screening completed by: _____

Date of the screening: Fri Sep 30 2022

Climate risk classification without project modulation:

- Baseline (1981-2020): Moderate Risk - (0.49)
- Near-Term (2021-2040) - SSP1-2.6: Moderate Risk - (0.57)
- Near-Term (2021-2040) - SSP5-8.5: Moderate Risk - (0.57)
- Mid-Term (2041-2060) - SSP1-2.6: Moderate Risk - (0.57)
- Mid-Term (2041-2060) - SSP5-8.5: High Risk - (0.61)

Filter questions (to be completed by the screener)	Yes	No
Does climate pose a risk to the project area?		
Are the proposed project activities affected by weather and climate?		

¹ Agro-chemical, capacity building and institutional training projects are considered as "No"

Table of contents

1. Climate risk screening

- 1.1. Climate risk – Baseline (1981-2020)
- 1.2. Climate risk – Near-term (2021-2040)
- 1.3. Climate risk – Mid-term (2041-2060)

2. Climate risk components and checklist

- 2.1. Hazard
- 2.2. Exposure
- 2.3. Vulnerability
- 2.4. Adaptive capacity

3. Recommendations to project activities

- 3.1. List of advisories to project components
- 3.2. List of climate resilient practices based on observed/projected hazards

4. Modulation of climate risk by the project

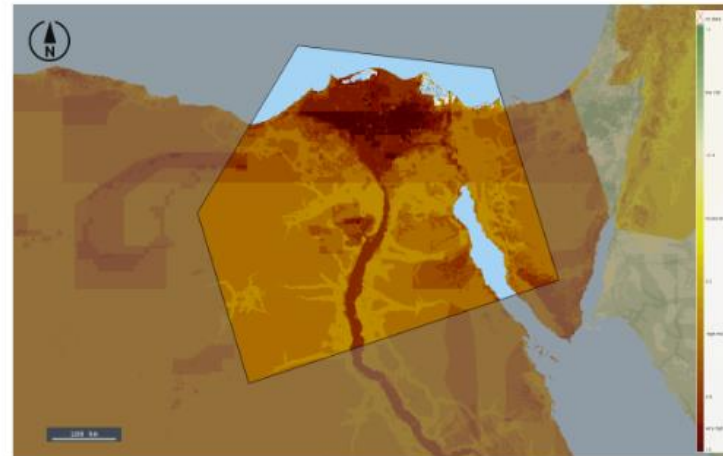
5. References and useful documents

1.1. Climate risks – Baseline (1981-2010)

[SECTION TO BE COMPLETED BY THE SCREENER]

The climate risk of the "xxxx" project is rated as "Moderate Risk (0.49)" (on a scale of low, moderate, high and very high).

Figure 1. Spatial distribution of climate risks for the baseline period (1981-2020) based on hazard probability, exposure of agricultural systems, vulnerability of livelihoods and adaptive capacity of the targeted system



Baseline climate (1981-2010): historical climate hazards in project areas	Yes	No	N/A
Extreme high temperatures: areas where maximum temperatures are above 35°C for at least 30 days on average per year	X		
Extreme Low temperatures: areas where minimum temperatures are below 0°C for at least 15 days on average per year		X	
Extreme precipitation: areas where maximum 1-day precipitation is above 50mm on average per year.		X	
Extreme precipitation: Areas prone to flood events with 100-year return period.		X	
Landslide: areas where median annual rainfall-triggered landslide is above 0		X	
Drought: areas where the Standardized Precipitation Index is below 0%		X	
Wildfires: areas where the fire frequency is above 1 on average per year		X	
Ocean temperature: areas where the temperature of the sea at surface level is above 25°C		X	
Ocean acidification: areas where pH at surface is below 8.085		X	

Note: Yes = above the specified threshold, No = below the specified threshold, N/A = not applicable

3.2. List of climate resilient practices based on observed/projected hazards

Table xxx. Climate resilient practices on biodiversity based on potential hazards

Climate change and weather extremes	Climate envelope shifts	Genetic diversity losses
<ul style="list-style-type: none"> - Ecosystem-based adaptation and nature-based solutions. - Habitat corridors and reforestation - Translocate species to more suitable environments - Buffer zones around protected areas - Remote sensing technologies for biodiversity monitoring - In-depth assessments on species responses to climate change 	<ul style="list-style-type: none"> - Robust understanding on biodiversity and shifts in species, both native and invasive - Preservation of germplasm and living genetic resources - Incorporate climate topics in the development of training curricula - Early warning systems, including day-to-day weather observations 	<ul style="list-style-type: none"> - Enable changes in genetic composition to cope with forthcoming environmental changes - Include species with a greater tolerance to abiotic and biotic stresses - Diverse ecosystems are more efficient carbon sinks - Diverse ecosystems support climate change adaptation by providing more diversified natural and food resources besides reducing exposure/vulnerability to climate hazards

Table xxx. Climate resilient practices for cropping systems based on observed and projected climate and weather related hazards

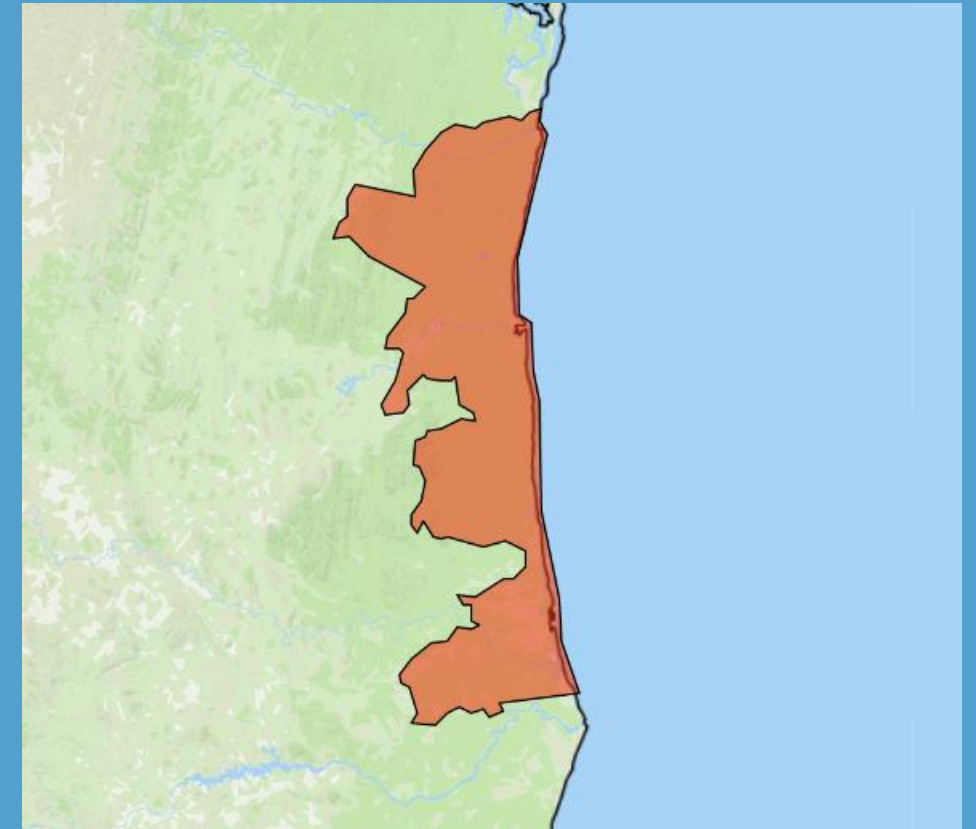
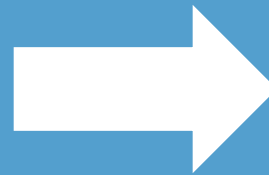
Extreme heat	Land degradation and GHG emissions	Drought	Heavy rainfall	Cold, frost and hail	Pests and diseases
<ul style="list-style-type: none"> - Heat tolerant crops - Short cycle varieties - Optimize crop calendars - Supplementary irrigation 	<ul style="list-style-type: none"> - Minimum/zero tillage - Crop residues - Bio-fertilizers - Split fertilization - Machine transplanting - Direct seeding into crop residues - Site-specific nutrient management - Remote and proximal optical sensors 	<ul style="list-style-type: none"> - Drought tolerant crop - Agroforestry - Weeding - Harrowing - Grafting - Mulching - Half-moons - Zai pit systems - Terracing - Drip irrigation system - Programmed irrigator - Small reservoirs 	<ul style="list-style-type: none"> - Raised bed systems - Field dredging - Field levelling 	<ul style="list-style-type: none"> - Plant row covers - Mulching - Optimize crop calendars - Hail protection nets - Greenhouses 	<ul style="list-style-type: none"> - Biological control - Crop rotations - Bio-pesticides - Pheromone traps - Inter-cropping - Integrated Pest and Disease Management (IPDM) - Vegetative covers - Biodiversity islands

4. Modulation of climate risks by the project [SECTION TO BE COMPLETED BY THE SCREENER]

	MODULATION OF CLIMATE RISKS	PROJECT OUTCOMES				URGENCY LEVEL
		XX	XX	XX	XX	Needs more action (less than 3 project activities answer the question); Current action is appropriate (3 or more project activities answer the question); NA (there are no project activities answering the question)
		XX	XX	XX	XX	
POLICY AND PLANNING	Does the project support the integration of climate risks into policies, planning and management frameworks? Does the project explicitly support the increased use of climate data and information in policy development, planning and management? Does the project invest in institutional development and capacity-building for institutions involved in climate related activities?					
CAPACITY BUILDING	Does the project invest in increased information and dissemination of climate-related information to target groups? Does the project invest in strengthening resilience (e.g., through access to climate data, information and services, training etc.) of the most affected and at-risk socio-economic groups? Does the project support equitable access and the capacity of target groups to utilize and apply climate and early warning services at farm level?					
DATA GATHERING	Does the project support the infrastructure and technologies necessary to collect and monitor climate variables necessary used for policy development and decision-making? Does the project strengthen institutions and their networks by developing the skills required to collect, analyze, and monitor climate related data and information? Does the project support development of databases and repositories of climate data and information?					
MITIGATION	Does the project invest in climate change mitigation measures along the food value chain (e.g., increasing energy efficiency, reforestation, land rehabilitation, reduction of food loss and waste, reduced methane and N ₂ O emissions in livestock sector) that reduces GHGs emissions? Does the contribute to the government's Nationally Determined Contributions and the decarbonization of the agriculture and food systems?					
ADAPTATION	Does the project invest in renewable energy and green technologies? Does the project invest in increasing adaptive capacity and resilience (e.g., climate-smart agricultural practices, soil carbon enhancement, frontier technologies, dietary change, ecosystem restoration)? Does the project promote sustainable natural resources management?					

Practical Applications of the CRTB: Project-level Examples

Conservation of the Atlantic Forest through the sustainable management of cocoa agroforestry landscapes – South Bahia (Brazil)



Practical Applications of the CRTB: Project-level Examples

Climate risk indicators

Baseline climate (1981-2010): historical climate hazards in project areas

	Yes	No	N/A
- Extreme high temperatures: areas where maximum temperatures are above 35°C for at least 30 days on average per year	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Extreme low temperatures: areas where minimum temperatures are below 0°C for at least 15 days on average per year	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Extreme precipitation: areas where maximum 1-day precipitation is above 50mm on average per year	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Extreme precipitation: areas prone to flood events with 100-year return period	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Landslides: areas where median annual rainfall-triggered landslide is above 0 events	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Drought: areas where the Standardized Precipitation Index is below 0%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Wildfires: areas where the fire frequency is above 1 on average per year	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Ocean temperature: areas where the temperature of the sea at surface level is above 25°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Ocean acidification: areas where pH at surface is below 8.085	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Vulnerability of the population in the areas of intervention

	Yes	No	N/A
- Development: countries where the Human Development Index (HDI) is below 0.6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Development: countries where the Multidimensional Poverty Index (MPI) is below 0.6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Food insecurity: countries where the food insecurity prevalence is above 30%	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Armed conflict: countries where conflict is exacerbating population's sensitivity to weather related hazards	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Migration: countries where weather extremes have displaced more than 50 000 people in a year	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Epidemics: countries where humanitarian crises, including health crises, are impeding the population to address the potential impacts of climate change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Economic: countries where more than 30% of the population is employed in the agricultural sector	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Inequalities: countries where there are sensitive groups (indigenous people or other marginalized groups) likely to be affected by climate change impacts	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Inequalities: countries where gender inequalities are likely to be exacerbated by climate change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Exposure of agricultural systems and population to climate hazards in project areas

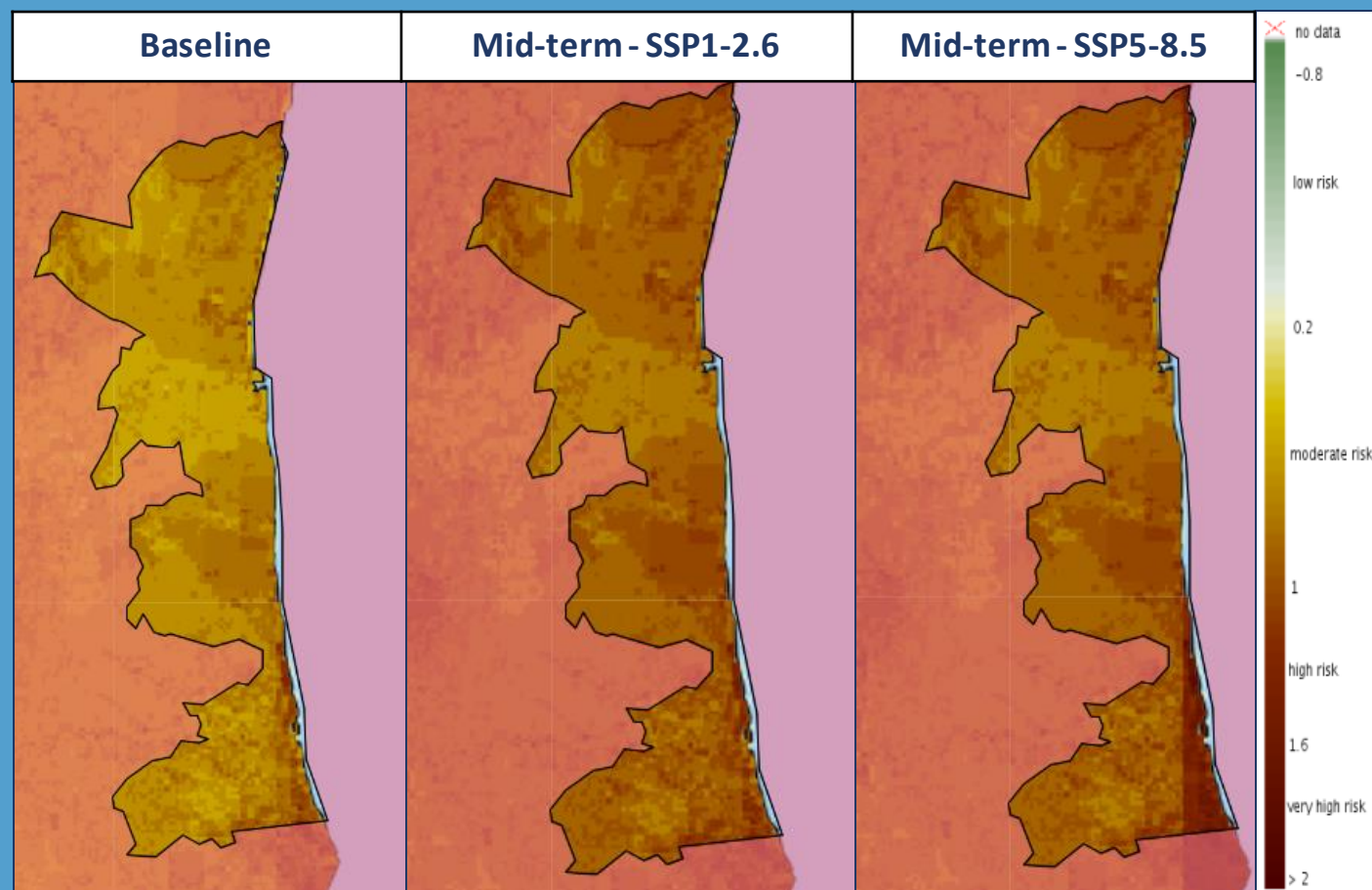
	Yes	No	N/A
- Crop cover: areas where crop cover is above 30%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Grass cover: areas where grass cover is above 30%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Shrub cover: areas where shrub cover is above 30%	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Fisheries: areas where total fish biomass is above the 50 th percentile	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Forest cover: areas where forest cover is above 30%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Biodiversity: areas where there is a presence of mangroves	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Biodiversity: terrestrial and marine protected areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Physical: areas located between 10 meters below and above sea level	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adaptive capacity and Climate Resilience Guiding Questions

	Yes	No	N/A
- Disaster risk reduction: countries where there is an adaptation plan and/or robust risk reduction measures	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Climate information: countries where there are climate information systems relevant for the agriculture sector	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Weather information: countries where there are weather forecasts available	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Communication: distance to roads and markets (less than 1h)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Government effectiveness: countries where government effectively supports local communities to adapt and/or mitigate climate change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Basic needs: countries where most of the population has access to electricity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Access to information: countries where communities have access to information through ICTs, phones, or other means	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Economic: countries where the community has the economic means (>20 000 USD/year) to adapt to climate change and associated hazards	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Economic: share of total government expenditure in agriculture, forestry, and fishing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Practical Applications of the CRTB: Project-level Examples

Climate risk maps



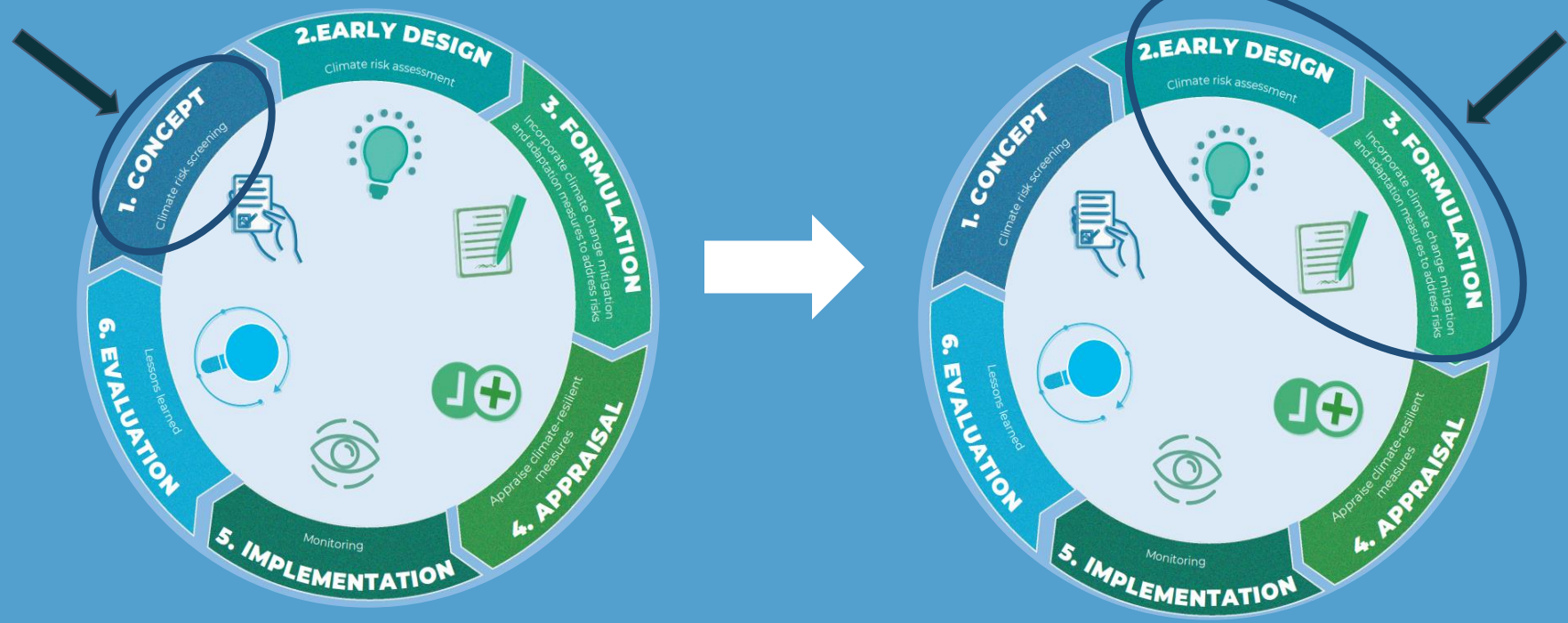
Examples of recommended interventions

- Inter-agency monitoring and coordination between climate, meteorological, agronomic experts, researchers, institutions, and small-holders in decision-making processes;
- Climate-informed tools and analyses: past and future climate change impacts on crops, crop suitability mapping;
- Participatory farm-level engagement: capacity building on tailored climate resilient practices to observed and projected hazards and impacts on forestry and the cocoa value chain.

From Screenings to Climate Risk and Climate Impact Assessments

Climate risk screening

Climate risk assessment



Relevant Resources

For further information on the CRTB and FAO's climate risk management, contact:

ESM-Unit@fao.org

Links to the CRTB and guidance document:

<https://data.apps.fao.org/crtb/>

<https://www.fao.org/documents/card/en/c/cc2909en>

 Learn more about the IPPN:
sdgintegration.undp.org/IPPN

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 Any questions? Drop us a line at:
ippn@sparkblue.org

