Food and Agriculture Organization of the United Nations

Mainstreaming **climate risk management** into FAO programming

Context

The agricultural sectors offer many solutions to reduce greenhouse gas emissions and increase the resilience of communities, ecosystems and the wider economy to climate shocks and change. Agriculture and resilient food value chains play a central role in supporting sustainable development, particularly in developing countries.

The agricultural sectors are however vulnerable to natural hazards and disasters. The negative impacts of climate change and extreme weather events on agriculture and food security are expected to be wide reaching and cross-sectoral. They threaten food security and nutrition, severely impacting the world's poorest and most vulnerable, almost 80 percent of whom live in rural areas.

The effect of climate change on agricultural value chains results in additional risks to the food security and nutrition of people who are directly dependent on them for their food and livelihoods. Climate change risks cascade from the impacts on agro-ecosystems to economic and social development and food security and nutrition at large.

A key element in sustainable and transformative development in agriculture is ensuring that investments are designed and informed by robust evidence about both past and future climate risks.

Our **work**

The **Climate Risks** team within the Office of Climate Change, Biodiversity and Environment of the Food and Agriculture Organization of the United Nations (FAO) has developed a climate risk screening system for agricultural investment projects.

Mainstreaming climate risk management into agricultural investment projects means that climate change must be taken into consideration at every stage of the project cycle.

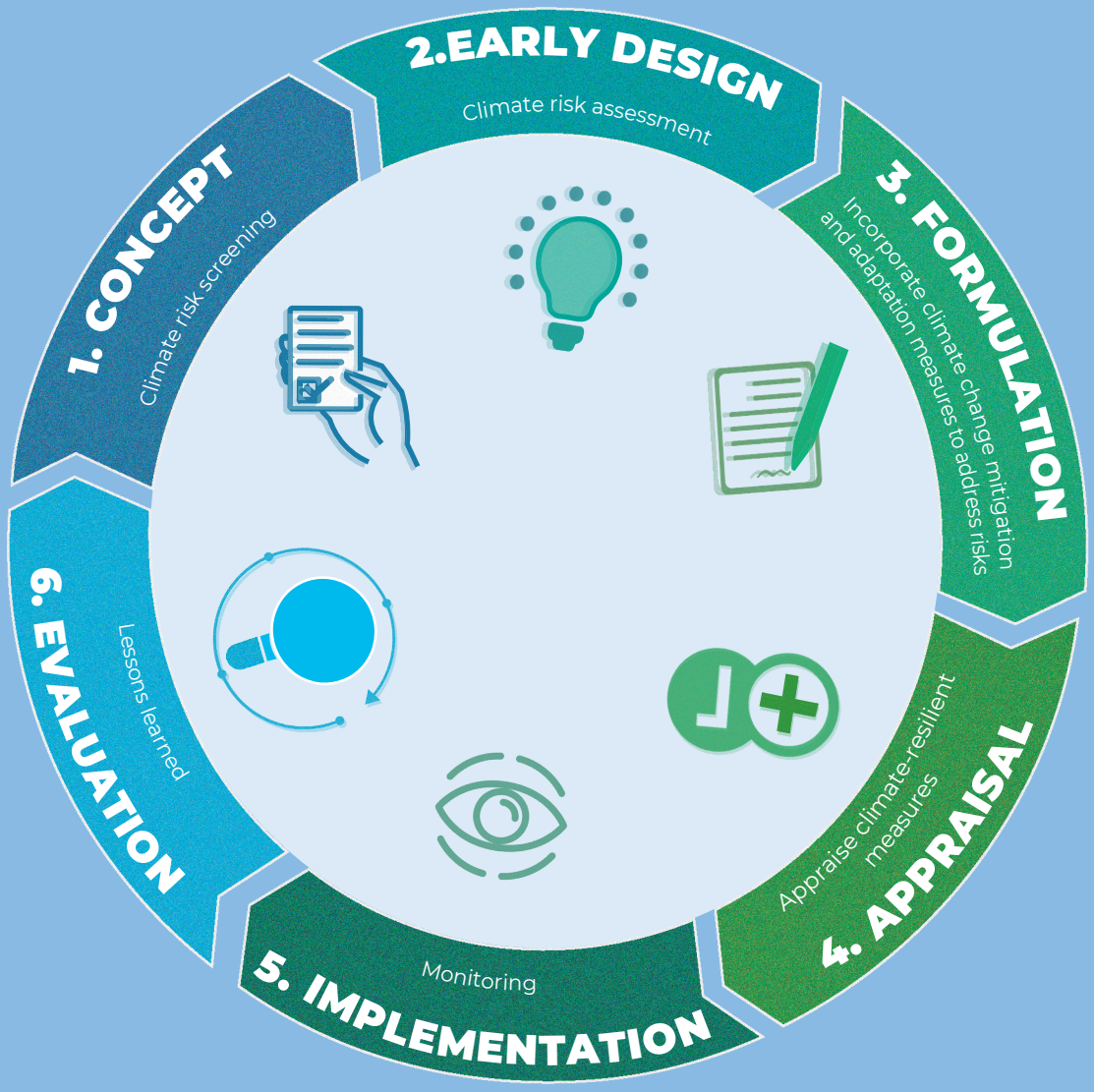
The screening and assessment of climate risks at the earliest stages of a project design supports decision-making related to the project, including the location, identification of climate change hotspots, the vulnerability of agricultural systems, targeted communities, and proposed project interventions to increase resilience.

Climate risk management for **agricultural investment projects**

Climate change considerations should be integrated at every stage in the project cycle, including monitoring climate risks during implementation through to evaluation of lessons learned. This can be done through the annual project implementation reviews (PIR), mid-term reviews (MTR) and terminal evaluations by including climate risk evaluations.

This brochure details the steps FAO is taking to mainstream climate risk management in project design, focusing on the conceptualization and design phases of the project cycle.

Figure 1. Screening and mainstreaming of climate risk management in project design



What is **climate risk?**

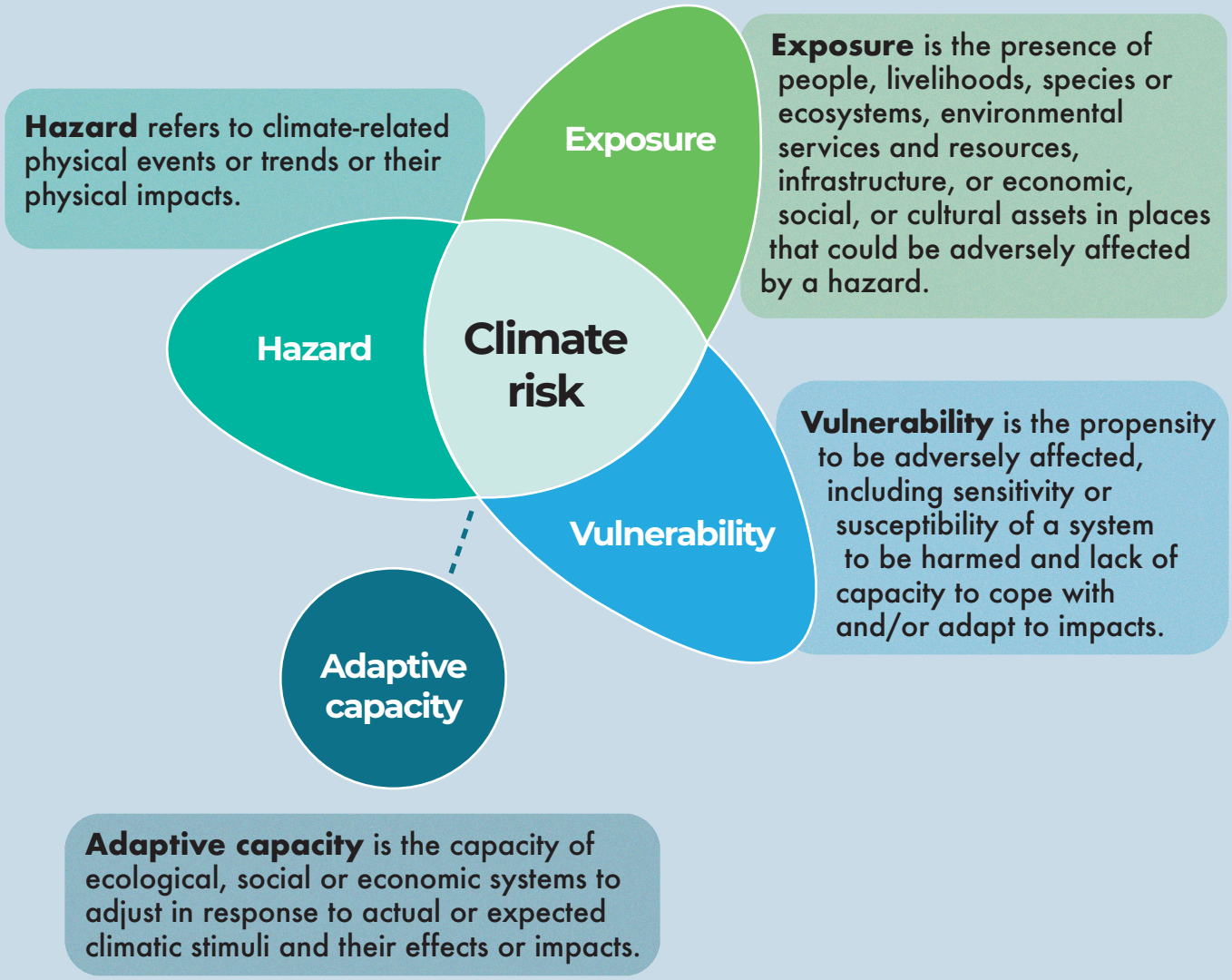
In the context of climate change, "risk" refers to the potential for adverse consequences of a climate-related hazard on the identified system or area.

Risk results from the interaction between the climate-related **hazard**, the **exposure** to the hazard over time and the **vulnerability** and **adaptive capacity** of the affected population or system.

Risk is highest when all three of the components – hazard, exposure and vulnerability – are categorized as high and adaptive capacity is low.

Figure 2. Understanding climate risk

(Adapted from the Intergovernmental Panel on Climate Change)



What is **climate resilience?**

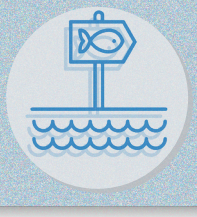
Climate risk identification and assessment means that climate resilient measures can be developed and integrated in projects. In agricultural systems (including crops, livestock, forestry, fisheries and aquaculture), climate resilience refers to a broad set of practices that, for example:

Sustainably enhance the production of crops by protecting and making them more resistant to withstand climate hazards.

Improve the capacity of an animal to be minimally affected in terms of dairy and meat production, morbidity and mortality, and to rapidly return to the health state pertained before being exposed to the disturbance.

Enhance the capacity of forests to recover after extreme weather events (e.g. forest fires) and maintain productivity without compromising the trees' taxonomic composition, structure, and ecological functions.

Improve the capacity of aquatic ecosystems to absorb changes related to climate change.



Climate risk screening: how does it work?

The climate risk screening process determines short- and medium-term climate hazards into the 2050s that may impact or alter the outcomes of an investment project. It assesses whether the project is likely to increase the vulnerability of the expected target populations and ecosystems to climate hazards.

FAO's climate risk screening includes a series of guiding questions to help identify climate-related risks in the proposed project's target area, socio-ecological systems and to the project interventions (Annex 1).

Based on the risks identified, specific recommendations are provided to support the integration of appropriate climate change mitigation and adaptation measures or to enhance the integration of climate change considerations into existing interventions.

Climate risk screening system in **6 steps**

1 Hazard identification

This step identifies the current and future weather-related hazards that are likely to affect agricultural systems (including crops, livestock, forestry, and fisheries and aquaculture) and the population in the project locations. Hazards may include short-term, or extreme weather events (e.g. storm, fire or flood), and slow-onset (chronic) events that occur over a longer period (e.g. drought).

2 Exposure assessment

This step assesses the exposure of the project area to hazards based on information about the population, livelihoods, species or ecosystems, environmental services and natural resources, infrastructure; or economic, social, or cultural assets that could be adversely affected.

3 Vulnerability assessment

This step assesses the degree to which the targeted population and ecosystems are susceptible to the adverse effects of climate change and weather extremes based on available information. Individuals and communities experience different levels of vulnerability depending on factors such as wealth, education, access to information, gender, age, disability, heath.

4 Adaptive capacity assessment

This step assesses the degree to which an ecosystem or a community is able to cope with or adjust to the adverse effects of climate change and weather extremes. Some of the factors which can create an enabling environment for increasing adaptive capacity include:

- access to climate information;
- the presence of a weather observation network and of climate change adaptation and disaster risk reduction plans (including early warning and early action strategies);
- strong land ownership;
- effective institutions;
- access to finance.

5 Climate risk classification

Based on the questions in the screening checklist, the project developer identifies potential climate related risks in the project area classified as 'No/Low', 'Moderate', 'High or 'Very High' risk. The classifications for climate risk are defined as follows.

Very high risk	Project outcomes will be jeopardized by climate change. Climate-related risks are likely to result in financial, environmental, and social disruption and/or systemic failures. Adaptation limits may be reached, or significant loss and damage will occur.
High risk	Project outcomes are highly likely to be impacted by climate change. Financial, environmental and social disruption and/or systemic failures cannot be excluded. Adaptation measures may not be readily available. Incorporation of climate risk management activities are likely to increase resilience and the adaptive capacity of households, infrastructure, communities and ecosystems.
Moderate risk	Project outcomes may be impacted by climate change. Impacts will be limited by space and time, transient or manageable. Financial, environmental and social disruption and/or systemic failure is unlikely. The system has the capacity to manage volatility, shocks, stressors or changing climate trends. Some climate risk management activities should be undertaken to ensure that the risks identified are fully understood and addressed during the project design phase.
Low/no risk	Project outcomes should not be impacted by or will have low impacts from climate change. Financial, environmental and social impacts and/or systemic failure appears very unlikely. Voluntary adaptation measures could be incorporated into the project during design and implementation phases based on the screening recommendations.

6 Modulation of climate risks by the project

Proposed project activities should aim to modulate risks identified through the screening checklist. Risk modulation is assessed qualitatively based on the project objectives and the activities that will directly reduce the climate risks identified.

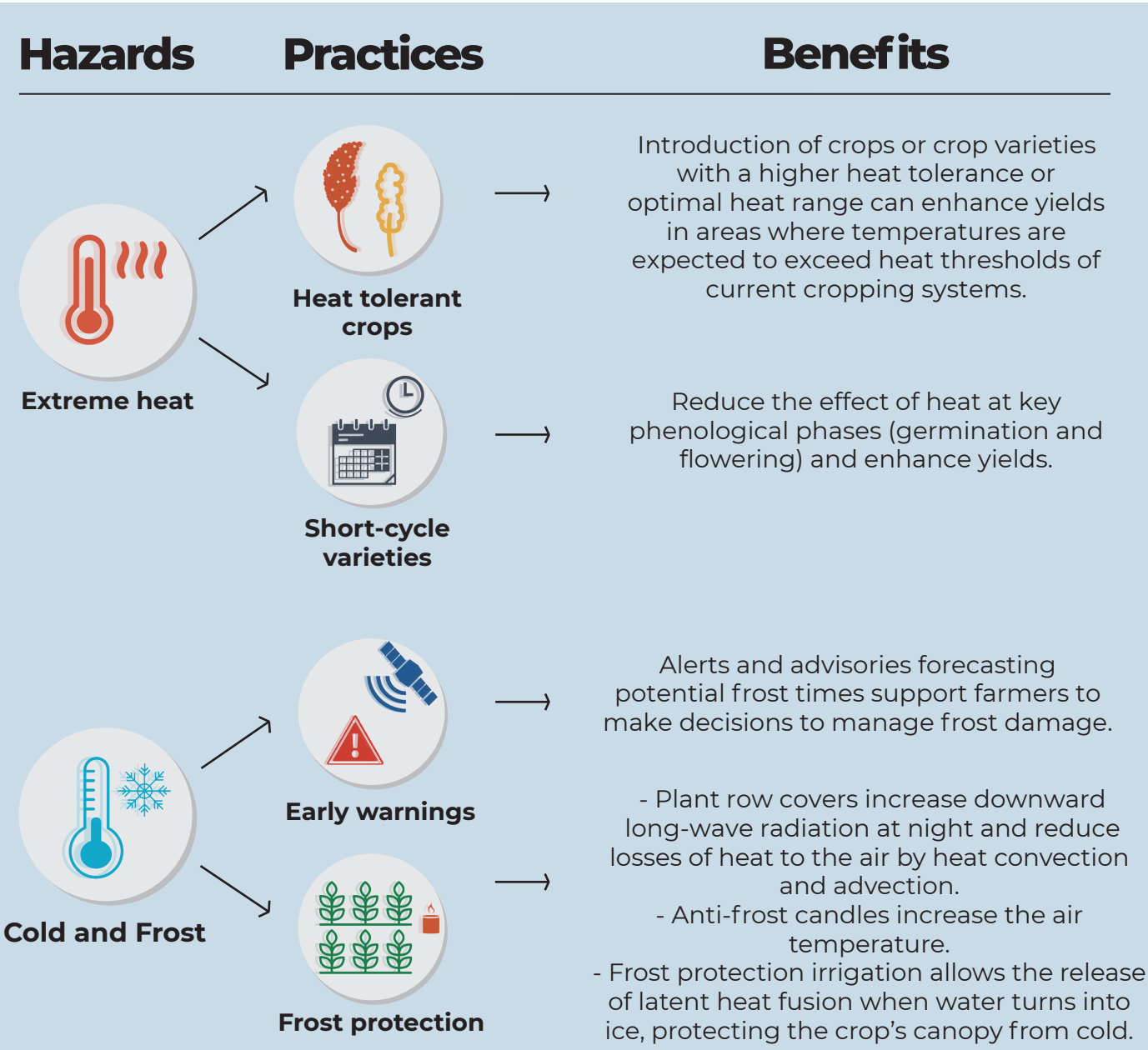
Responses to the guiding questions should aid in the further incorporation of climate risk modulation and mitigation measures during project design. The modulation of risk by the project can be determined as "Robust", "Sufficient" or "Insufficient" as defined below.

Robust modulation	All interventions and resilience measures are fully informed by evidence of current and future climate risks and modulation measures have been integrated to the highest possible extent.
Sufficient modulation	While resilience and modulation measures are present in the current interventions, further measures could be taken to fully modulate the climate risks identified.
Insufficient modulation	If further resilience and modulation measures are not considered, the project is at risk of failing to address climate implications on project implementation and the implications may undermine the results of the project.

Identifying **climate resilient practices**

Once the climate risks have been identified and the level of risk modulation estimated, the next step is the identification and appraisal of climate resilient practices that address the identified risks. These measures are specific to project objectives, sector(s) and context and incorporated or further elaborated during project design. At this stage, a guidance note giving details of appropriate climate resilient practices by sector and by climate risk is available upon request.

Figure 3. Examples of climate resilient practices for hazards of extreme heat and cold/frost

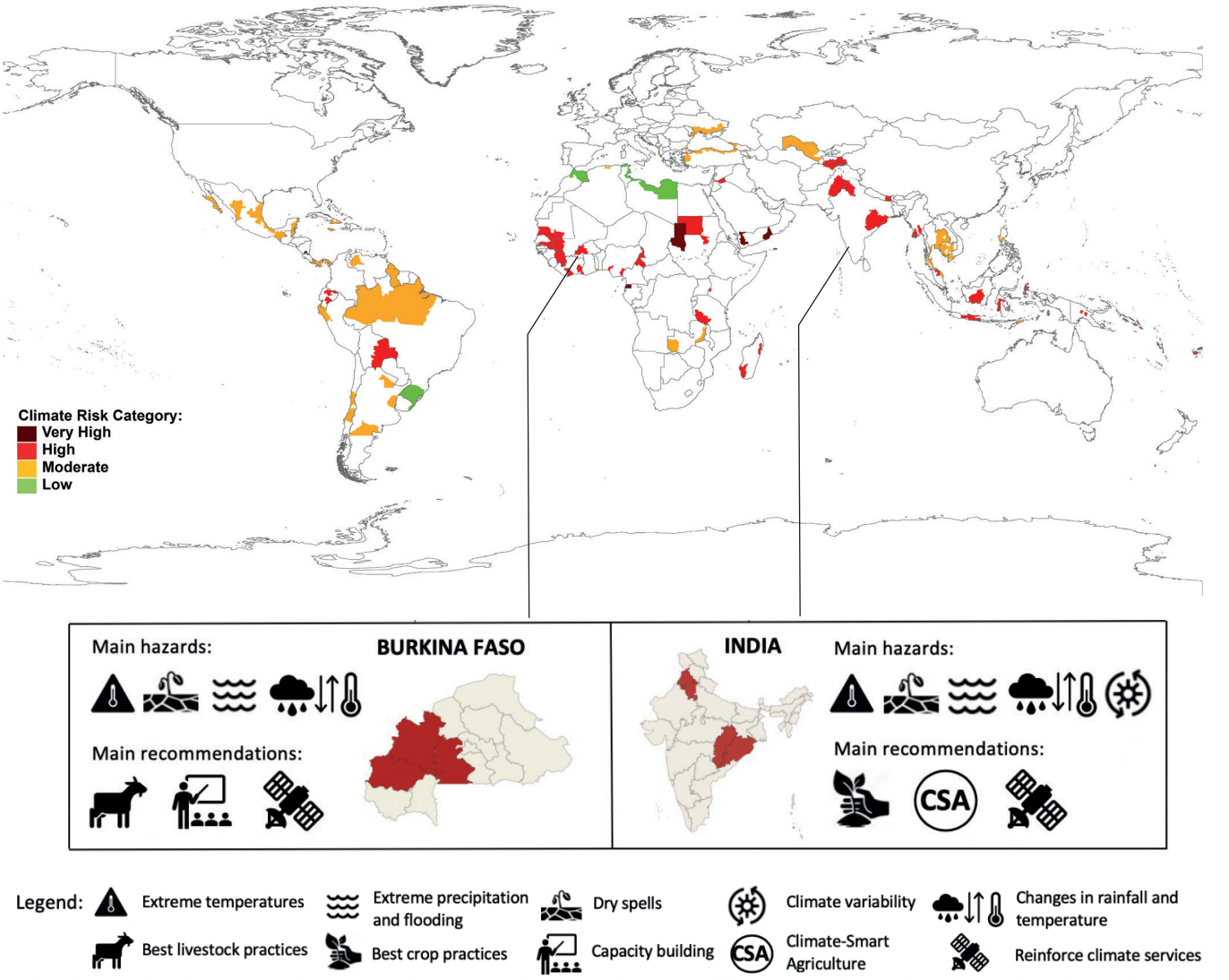


Progress to date: the 2020 **FAO-GEF portfolio**

Following guidance from the Global Environment Facility's (GEF) Scientific and Technical Advisory Panel, FAO has applied its newly developed climate risk framework across the FAO-GEF project pipeline. The process ensured that climate resilience has been integrated into the FAO-GEF portfolio of projects approved by the GEF Council in 2020, totalling **USD 254 million.**

To date, 68 projects have been screened for climate risks.

Figure 4. Results of climate risk screenings



Source: Jorge Alvar-Beltrán, 2021. Map conforms to United Nations World Map 4170, October 2020.

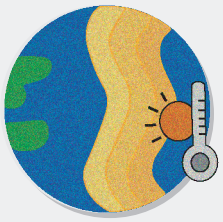
The boundaries and names shown and the designations used on this/these map(s) do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers and boundaries. Dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

How have the results of the climate risk screening translated into **more climate-resilient GEF projects?**

Myanmar: high risk **and** robust modulation

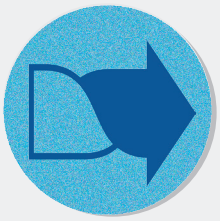
RICE-Adapt: Promoting climate resilient livelihoods in rice-farming communities in the lower Ayeyarwady and Sittaung river basins

Climate risks identified



Increase in heat-wave frequency and duration

Sea level rise



Limited adaptive capacity

Reinforce climate data collection, monitoring and management, including the enhancement of climate service delivery along the value chain (project outputs 1.3 to 1.6)

Integrate reference to the effects of climate change into policy and planning (project outputs 1.2)

Ensure that capacity building and training is achieved at all levels through farmer field schools and improved extension services (project outputs 1.3, 2.1 and 2.4)

Interventions included

Mauritania: high risk **and** robust modulation

Agriculture and livestock producer resilience in south-east Mauritania

Climate risks identified

Limited access to climate information

Land degradation

Limited adaptive capacity

Develop monitoring/observation tools with meteorological services to assist in the generation of information and support early warning systems to inform strategic and adaptive approaches

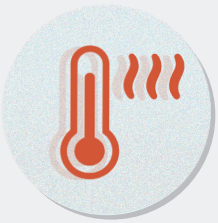
Promote crop-livestock integration, grazeland management, manuring and composting

Promote alternative livelihoods
Implement the Agro-Pastoral Field School (APFS) approach to build farmers' capacities to implement climate resilient practices

Interventions included

Uzbekistan: moderate risk and sufficient modulation
Food System, Land Use and Restoration Impact Program in Uzbekistan

Climate risks identified



Extreme heat

Changes in onset of frost

Extended dry spells/drought

Enhance refrigeration during storage and transport of dairy products

Promote frost and drought tolerant nut crops (walnut, almond, pistachio)

Adapt timing and location of bee production according to information on extreme heat and drought

Interventions included

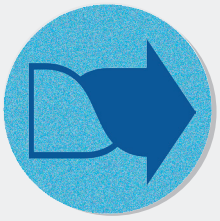
Mali: high risk and sufficient modulation

Resilient, productive and sustainable landscapes in Mali's Kayes region

Climate risks identified

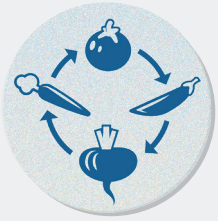
Extreme heat and agricultural droughts

Land degradation



Limited adaptive capacity

Use climate-adapted crop varieties
Promote the zaï pit system
Adopt crop diversification



Reduce tillage
Promote crop rotation

Strengthen institutional planning processes and increase access to finance, including climate finance

Interventions included

Annex 1. Climate risk screening checklist

Results of the climate risk screening checklist

Filter questions	Yes	No
Does climate pose a risk to the proposed study area of the project?	☐	☐
Are the proposed project activities affected by weather and climate-related impacts?[1]	☐	☐

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

If "Yes" to either of the filter questions, the project should be screened for climate risk. Follow the guidance outlined below:

Step 1: Hazard identification

Step 1 will identify the historical and current observed (in the last 30 years or more) and projected future (2050-2100) weather-related hazards that are likely to affect agricultural systems (including crops, livestock, fisheries, livestock forests, value chains and agricultural livelihoods) in the project's location. Many resources are available to support the identification and analysis of hazard information. Follow these guiding questions to establish a baseline of existing and potential weather-related hazards:

Climate baseline (historical and current hazards in the areas of intervention)	Yes	No	TBD
Observed climate and weather hazards (in the last 30 years):			
Extreme temperature (above 35°C or below 0°C)	☐	☐	☐
Extreme precipitation and flooding	☐	☐	☐
Lack of precipitation (agricultural droughts and/or dry spells)	☐	☐	☐
Storms (tropical storms, snowstorms, hailstorms, dust storms, etc.)	☐	☐	☐
Winds (typhoons, cyclones, hurricanes, tornadoes, harmattan)	☐	☐	☐
Sea level rise (from global warming and storm surges)	☐	☐	☐
Other weather-related hazards observed (in the last 30 years):			
Landslides	☐	☐	☐
Wildfires	☐	☐	☐
Salinization	☐	☐	☐
Ocean acidification	☐	☐	☐
Pests and diseases	☐	☐	☐
Others (e.g. lightning, hail, freezing rain, avalanches)	☐	☐	☐

*please note this section is not included in the risk calculation

Projected change from baseline (future hazards in the areas of intervention)	Yes	No	TBD
Do future climate scenarios foresee mid (2050) to long-term (2100) change (in frequency and intensity) on climate hazards compared to the baseline?			
Extreme temperature (above 35°C or below 0°C)	☐	☐	☐
Extreme precipitation and flooding	☐	☐	☐
Lack of precipitation (agricultural droughts and/or dry spells)	☐	☐	☐
Change in temperature (increase or decrease)	☐	☐	☐
Change in rainfall (increase or decrease)	☐	☐	☐
Climate variability (larger or smaller)	☐	☐	☐
Intensity and frequency of extreme events (larger or smaller)	☐	☐	☐
Total number of responses			
Hazard risk = (total nº YES responses / total nº YES + NO responses) * 10			

Step 2: Exposure Assessment

Step 2 will identify the exposure of the project area to the hazards based on information related to presence of people, agricultural livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected. Follow the guiding questions below to identify the exposure to natural hazards.

Exposure of agricultural systems in the areas of intervention	Yes	No	N/A
Is the project located in areas exposed to weather-related natural hazards?			
Low-lying areas (valleys, coastal zones, and small islands)	☐	☐	☐
Very warm areas (subtropical)	☐	☐	☐
Tropical areas (rainforests)	☐	☐	☐
Arid and semi-arid areas (deserts)	☐	☐	☐
Mountains zones and permafrost areas (tundra)	☐	☐	☐
Are target agricultural systems, ecosystems or livelihoods exposed to weather-related hazards?			
Is crop production affected by rainfall variability, prolonged droughts, changes in temperature or pests and diseases?	☐	☐	☐
Is livestock productivity frequently affected by rainfall variability, prolonged droughts, changes in temperature or diseases?	☐	☐	☐
Are fisheries frequently affected by ocean acidification, water salinity and changes in sea surface temperature due to ocean-atmospheric oscillations or climate change?	☐	☐	☐
Is forest productivity frequently affected by wildfires, diseases, rainfall variability, prolonged droughts, or changes in temperature?	☐	☐	☐
Is the biodiversity affected by changes in climate variables?	☐	☐	☐
Is any stage of the agricultural value chain (production, storage, processing and marketing) exposed to climate-related hazards?	☐	☐	☐
Total number of responses			
Exposure risk = (total nº YES responses / total nº YES + NO responses) * 10			

Step 3: Vulnerability Assessment

Step 3 will identify the degree to which a system is susceptible to, and unable to cope with, the adverse effects of climate change, including climate variability and extremes. Individuals and communities are vulnerable in different ways depending on factors including wealth, education, gender, age, disability and heath. Follow the guiding questions below to identify the vulnerability of your project area or system to weather-related hazards and exposure. Reflect on the current social, economic and political factors in your project area. Examples of factors to consider include access to technology, prices (particularly food and energy), financial resources, conflict, political instability, legal enforcement, population growth, urbanization, pollution, land ownership issues, land and soil quality, nutrition, education, and life expectancy. Follow the guiding questions below to assess the vulnerability of the population in the areas of intervention.

Vulnerability of the population in the areas of intervention	Yes	No	TBD
Is conflict exacerbating the population's sensitivity to weather-related hazards?	☐	☐	☐
Is population displacement being exacerbated by climate change impacts?	☐	☐	☐
Are infectious diseases (e.g. COVID-19, malaria, cholera) increasing the population's vulnerability and affecting their capacity to address potential weather-related hazards?	☐	☐	☐
Is the income of the target population predominantly coming from agriculture?	☐	☐	☐
Are there sensitive groups (indigenous peoples or other marginalized groups) that are more sensitive to and likely to be affected by climate change?	☐	☐	☐

Are gender inequalities being exacerbated by climate change?	☐	☐	☐
Is the Human Development Index (HDI) equal or below 0.6?	☐	☐	☐
Is the Multidimensional Poverty Index (MPI) equal or above 0.1?	☐	☐	☐
Total number of responses			
Vulnerability risk = (total nº YES responses / total nº YES + NO responses) * 10			

Step 4: Adaptive capacity and climate resilience

This step will assess the degree to which a system or a community is unable to cope with the adverse effects of climate change, including climate variability and extremes. Some of the factors to consider include access to climate information, technology, land ownership, institutional support, financial mechanisms, etc. Follow the guiding questions below to assess the adaptive capacity of the population in the areas of intervention.

Adaptive capacity in the areas of intervention	**Yes**	**No**	**TBD**
Are climate information systems monitoring climate change, weather hazards, climate-driven crop pest/diseases and human vector borne diseases at a country level?	☐	☐	☐
Are climate and weather information services (real-time weather data, seasonal forecasts etc.) effectively being delivered (through radio, TV, SMS, extension services etc.) to the farmers, rural dwellers, and end users?	☐	☐	☐
Do the country have an early action plan (preparedness and emergency response) to mitigate the impacts of weather-related hazards once the shock occurs?	☐	☐	☐
Does the government or other institutions support the target population/communities with the necessary social and economic resources to prepare for or respond to climate-related events?	☐	☐	☐
Is the target community carrying out (by own means) agricultural adaptation?	☐	☐	☐
Does the target population have the economic means or support to adjust or adapt their activities in response to weather-related shocks?	☐	☐	☐
Do policies/mechanisms exist that make financial credit, loans, and agricultural insurance available?	☐	☐	☐
Are social protection measures in place for informal workers (e.g. fishers and fish processors)?	☐	☐	☐
Total number of responses			
Vulnerability risk = (total nº YES responses / total nº YES + NO responses) * 10			

Step 5: Climate risk classification

Based on the questions in the screening checklist, the project developer identifies potential climate-related risks and hazards in the project area and obtains a climate risk classification as 'No/Low', 'Moderate', 'High or 'Very High' risk.

Based on the formula below, calculate the climate risk by assigning the number of "Yes" responses of each step to Hazards, Exposure, Vulnerability and Adaptive Capacity and use the guidance below to determine the overall climate risk to the project.

$$Risk = \frac{((Hazards + Exposure + Vulnerability) - Adaptive\ Capacity)}{3}$$

Risk between 0 and 3	Low/No Risk
Risk between 3 and 6	Moderate Risk
Risk between 6 and 8	High Risk
Risk between 8 and 10	Very High Risk

Step 6: Modulation of climate risks by the project

Proposed project activities should aim to modulate risks from the weather-related natural hazards identified through the screening checklist. A matrix is used to identify areas in which climate risk can be modulated. The responses to the guiding questions should aid in the further incorporation of climate risk modulation and mitigation measures during project design.

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