Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

# Global perspectives on emerging technologies for climate-resilient agriculture

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# Outline

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2. Challenge in the current scenario
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# Introduction to Climate-resilient agriculture

- Climate-resilient agriculture/Climate-smart agriculture (CSA)- an integrated approach to managing landscapes—cropland, livestock, forests and fisheries - that address the interlinked challenges of food security and climate change.

- Helps- to transform agri-food systems towards green and climate resilient practices.

- Supports reaching internationally agreed goals- the SDGs, the Paris Agreement and the Sendai Framework for Disaster Risk Reduction.

- **CSA aims to tackle three main objectives:**

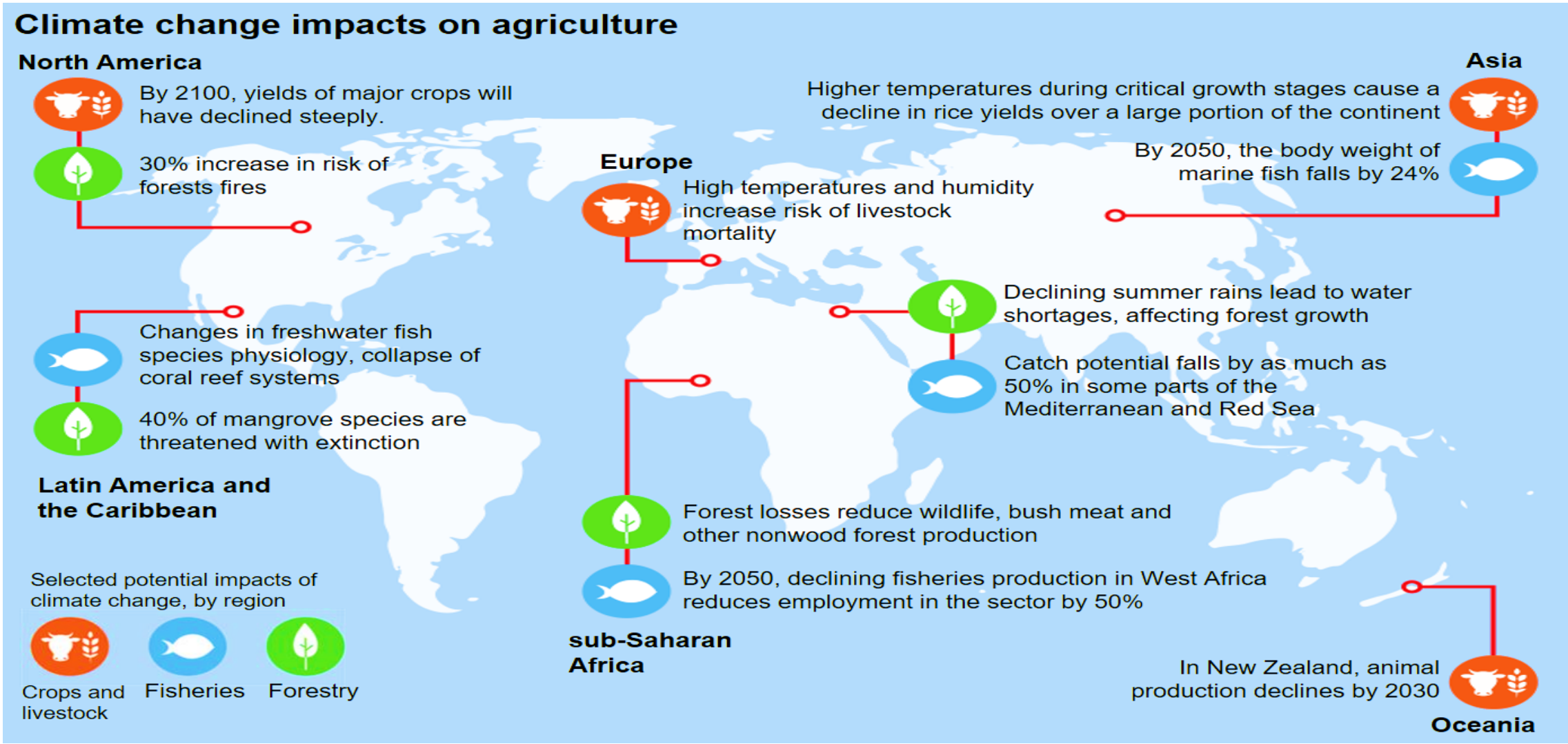
Sustainably **increasing** agricultural **productivity and income**

**Adapting** and building resilience to **climate change.**

**Reducing** and/or removing **greenhouse gas emissions.**

(FAO, 2010)

# Challenge in the current scenario



# Challenge in the current scenario (contd.)

- **Place-specific** nature of agrifood systems and the challenges associated with **scale and timing of climate change** impact.

- Variation in-

  - Practical action to invest in specific measures.
  - Options to strengthen the climate resilience of agrifood systems.

- Expected **impact of climate change** on elements of agrifood system, depend on the **trend in hydro-meteorological hazards.**

- The **probability and size** of impact, **influence the timing and scale of action** to enhance resilience of agri.

- Large impacts lead to - producers finding alternative livelihood options within and outside of the agrifood systems.

# Global perspectives on CSA

- Effective climate-smart practices already exist and could be implemented in developing country agriculture systems.
- Adopting an ecosystem approach, working at **landscape scale and ensuring inter-sectoral coordination and cooperation** is crucial for effective climate change responses.
- Investment is required in **filling data and knowledge gaps and in research and development of technologies, methodologies**, as well as the conservation and production of suitable varieties and breeds.

| Crops:Improved rice production systems | Conservation Agriculture | Agroforestry | Livestock production efficiency and resilience | Urban and peri-urban agriculture | Diversified and Integrated Food - Energy Systems |
|---|---|---|---|---|---|
| • Water-saving technology - Alternate-Wetting and Drying (AWD)<br>• Urea deep placement (UDP) technology<br>• Ammonium sulphate supplements- promote soil microbial activity and reduce methanogens. | • No tillage and direct seeding<br>• Straw and cover crops<br>• Crop rotation | • Use of trees and shrubs in agricultural crop and/or animal production and land management systems | • Improved pasture and manure management<br>• Decrease in the use of synthetic fertilizers<br>• Improving livestock health via provision of veterinary services | • Community gardens, private backyards, schools, hospitals, rooftops, window boxes and vacant public lands (including at the side of roads and rail tracks) | • Combines food and energy crops on the same plot of land, e.g. in agro-foresty systems: growing trees for fuelwood and charcoal<br>• Use of residues of one type of product to produce another, e.g. biogas from livestock residues |

# Global perspectives on CSA (contd.)

❖ **Case 1: Mitigating methane emissions through new Irrigation Schemes (Bohol, Philippines)**

- Bohol Island is one of the biggest rice-growing areas in the Philippines' Visayas regions. Before the completion of the Bohol Integrated Irrigation System (BIIS) in 2007, two older reservoirs (Malinao and Capayas Dam) were beset by problems and unable to ensure sufficient water.

- In the face of declining rice production, the National Irrigation Administration (NIA) created an action plan for the BIIS.

- This included the construction of a new dam (Bayongan Dam) and the implementation of a water-saving technology called **Alternate-Wetting and Drying (AWD)**.

- The visible success of AWD in pilot farms and specific training to farmers, were able to dismiss the widely held perception of possible yield losses from non-flooded rice fields. Ample adoption of AWD facilitated an optimum use of irrigation water, the **cropping intensity** increased from **around 119 % to 160 %** (maximum of 200 % in double-cropping systems).

- AWD potentially reduces methane emissions by 48 % compared to continuous flooding of rice fields. AWD generates **multiple benefits related to methane emission reduction** (mitigation), **reducing water use** (adaptation where water is scarce), **increasing productivity** and **contributing to food security**.

# Global perspectives on CSA (contd.)

❖ **Case 2: National Biogas Programme (Viet Nam) (Integrated Food - Energy Systems)**

- Viet Nam embarked on an integrated land management scheme, following land rights being given to individual farmers.
- It involves gardening, fish rearing and animal husbandry, to make optimal use of the land.
- Traditional fuels such as wood and coal for cooking are becoming increasingly scarce and expensive, and can contribute to deforestation. **Increasing livestock production** in rural communities with high population density leads to health and **environmental issues from the quantity of animal dung** being produced.
- **Biogas digesters** as a part of the solution offered by this initiative, using waste to generate energy, and the resultant slurry used as a **fertilizer to improve soil quality**. A **market-based approach has been** adopted to disseminate the plants and the service provided to those buying the digesters.
- The customer must have at least four to six pigs or two to three cattle that provide the animal dung. They pay the total installation cost for the digesters to local service providers, and operate the biodigester using instructions provided by them. **A biodigester produces enough daily fuel for cooking and lighting**. It **improves the surrounding environment**, while the livestock produces meat, milk and fish products for **local consumption and subsistence farming**.

# FAO's innovative tools and technologies for CSA planning and implementation

- **Assessment, monitoring and evaluation** are integral parts of CSA planning and implementation.
- Both the past and future impacts of climate variability on agriculture and vulnerability of communities needs to be assessed.
- CSA options should be assessed for their effectiveness in achieving goals related to food security, climate change adaptation and mitigation as well as other development objectives. Notable examples include:

## Modelling System for Agricultural Impacts of Climate Change (MOSAICC)

- The MOSAICC helps countries carry out inter-disciplinary climate change impact assessment on agriculture through simulations.
- Ex: AquaCrop - Assess climate change impacts on crop yields.

## Monitoring and Assessment of Greenhouse Gas Emissions and Mitigation Potential in Agriculture (MAGHG)

- MAGHG supports member countries in reporting and gathering data on GHG emissions in the agriculture, forestry and other land use (AFOLU) sector.
- FAO also assists countries in analysing this data for improved actions to respond to climate change.

## Climate Risk Management (CRM)

- CRM is an integrated approach that addresses vulnerabilities to short-term climate variability and longer-term climate change in the context of sustainable development.
- FAO's key CRM component is the provision of usable weather and climate information products that help the farmers, livestock herders and fishers to assess risks and improve opportunities at local level.

For more tools and details: https://www.fao.org/climate-smart-agriculture/knowledge/methods/en/

# Enabling policy environment for CSA

- Before designing climate-sensitive policies, policymakers should **systematically assess** the intended and unintended effects of a wide range of current **international and national agricultural and non-agricultural agreements** and policies on the objectives of climate-smart agriculture and take into account other national development priorities.

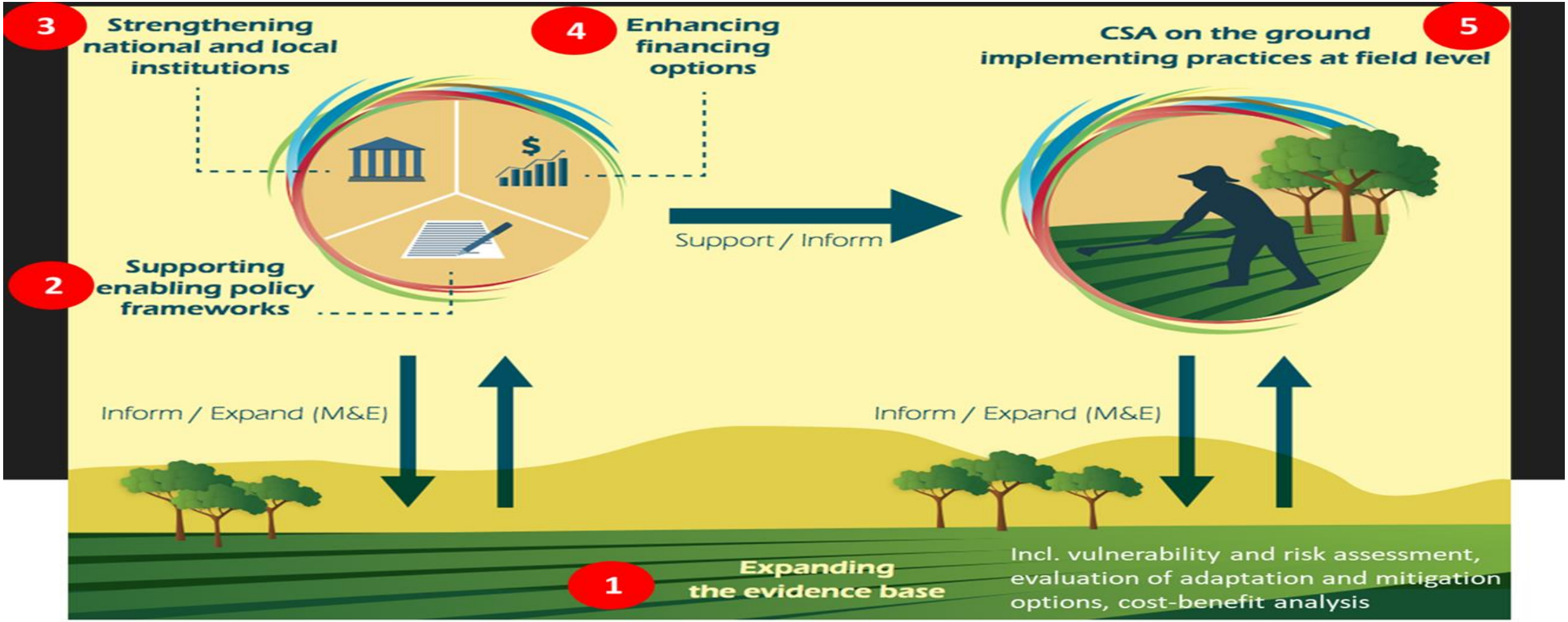
- Policies to stimulate the adoption of CSA systems should focus on **filling policy gaps** and **contribute to the country-driven capacity development** in the short and long term.

- Understanding the **socio-economic** and **gender-differentiated barriers,** and **incentive mechanisms** that affect the adoption of CSA practices is critical for designing and implementing supportive policies.

- A key role for the public sector is the creation of an **enabling environment** that can **allow private sector and civil society stakeholders to make timely and well-informed decisions** on matters pertaining to sustainable food production, climate change adaptation, and reductions and removals of greenhouse gases.

# Enabling policy environment for CSA (contd.)

## A 5-Step implementation process




Source: FAO, 2017, Climate-Smart Agriculture Sourcebook – Second Edition

# Video | Climate-Smart Agriculture in Action: Africa, Asia and Latin America

- Weblink: https://www.youtube.com/watch?v=OzFSNZfBcFc

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*Thank you!*