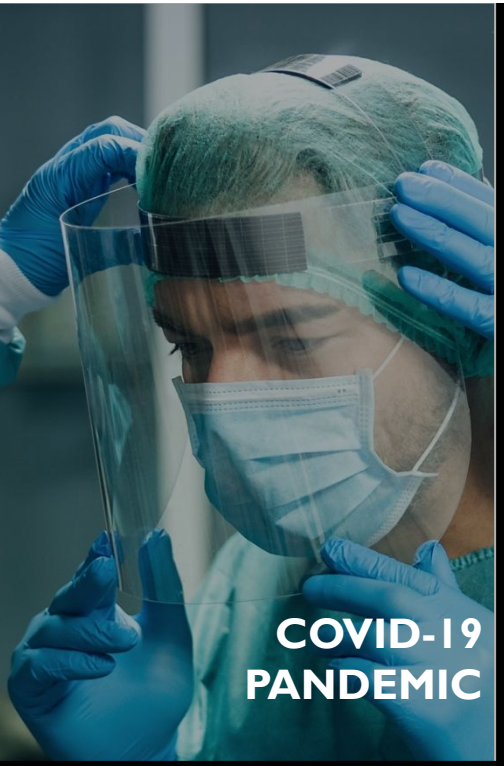
Food and Agriculture Organization
of the United Nations

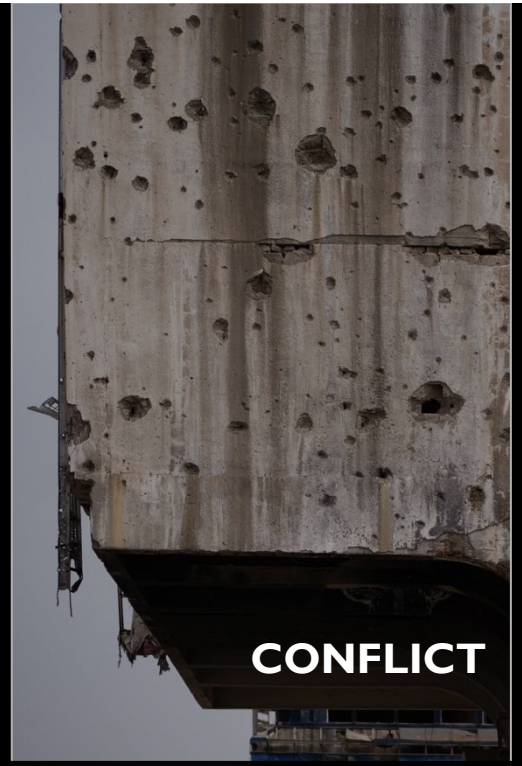
Climate Smart Agriculture Adaptation and Mitigation Synchrony

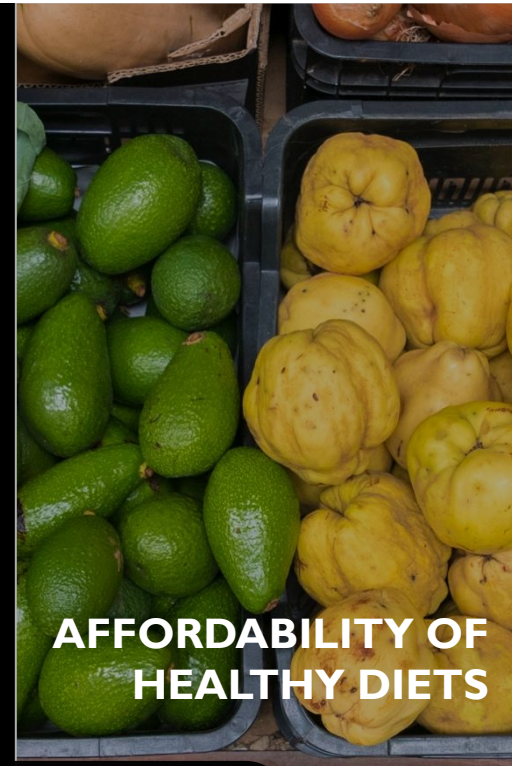
3 August 2022

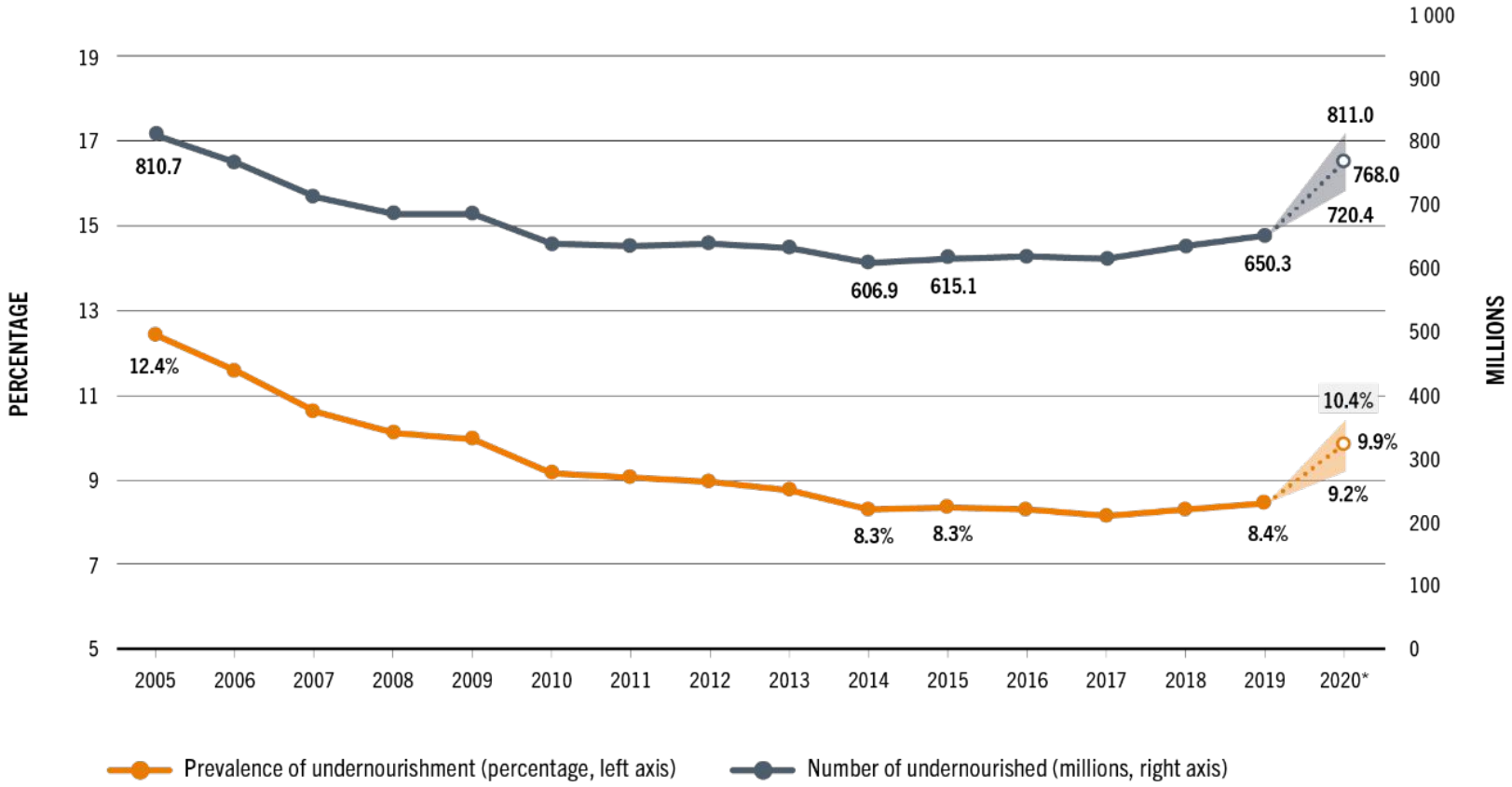
Food and Agriculture Organization of the United Nations (FAO)

Food and Agriculture Organization
of the United Nations








PERCENTAGE
MILLIONS
19
17
15
13
11
9
7
5
1 000
900
800
700
600
500
400
300
200
100
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020*
810.7
606.9
615.1
650.3
811.0
768.0
720.4
12.4%
8.3%
8.3%
8.4%
10.4%
9.9%
9.2%
Prevalence of undernourishment (percentage, left axis)
Number of undernourished (millions, right axis)

702-828
MILLION
PEOPLE ARE
UNDERNOURISHED

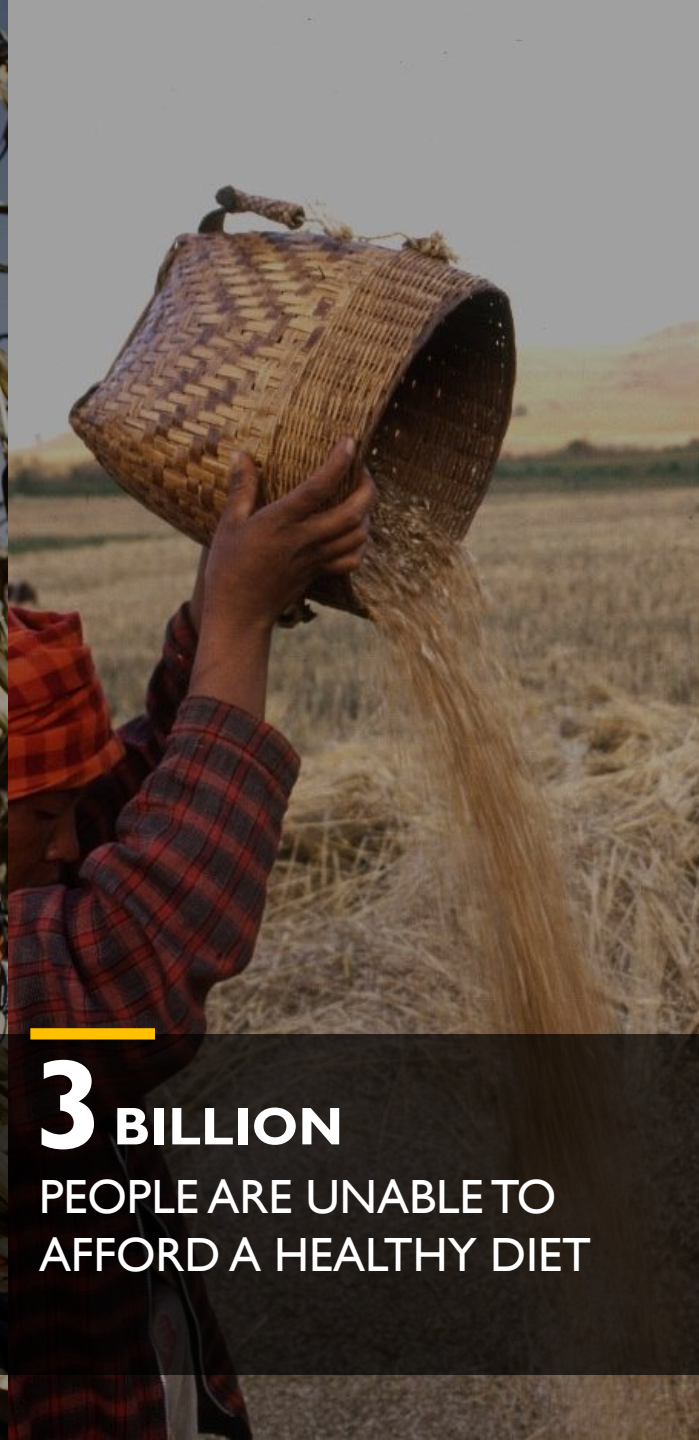
CHILDREN

149 **MILLION**
STUNTING

45 **MILLION**
WASTING

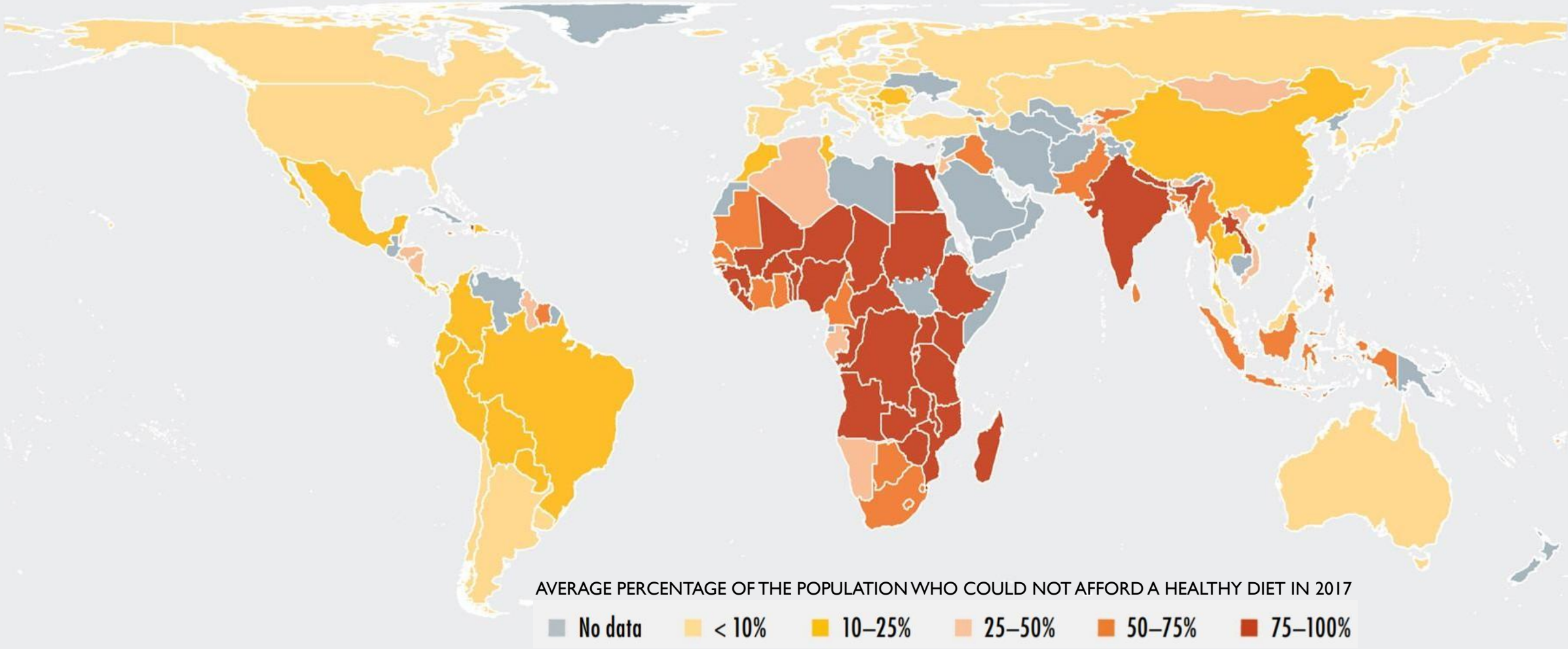
39 **MILLION**
OVERWEIGHT

2.4 **BILLION**
PEOPLE ARE AFFECTED BY
MODERATE OR SEVERE
FOOD INSECURITY



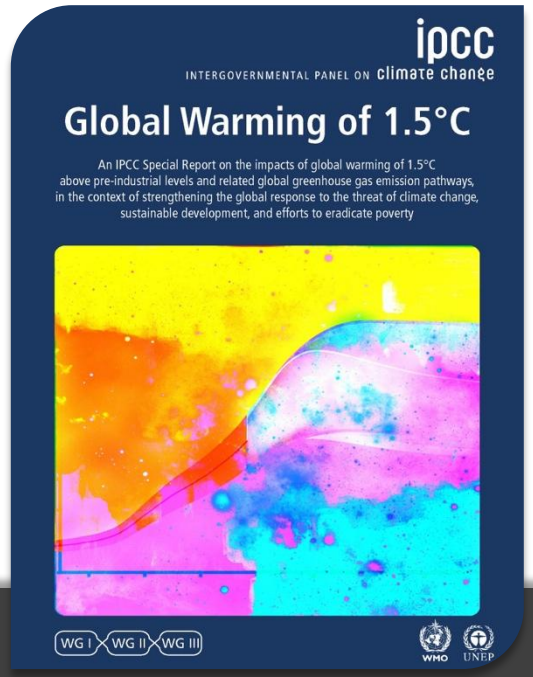
3 **BILLION**
PEOPLE ARE UNABLE TO
AFFORD A HEALTHY DIET

Food and Agriculture Organization
of the United Nations

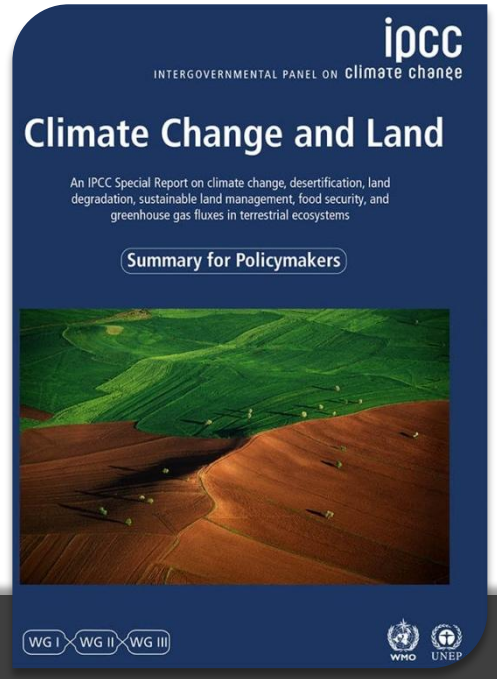


Food and Agriculture Organization
of the United Nations

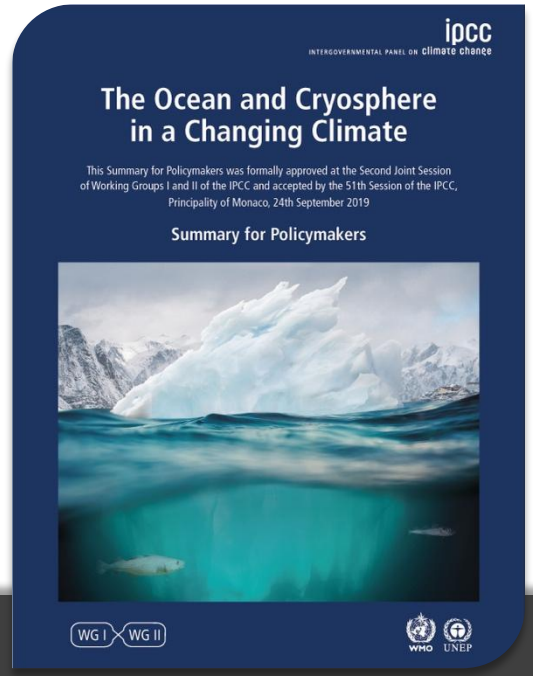
2018



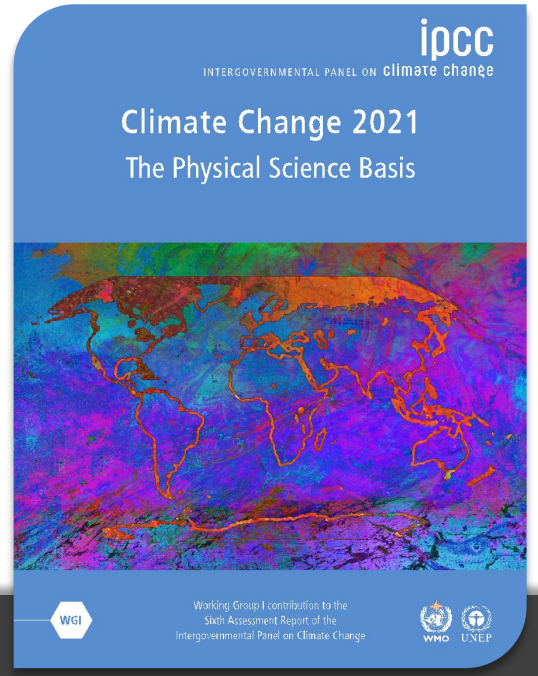
2019



2019



2021



Food security will be increasingly affected by future climate change

e.g. supply chain disruptions; declined yields; increased prices; reduced nutrients; increased hunger

Food and Agriculture Organization
of the United Nations

HEADLINES

Human influence has warmed the atmosphere, ocean & land.
Of the 1.1 degree rise in temp since pre-industrial era, 1 degree is human induced

Rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.

Scale of changes across the climate system is unprecedented. Global mean sea level is now rising faster since 1900 than over any preceding century in at least the last 3000 years.

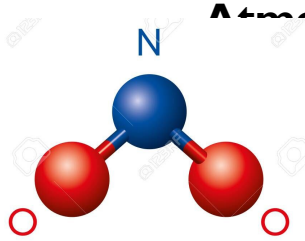
Science is able to attribute intensifying climate extremes with human actions in every region – heatwaves, precipitation, droughts & cyclones

Limiting warming levels to 1.5 by end of century is possible but needs major paradigm shifts in 2020s.

CONTRIBUTIONS BY AGRI-FOOD SYSTEMS

heric concentration of methane

reports a faster growth over
–2019 largely driven by emissions
the fossil fuels and agriculture
<u>ninated by livestock)</u> sectors.



tmospheric concentration of NO_2

increased to 0.95 ± 0.04 ppb yr-1 between 2014-2019- largely due to nitrogen fertilizer and manure

> *"human-induced climate change has contributed to increases in **agricultural and ecological droughts** in some regions due to evapotranspiration increases (graph on next slide)*

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Food and Agriculture Organization
of the United Nations

HEADLINES

Faster warming of 1.5 degree or more expected by 2040 if no action is taken.

Global Warming is projected to **intensify the global water cycle** - its variability, global monsoon precipitation & the severity of wet & dry events

Frequency and intensity of extremes will become more drastic due to increasing global warming.

Some changes due to historical and future GHG emissions are **irreversible,** specially changes in ocean, ice sheets and global sea level

Ocean and land carbon sinks are projected to be less effective at slowing the accumulation of CO_2 in the atmosphere

IMPLICATIONS FOR AGRI-FOOD PRODUCTION

CROP PRODUCTION

- Shifting agriculture seasons
- Decreasing crop yields & crop suitability (ie max-attainable yields)
- Increased pests & diseases

LIVESTOCK

- Animal health decline from heat stress
- Impact on biomass and nutritional quality

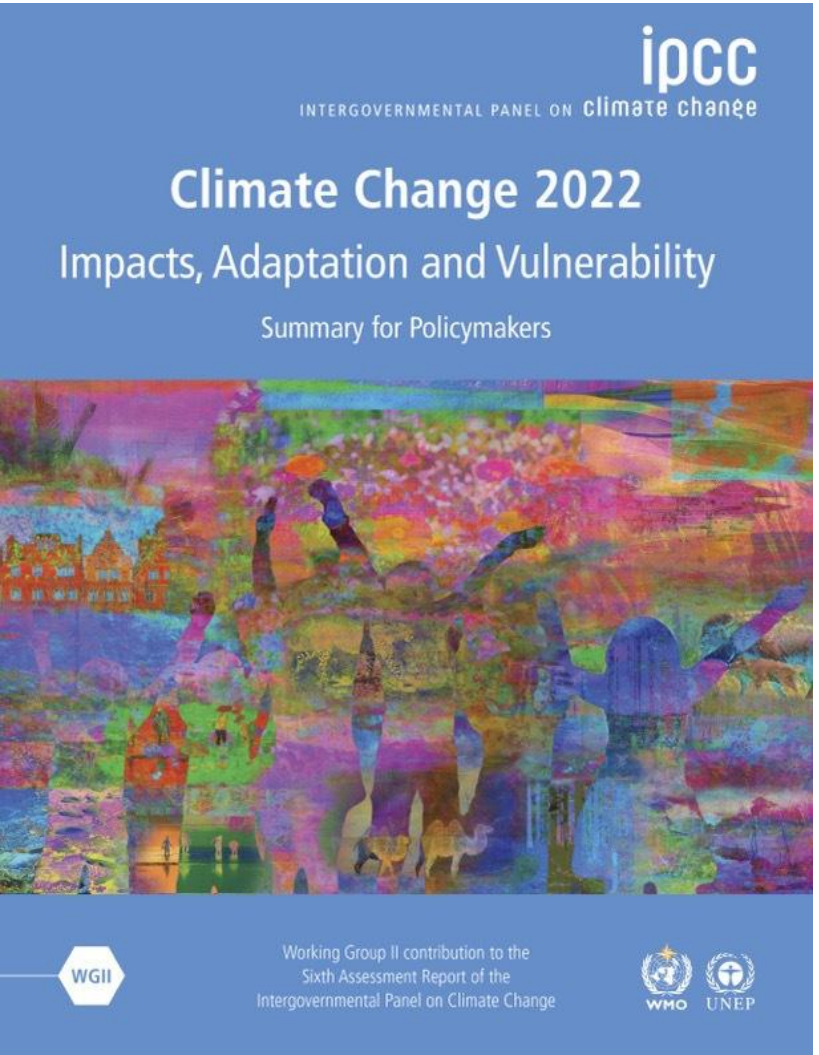
FISHERIES, AQUACULTURE

- Displacement and/or increased mortality of stocks
- Reduced catch

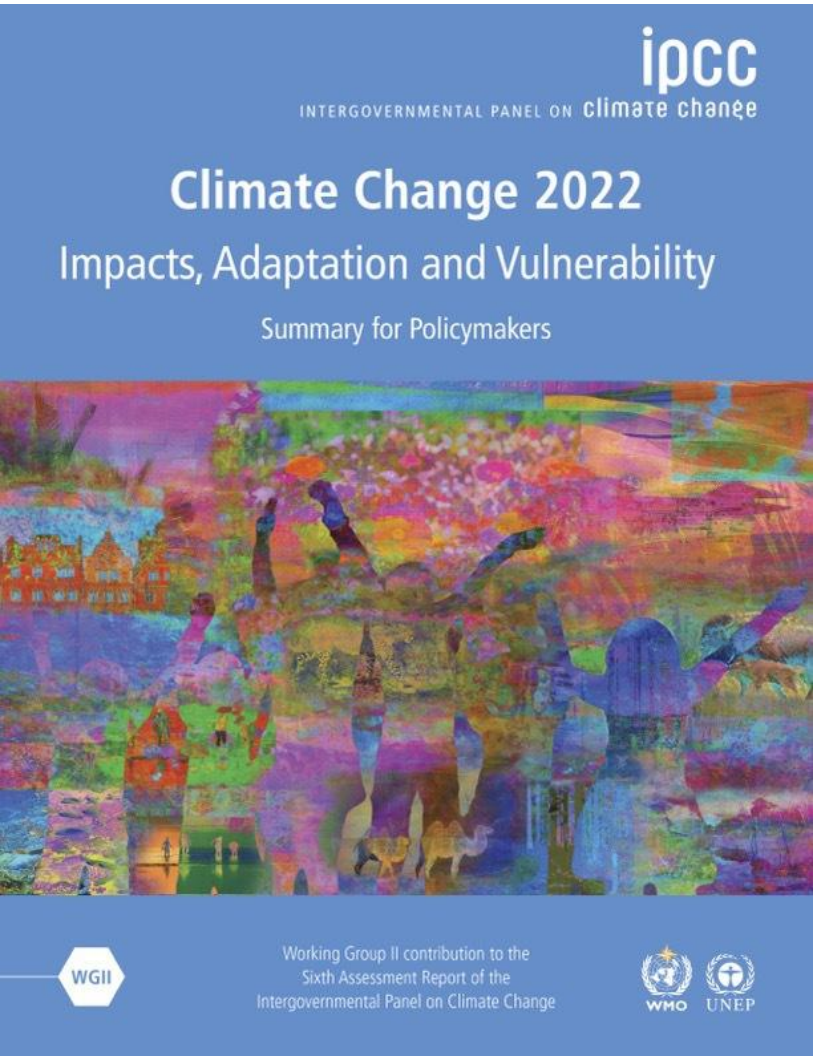
OTHERS

- Food safety,
- high-risk livelihoods

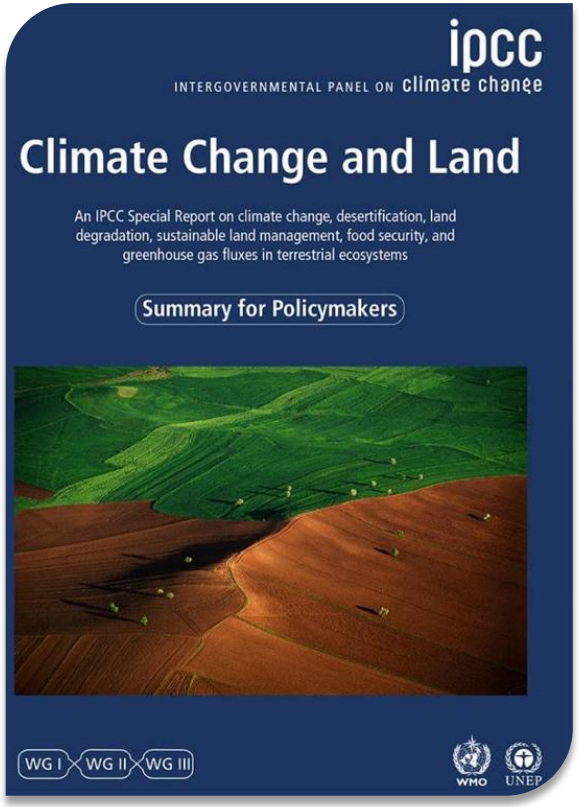
Food and Agriculture Organization
of the United Nations



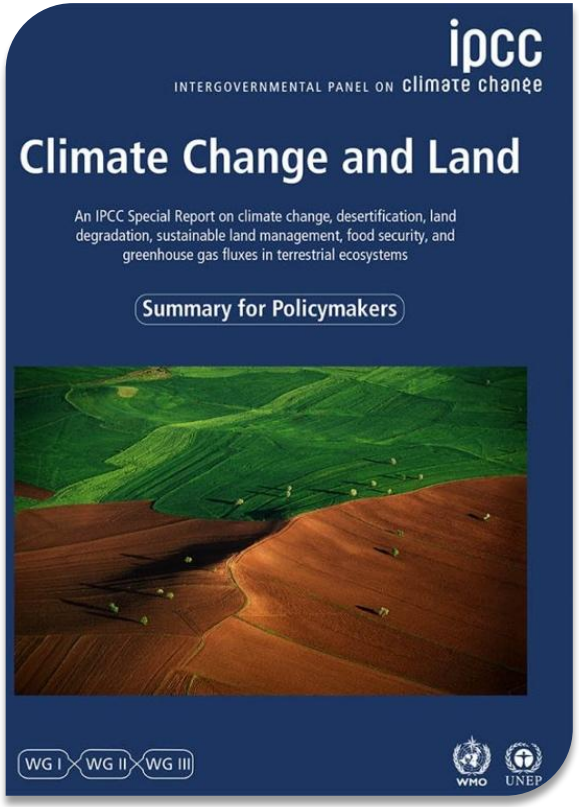
- Weather and climate extreme events have already exposed millions of people to acute food insecurity and reduced water security.
- Economic damages from climate change have been detected in climate-exposed sectors, with regional effects to agriculture, forestry and fisheries,
- Global hotspots of high human vulnerability are found particularly in West, Central and East Africa, South Asia, Central and South America, Small Island Developing States and the Arctic.
- Vulnerability is more critical in locations with poverty, governance challenges and limited access to basic services and resources and violent conflicts.



- There are feasible and effective adaptation options that can reduce risks to people and nature.
- Comprehensive, effective and innovative responses can use synergies and reduce trade-offs between adaptation and mitigation to advance sustainable development.
- Safeguarding biodiversity and ecosystems is fundamental to climate resilient development, given the threats posed by climate change to them and their role in adaptation and mitigation.

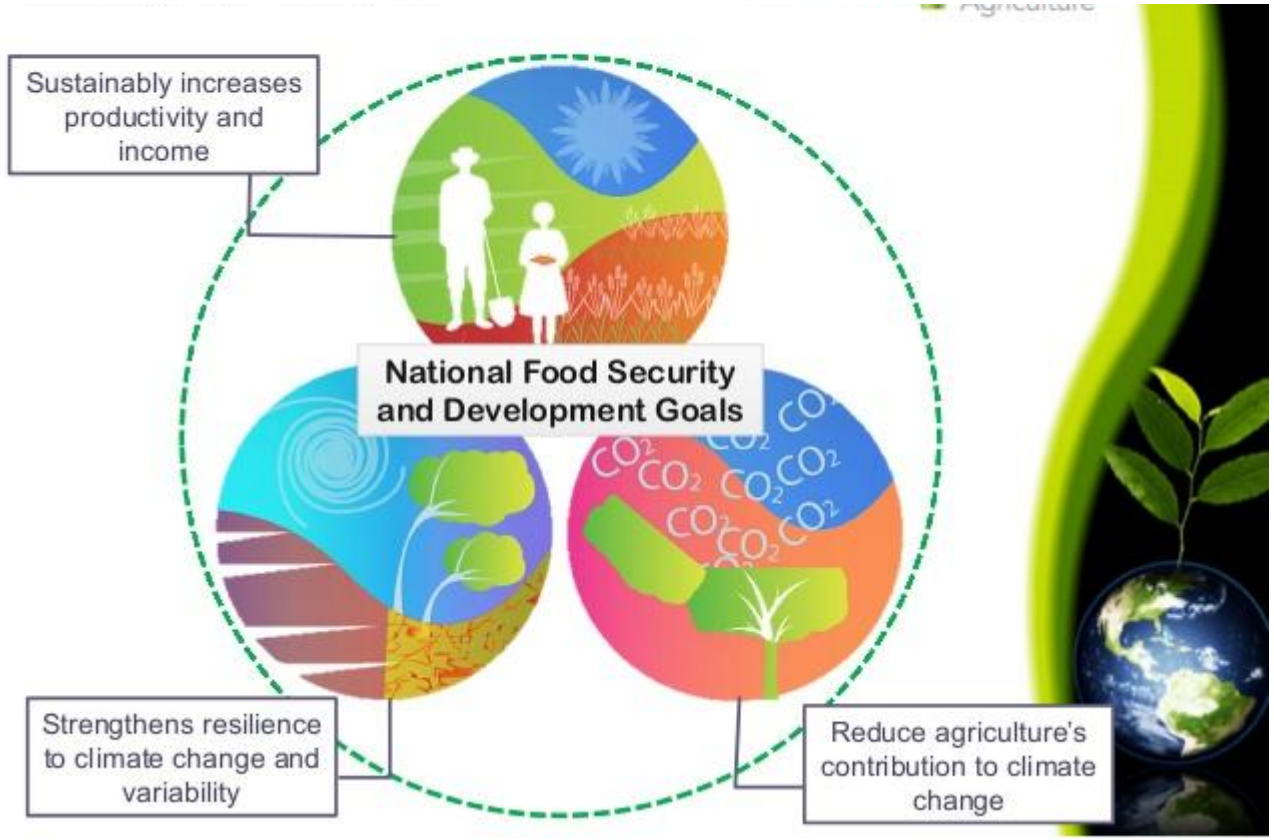


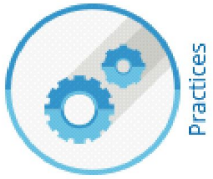
- Forests play an important role in relation to climate resilience, adaptation and mitigation, including serving as carbon sinks and storage and housing biodiversity, as well as buffering risks caused by climate change impacts.
- Reveals that 21-37 percent of total greenhouse gas emissions could be attributed to the global food system.
- These arise from production, land-use change, processing, packaging, distribution, preparation and consumption of food, including food loss and waste.



- Carbon sinks need to be enhanced and greenhouse gas emissions and emissions intensity reduced across agrifood systems
- A drastic reduction in emissions from all other sources, to reach the goal of holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels in accordance with the Paris Agreement.

- An approach aims to tackle three main objectives:
  - sustainably increasing agricultural productivity and incomes;
  - adapting and building resilience to climate change; and
  - reducing and/or removing greenhouse gas emissions, where possible.
- CSA practice is context-specific, depending on local socio-economic, environmental and climate change factors.





- Expanding the evidence base
- Supporting enabling policy frameworks
- Enhancing funding, and financing options, and
- Implementing CSA practices at field level.

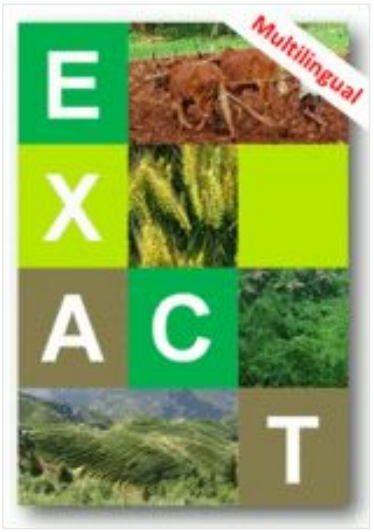
- CSA has to be mainstreamed into core government policy, expenditure and planning frameworks.
- CSA policies must contribute to broader economic growth, poverty reduction and sustainable development goals.
- Providing incentives for adopting CSA, such as payments for environmental services (managing land to provide an ecological service), encourages farmers to take on climate-smart practices and to overcome initial investment barriers.
- Two areas of intervention related to policies and planning for the adoption of climate-smart agriculture:
  - Support to ensure that agriculture and CSA are included in mid to long-term development planning processes and investment decisions
  - Support to create the required policy, financial and enabling environment.

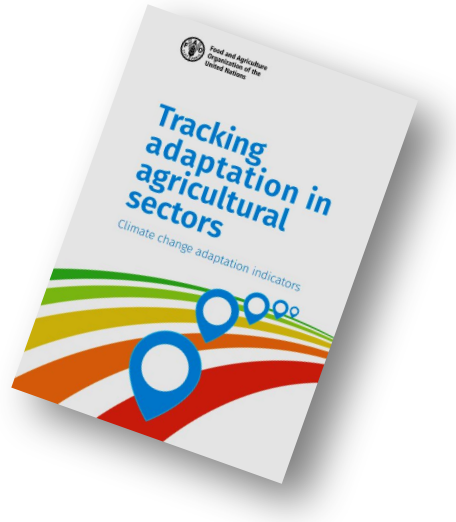
- **Integrated Practices:** reduce the pressure on the natural resources and minimize the need for external inputs (e.g. energy, chemical fertilizers and pesticides).
- **Crop production:** Crop production must adapt (e.g. crop varietal selection, plant breeding, cropping patterns and ecosystem management approaches) and become resilient to changes (frequency and intensity).
- **Livestock:** Options to reduce greenhouse gasses are available along the entire supply chain and are related to feed management, enteric fermentation and manure management.
- **Forestry:** Forests and trees that are essential to livelihoods and food security, to environmental sustainability.
- **Urban and peri-urban agriculture:** Agriculture – including horticulture, livestock, fisheries, forestry, and fodder and milk production – is increasingly spreading to towns and cities.
- **Genetic resources and biodiversity:** Agriculture, including livestock, forestry, aquaculture and fisheries, depends on the three components of biodiversity: the diversity of species, the diversity within each species and the diversity of ecosystems.
- **Fisheries and aquaculture:** Increasing global demand for fish and aquatic foods, ocean acidification and climate variability and change are the challenges to be addressed.
- **Land and water management:** Practices to sustainably manage land and water include a broad range of practices and methods including soil carbon sequestration and the restoration of peatlands and degraded lands.

- Climate-Smart Agriculture (CSA) proposes an approach that can support to fulfill the commitments put forward in NDCs and to implement climate change adaptation and mitigation action in the agricultural sectors through UNFCCC instruments, in particular NAMAs and NAPs.
- CSA contribute to national policies including NDCs, NAMAs and NAPs by supporting transformative change in all areas of agri-food systems including agricultural production, storage, transport, and consumption.
- Promotes engagement with international financing opportunities, such as the Green Climate Fund and the Global Environment Facility.

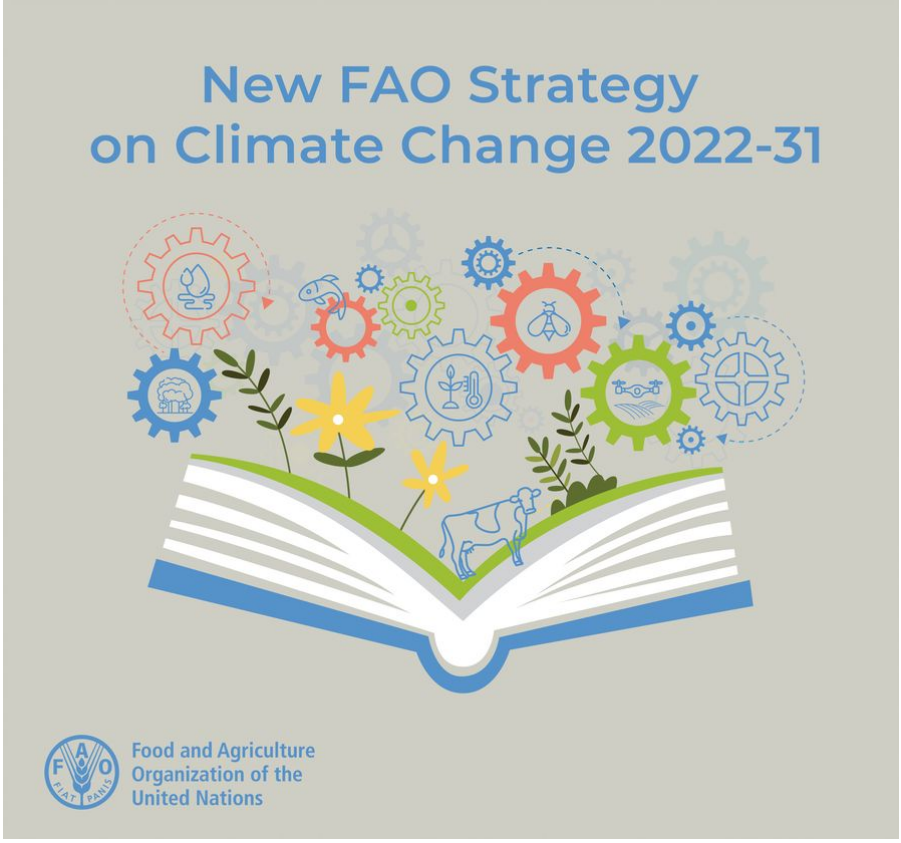
Food and Agriculture Organization
of the United Nations

- **Impact Assessment** – Comprehensive assessment of impacts of climate change on agriculture and food security
- **Crop/Pasture Monitoring and Yield Forecasting**
- **Economics and policy** - identifying and harmonizing climate-smart agricultural policies, analysing impacts, costs and benefits as well as incentives and barriers to the adoption of climate-smart agriculture
- **Carbon balance assessment** - Estimates of the impact of agriculture and forestry development projects, programmes and policies on the carbon-balance.
- **Monitoring the mitigation potential -** Monitoring and Assessment of Greenhouse Gas Emissions and Mitigation Potential in Agriculture





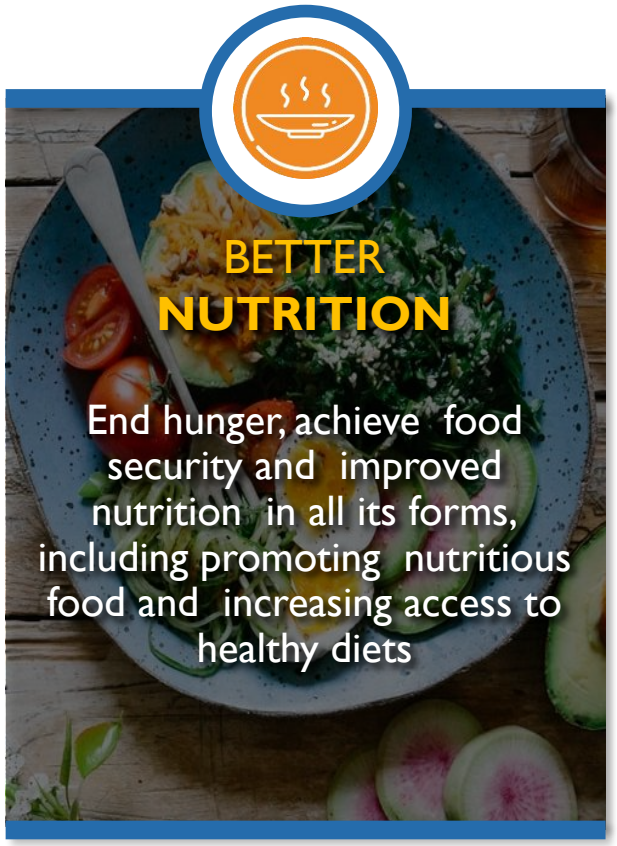
- Take an agrifood systems approach
- Put farmers, livestock keepers, fishers, aquaculturists and forest-dependent people at the centre
- Embrace good practices and innovations
- Build on science-based evidence, including open science and data.
- Promote country-driven climate action for sustainable results.
- Deliver through strategic partnerships.
- Mainstream gender equality, youth engagement, Indigenous People's participation and social inclusiveness
- Support inclusive multi-stakeholder approaches
- Scale up support
- Adopt a "no-one-size-fits-all" approach



Food and Agriculture Organization
of the United Nations

BETTER PRODUCTION

Ensure sustainable consumption and production patterns, through efficient and inclusive food and agriculture supply chains at local, regional and global level, ensuring resilient and sustainable agri-food systems in a changing climate



BETTER NUTRITION

End hunger, achieve food security and improved nutrition in all its forms, including promoting nutritious food and increasing access to healthy diets

BETTER ENVIRONMENT

Protect, restore and promote sustainable use of terrestrial and marine ecosystems and combat climate change (reduce, reuse, recycle, residual management) through MORE efficient, inclusive, resilient and sustainable agri-food systems

BETTER LIFE

Promote inclusive economic growth by reducing inequalities (urban/rural areas, rich/poor countries, men/women)

Food and Agriculture Organization
of the United Nations

THANK YOU.

Chief-scientist@fao.org

Twitter: @FAOScienceChief