FAO perspective on Climate Smart Agriculture, Biodiversity loss and Uncertainties under climate change

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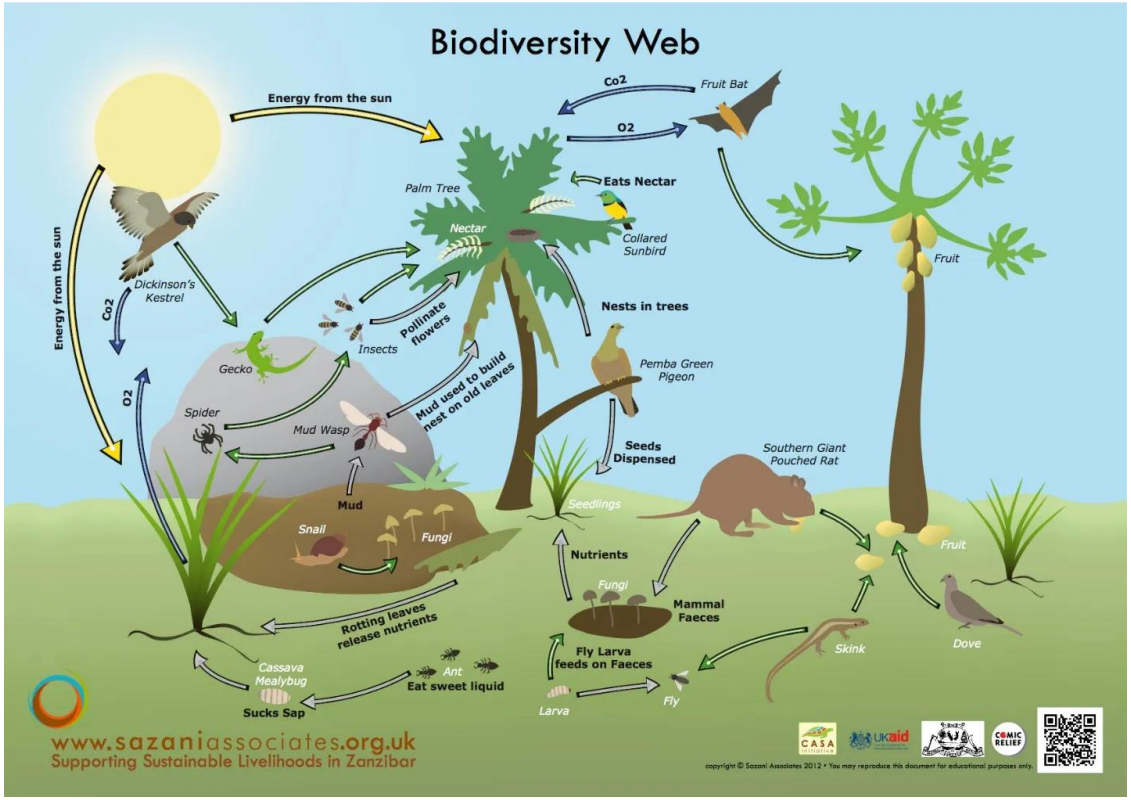
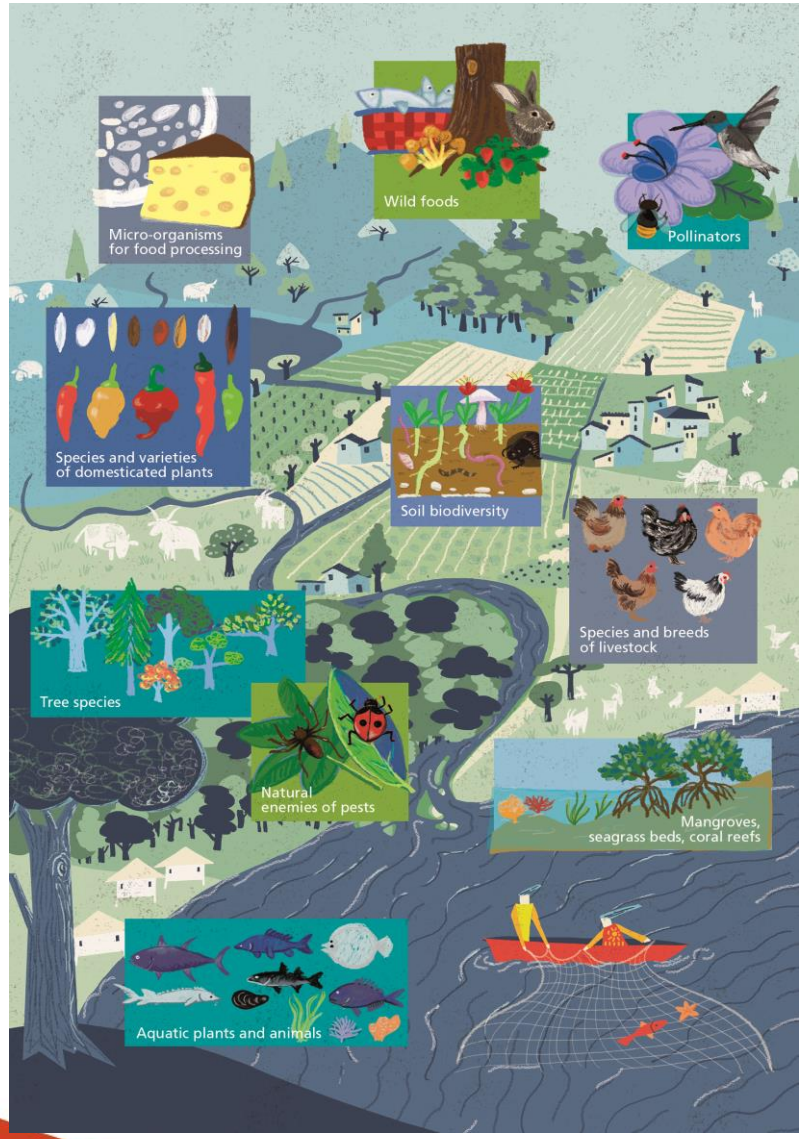
Biodiversity

The variety and variability of life on hearth.

Three levels:

1. Genetic level
2. Species level
3. Ecosystem level



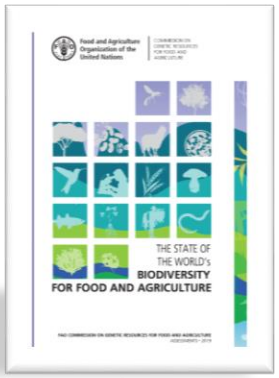


Biodiversity for food and agriculture

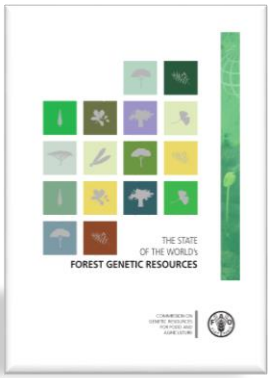
The variety of life at genetic, species and ecosystem levels that contributes to agriculture and food production

Source: FAO. 2019. *The State of the World's Biodiversity for Food and Agriculture - In brief*. Rome. Available at http://www.fao.org/3/CA3229EN/CA3229EN.pdf

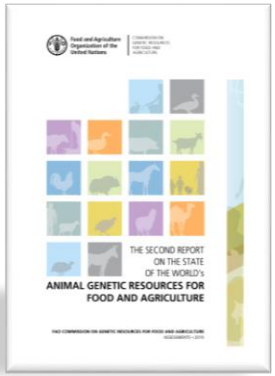
FAO's Global Assessments



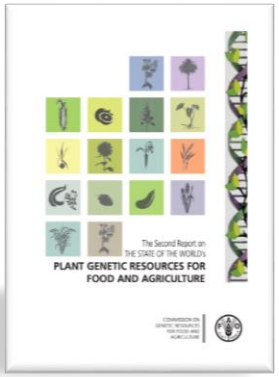
The State of the World's Biodiversity for Food and Agriculture



The State of the World's Forest Genetic Resources



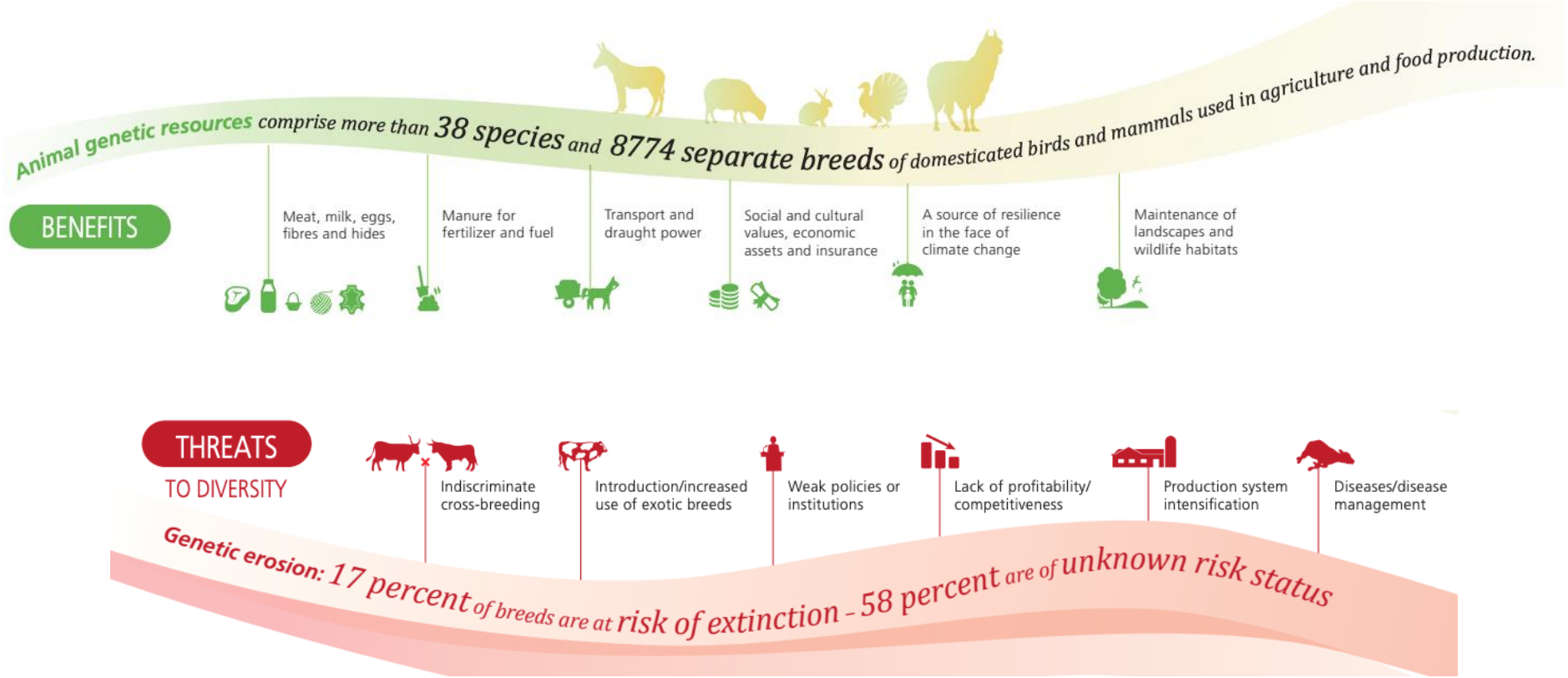
The State of the World's Animal Genetic Resources for Food and Agriculture



The State of the World's Plant Genetic Resources for Food and Agriculture

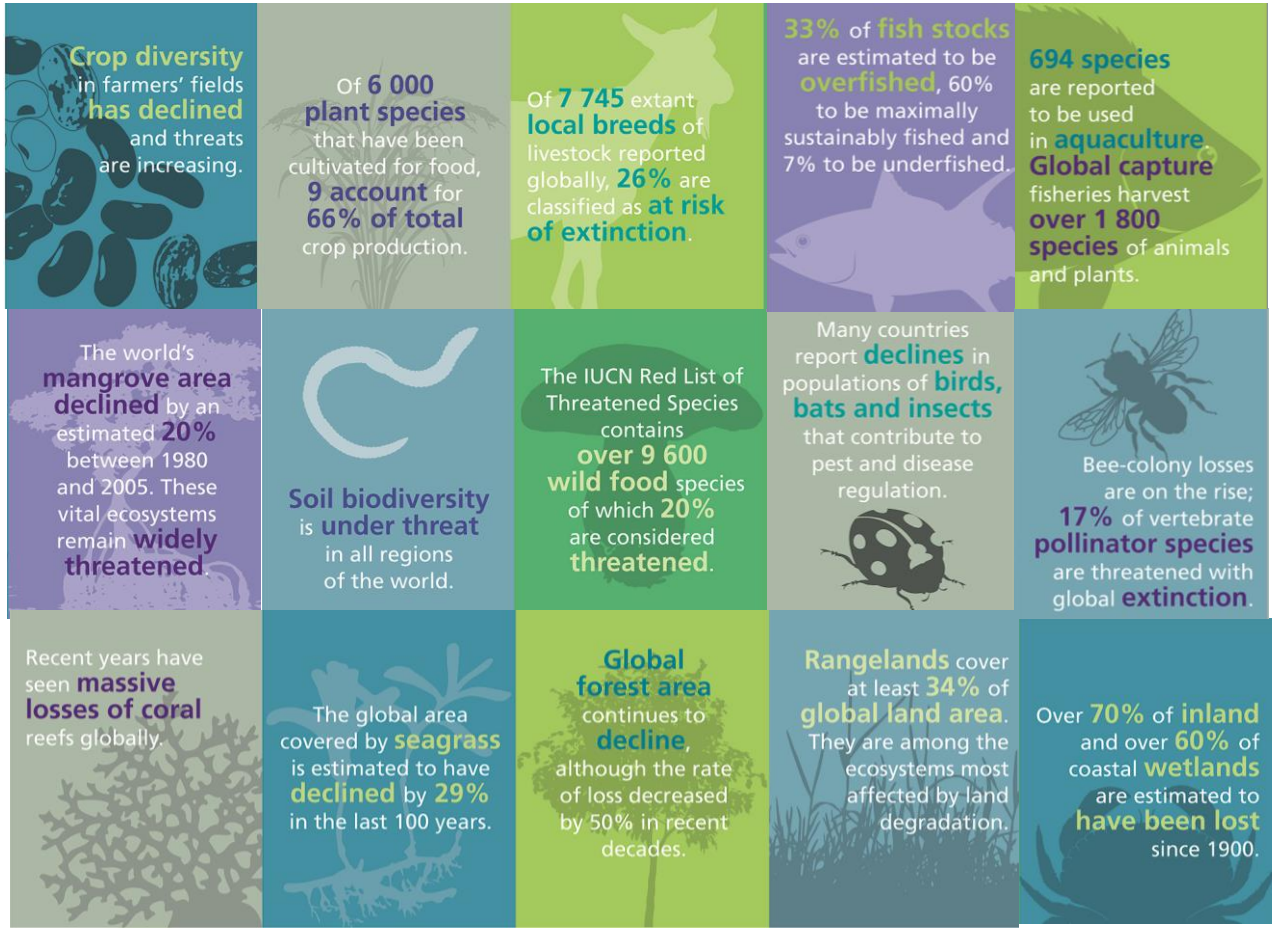
The State of the World's Aquatic Genetic Resources for Food and Agriculture

Genetic Resources are under threat



Source: FAO, 2015. T*he Second Report on the State of the World's Animal Genetics Resources for Food and Agriculture*. Rome. Available at http://www.fao.org/3/a-i4787e.pdf

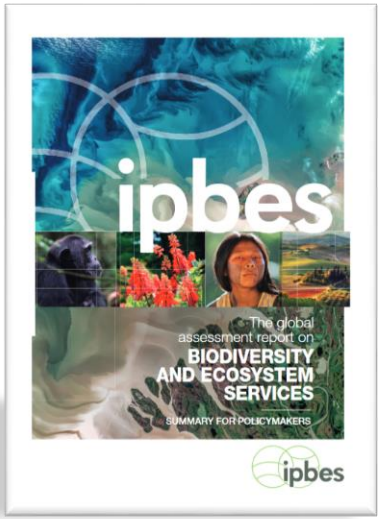
Biodiversity for food and agriculture is under threat



Source: FAO. 2019. *The State of the World's Biodiversity for Food and Agriculture - In brief*. Rome. Available at http://www.fao.org/3/CA3229EN/CA3229EN.pdf

Drivers of biodiversity loss

1. Changes in land and sea use
2. Direct exploitation of organisms
3. Climate change
4. Pollution
5. Invasive alien species



Unsustainable agriculture practices contribute to most of these drivers

Risks for agriculture

- Loss of genetic diversity
- Loss of crop wild relatives
- Loss of species diversity within farms and in rangelands
- Loss of species diversity
- Loss of habitats
- Degradation of ecosystems

Loss of a reservoir of genetic variations and related adaptation capacity

Loss of ability to adapt to changing conditions

Increased vulnerability to pests and diseases and to changes

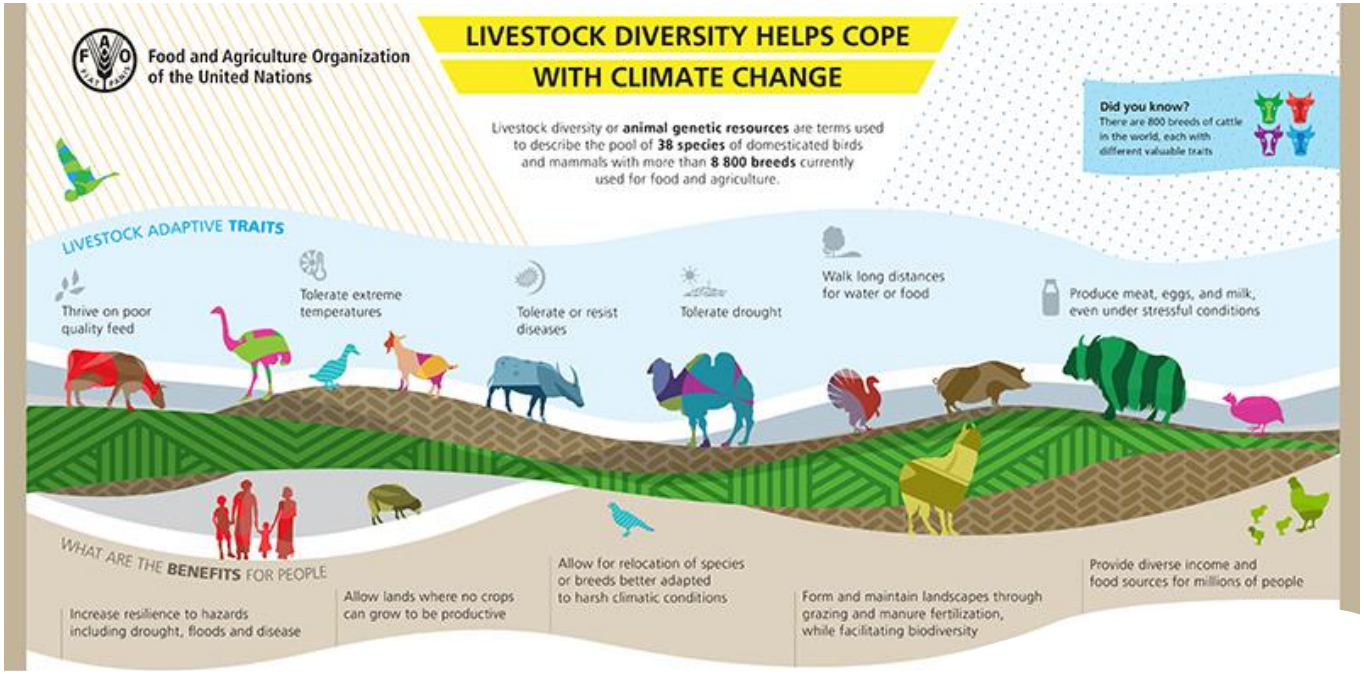
Loss of productivity

Loss of ecosystem services such as pollination, soil fertility

Food insecurity

Loss of biodiversity has an important impact on agriculture and food security

What can we do?



- Improve knowledge of characteristics and trends
- Strengthen institutional frameworks
- Improve awareness, education, training and research

Plan of Actions

Plan of Actions

- Strengthen breeding strategies and programmes
- Expand and diversify conservation programmes

Source: Global Plan of Action for Animal Genetic Resources for Food and Agriculture

The use of many biodiversity-friendly practices is reported to be increasing

Management practices and approaches	Production systems (PS)											
	Livestock grassland-based systems	Livestock landless systems	Naturally regenerated forests	Planted forests	Self-recruiting capture fisheries	Culture-based fisheries	Fed aquaculture	Non-fed aquaculture	Irrigated crop systems (rice)	Irrigated crop systems (other)	Rainfed crop systems	Mixed systems
Landscape management	↗	↗	↗	↗					↗	↗	↗	↗
Ecosystem approach to fisheries					↗	↗	↗					
Restoration	↗		↗	↗	↗				↗	↗	↗	↗
Diversification	↗	↗	↗	↗	↗	↗	↗		↗	↗	↗	↗
Home gardens	↗	↔	↗	↗					↗	↗	↗	↗
Agroforestry	↗	↗	↗	↗					↗	↗	↗	↗

Proportion of countries reporting the PS that report any trends (%)

0–9
10–19
20–29
30–39

Source: FAO. 2019. *The State of the World's Biodiversity for Food and Agriculture*. Rome.

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Polyculture/aquaponics							↗					↗
Organic agriculture	↗	↗	↗	↗					↔	↗	↗	↗
Low external input agriculture	↗↙	↗	↗	↗					↗	↗	↗↙	↗
Sustainable soil management	↗	↗	↗	↗					↗	↗	↗	↗
Management of micro-organisms	↗		↗	↗	↗				↗	↗	↗	↗
Conservation agriculture	↗	↗	↗	↗					↗	↗	↗	↗
Integrated plant nutrient management	↗	↗	↗	↗					↗	↗	↗	↗
Integrated pest management	↗	↗	↗	↗	↗				↗	↗	↗	↗
Pollination management	↗	↗	↗	↗						↗	↗	↗
Enrichment planting			↗	↗								↗
Reduced-impact logging			↗	↗								
Domestication	↗	↔	↗↙	↗			↗		↗	↗	↗	↗
Base broadening	↗	↗	↗↙	↗					↗	↗	↗	↗

Proportion of countries reporting the PS that report any trends (%)

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10–19
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Notes: Analysis based on 91 country reports. See main report for details of the methodology.

Climate-Smart Agriculture approach

Climate-Smart Agriculture (CSA):

- is an **approach** to guide transformation and reorientation of agricultural systems to effectively support development and ensure **food security in a changing climate**;
- is not a set of practices that are universally applicable;
- is context and location specific;
- works at multiple scales.

Climate-Smart Agriculture: 3 Pillars

Sustainably increase agricultural productivity and incomes

1

Adapt and build resilience of people and food systems to climate change

2

Reduce and/or remove greenhouse gas emissions, where possible

3

Climate-smart agroforestry systems in the Central American Dry Corridor

Integrated systems

Pillar 1: Productivity & Incomes	**Pillar 2: Resilience & Adaptation**	**Pillar 3: Mitigation**
Increased soil fertility/ **biodiversity**	Increased resilience to drought due to increased soil moisture contents: - Higher water infiltration rates and water retention capacity of soils - Reduced loss of water to surface runoff;	Reduced pressure on forest and reduced GHG emissions through avoided burning forest burning
Increased crop yields		
Increased land productivity	Increased resilience to high-intensity rainfall events: - Reduced erosion and loss of top soil; - Reduced crop damage.	Removal of GHG from the atmosphere through carbon sequestration by soils and storage as soil organic carbon
Increased biodiversity of the farming system. Diversified livelihood/farm income from tree products		

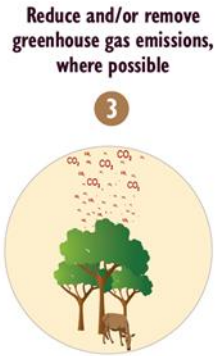
Source: Schnetzer, 2018

CSA practices for crop production

Enhancing on-farm biodiversity
(e.g. varietal mixtures, intercropping, crop rotations)

- Diversification of farm income
- Greater resilience to pests and diseases, also under changing climate conditions
- Enhanced ecosystem service and production factor: pollination

Source: Wageningen University



CSA practices for livestock production

Grazing management
(Rotational grazing)

- Improved grassland productivity
- Avoidance of land degradation/restoration of degraded pastures, greater resilience to weather extremes and climate variability
- Higher quality/digestibility of forage, reduced GHG emissions from enteric fermentation

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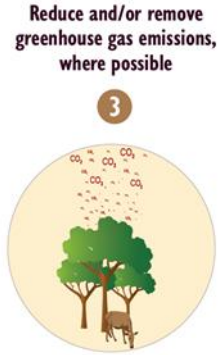
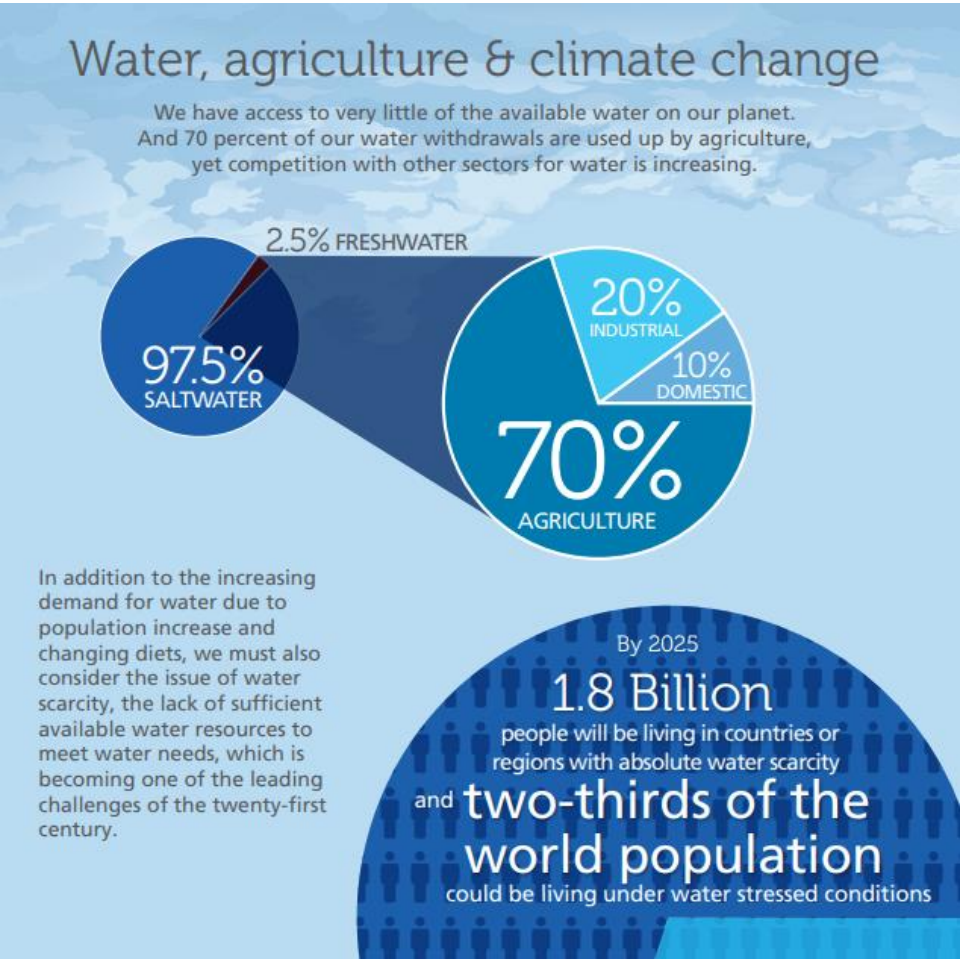
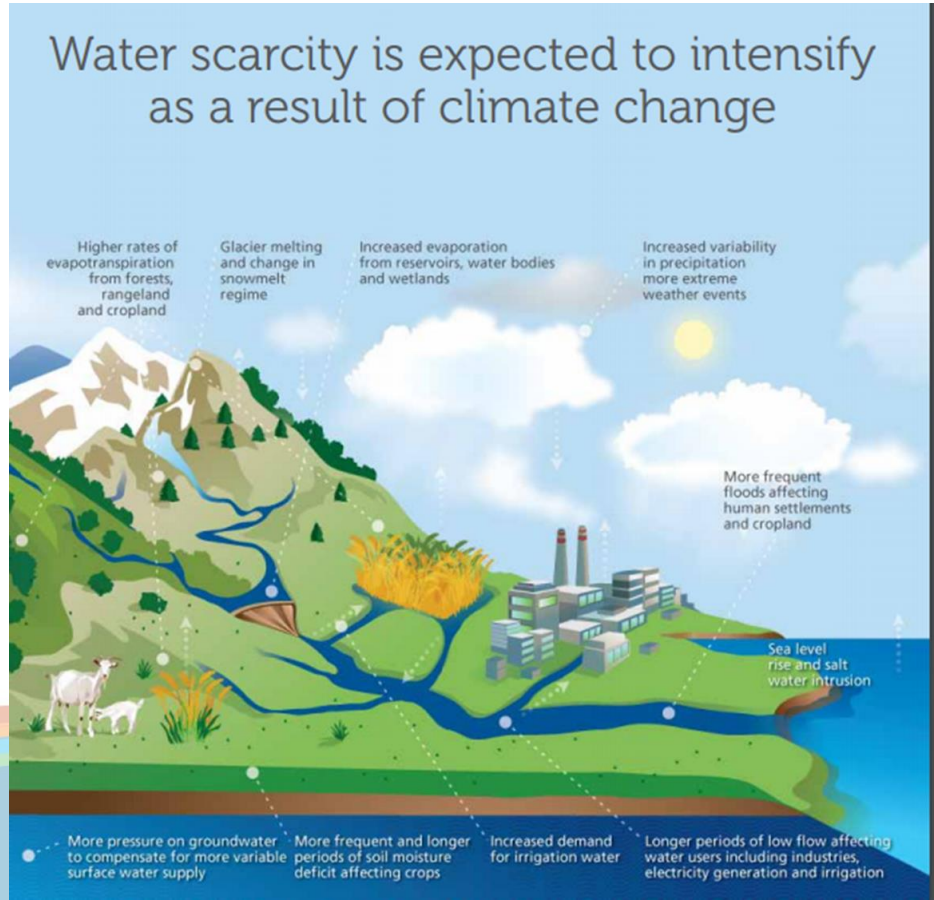


- High capacities for sequestering and storing carbon.
- Acting as natural barriers to physical impacts of climate change.
- Contribute to the sustainable supply of fish.
- Improved resilience, can contribute to stabilizing the availability of nutritious food and securing income.
- Enable the development of stronger social systems and create livelihood options from within the communities that rely on fisheries and aquaculture.

Well-managed mangroves and their biodiversity

Water, agriculture and climate change





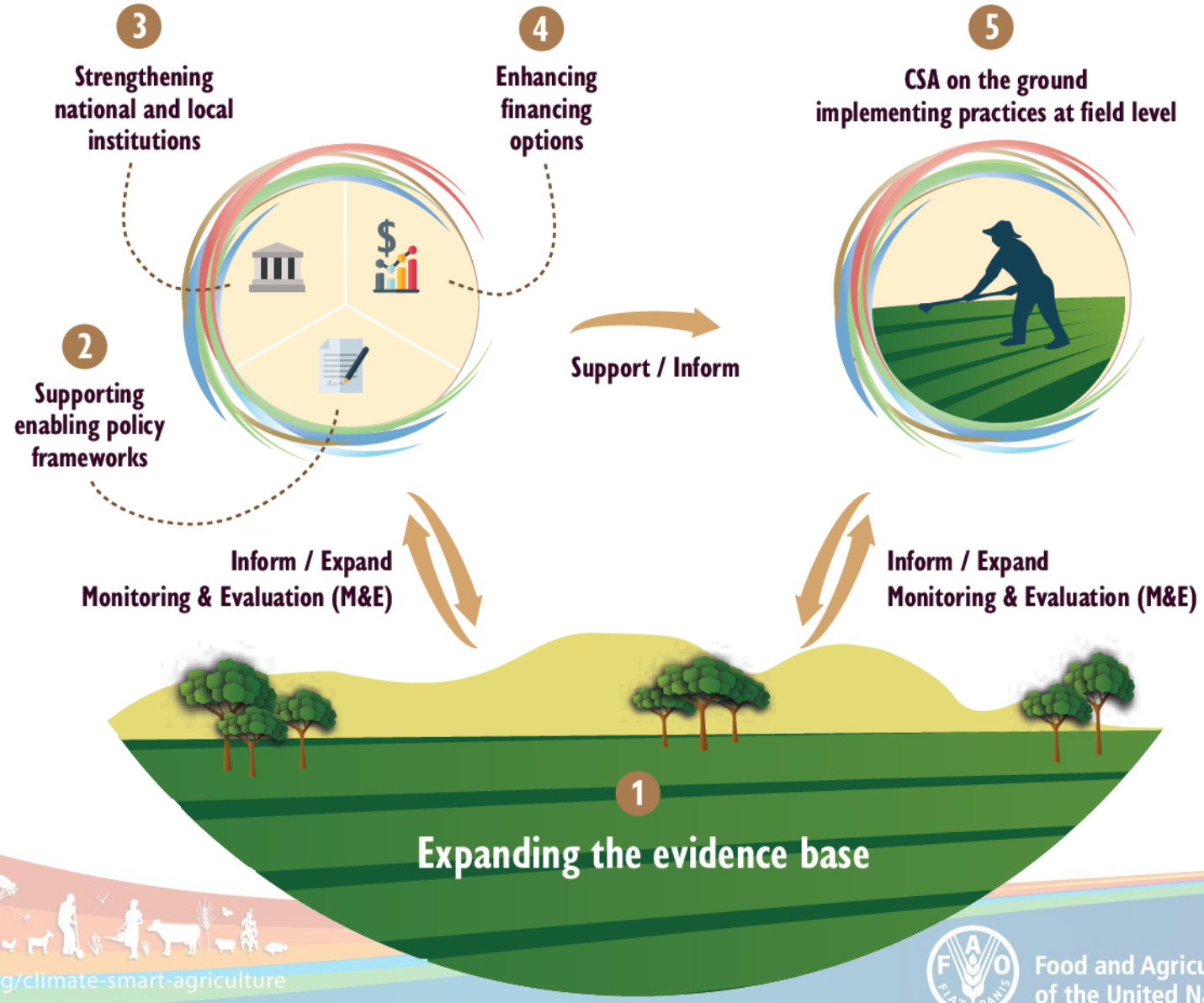
fao.org/climate-smart-agriculture

Water sector and Biodiversity

Landscape management strategies include

- Buffer strips along water bodies to reduce the run-off of nutrients, chemicals and sediments from farming, helping to improve water quality.
- Ecosystem degradation is a contributing factor in several major water related disasters.
- Healthy ecosystems is increasingly recognized as a means of disaster risk reduction.
- Ecosystems are increasingly being used to augment, or replace, built disaster reduction infrastructure, such as dykes, and often with significant economic gains resulting from reduced operational and capital costs.
- Similarly restoring soils and vegetation in dryland landscapes is becoming a significant and increasingly effective response to reducing risks from drought.

CSA implementation: A 5-actions process



What next?

- Integrate biodiversity in agriculture and climate change policies, projects and activities
- Re-educate the fields to a more varied, sustainable and traditional practices with the support of government incentives and technologies
- Economic and political frameworks need to be strengthened to help decision-makers change their way of thinking and acting.
- Review, harmonize and adapt existing policies related to CC and agriculture inserting CSA and biodiversity approaches across different sectors of government to address inconsistencies and gaps.

Food and Agriculture Organization of the United Nations

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Thank you for your attention