FAO's work on Climate Change *Fisheries & Aquaculture*

Food and Agriculture Organization of the United Nations

FISHERIES, AQUACULTURE AND CLIMATE CHANGE

The role of fisheries and aquaculture in the implementation of the Paris agreement

Billions of people around the world depend on fisheries and aquaculture for food, essential nutrients and livelihoods. The sector is already under stress from pollution, habitat degradation, overfishing and harmful practices; climate variability, climate change and ocean acidification represent additional threats to the sector and dependent communities.

FAO and its partners are working together to reduce vulnerabilities of those most dependent on fisheries and aquaculture for their existence by designing and implementing suitable adaptation and mitigation measures. FAO and its partners are working at finding solutions to meet an ever-growing demand for fish in an era of limited natural resources, build resilience and unlock the Blue Growth potential of the aquatic systems.

"The health of our planet as well as our own health and future food security all hinge on how we treat the blue world".

FAO DIRECTOR-GENERAL JOSÉ GRAZIANO DA SILVA

Significance of fisheries and aquaculture sector

Key facts & figures

Global total **capture fishery production** in 2014 was **93.4 million tonnes.**

31.4% of fish stocks are estimated as **overfished** (fished at biologically unsustainable levels).

Global total **aquaculture production** of aquatic animals in 2014 was **73.8 million tonnes.**

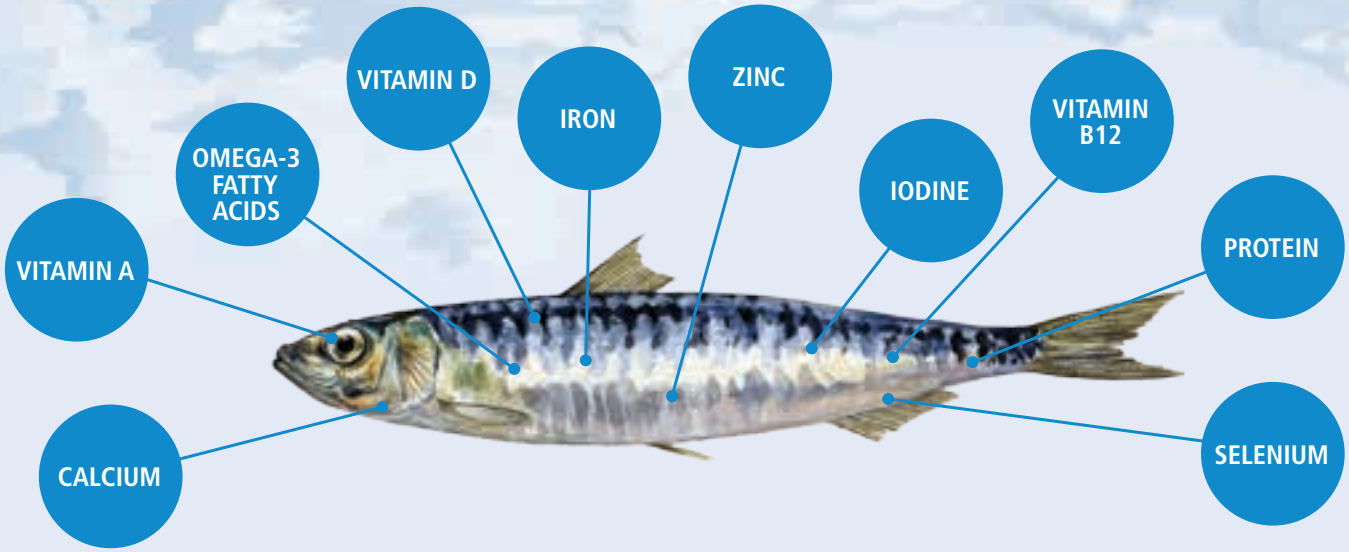
Fish **trade** was valued at **US $135 billion** in 2015.

World fish supply reached a record high of **20 kg per capita** in 2014.

10-12% people, i.e. over **870 million** people, depend on fisheries and aquaculture.

Women account for **19%** of all people directly engaged in the fisheries and aquaculture sector, and over **50%** when including the post-harvest sector

Fish: nature's super food



Key nutrients in seafood:

Long chain omega-3 fats

Mainly found in fish and fishery products, these fatty acids are essential for optimal brain development.

Iodine

Seafood is in practice the only natural source of this crucial nutrient. Iodine serves several purposes like aiding thyroid function. It is also essential for neurodevelopment.

Vitamin D

Another nutrient crucial for mental development, this vitamin also regulates the immune system function and is essential for healthy bones.

Iron

During pregnancy, iron intake is crucial so that the mother can produce additional blood for herself and the baby.

Calcium, zinc, other minerals

Diets without dairy products often lack calcium, and zinc deficiency slows a child's development.

Impacts of climate change on fisheries and aquaculture

GHG accumulation and global warming changes

- Oceans currents
- El Niño Southern Oscillation
- Sea level rise
- Rainfall
- River flows
- Lake levels
- Thermal structure
- Storm severity
- Storm frequency
- Acidification

Areas affected

Production and ecology

Fishing, aquaculture, and post-harvest operations

Communities and livelihoods

Wider society and economy

Impacts

Species composition production and yield, distribution and seasonality, disease and other disruptions, coral bleaching, calcification.

Safety end security, efficiency and costs, infrastructure security.

Loss and damages to assets, risks to life and health, vulnerability and confidence, displacement and conflict.

Cost of migration and adaptation, social and market impacts, water and other resources.

Source: developed from Badjeck *et al.* 2010

Specific impacts of climate change on fish and food security

AVAILABILITY of aquatic foods will vary through changes in habitats, stocks and species distribution.

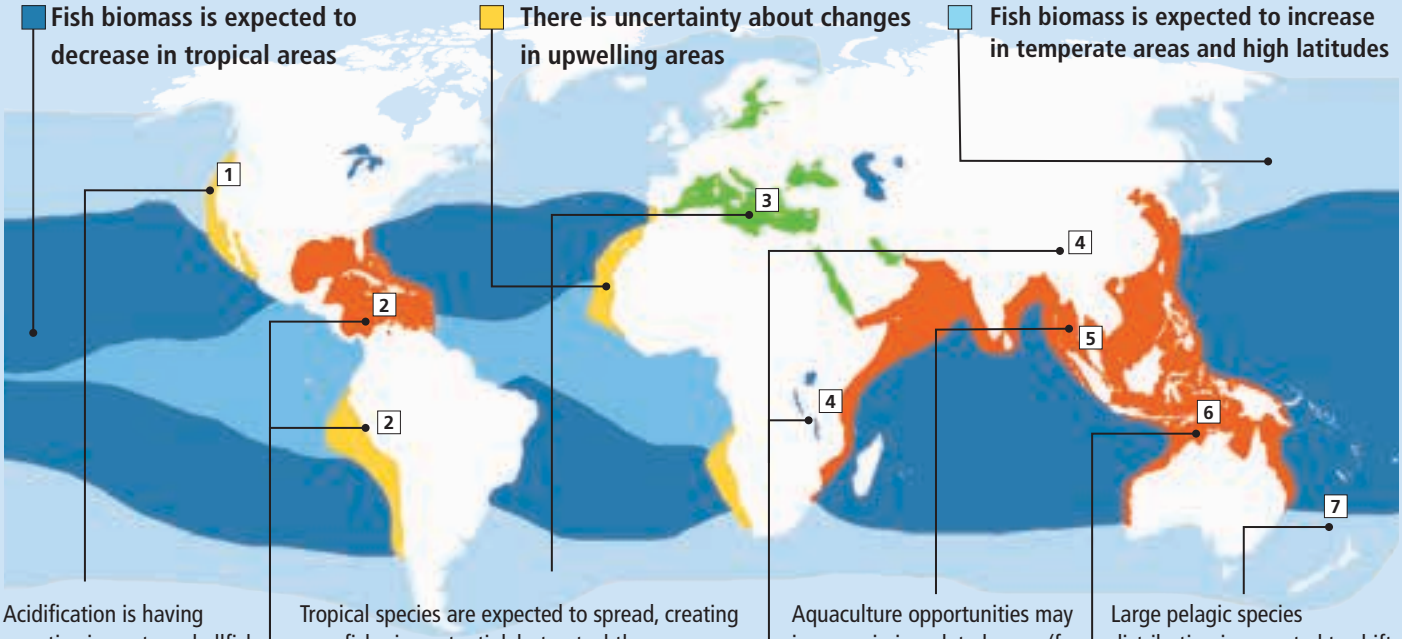
STABILITY of supply will be impacted by changes in seasonality, increased variance in ecosystem productivity and increased supply variability and risks.

ACCESS to aquatic foods will be affected by changes in livelihoods and catching or farming opportunities.

UTILIZATION of aquatic products will also be impacted and, for example, some societies and communities will need to adjust to species not traditionally consumed.

Regional variability of climate change impacts on fisheries and aquaculture

Depending on the regional and local context, climate change is expected to result in negative impacts, but also opportunities as shown in the following examples.



1 Acidification is having negative impact on shellfish aquaculture (for ex. North East Pacific)

2 Tropical species are expected to spread, creating new fisheries potential, but autochthonous species are likely to be impacted negatively due to increased temperatures (for ex. The Mediterranean Sea)

3 El-Niño related events and extreme weather events are expected to increase in intensity and/or frequency with impacts on the fisheries sector (for ex. Caribbean and Peru)

4 Inland fisheries are at risk because of water shortages, drought and impacts from other sectors (for ex. in African Great Lakes and Asian freshwater bodies)

5 Aquaculture opportunities may increase in inundated areas (for ex. in South East Asia)

6 There is a high risk of mass coral bleaching and mortality with associated impacts on fish stocks (for ex. in the Western Pacific)

7 Large pelagic species distribution is expected to shift, creating winners and losers (for ex. in the Pacific)

High-Latitude Spring Bloom Systems
Semi-Enclosed Seas
Coastal Boundary System
Eastern Boundary Upwelling System
Equatorial Upwelling Systems
Subtropical Gyres

Source: modified from IPCC, 2014

Damage and losses from climate related impacts on agriculture, fisheries and aquaculture

Share of climate related disasters' damage and losses absorbed by agriculture, including fisheries and aquaculture, in developing countries (2003-2013).

17%
Damage

31%
Losses

25%
Damage and losses

Agriculture, including fisheries and aquaculture

All other sectors

Source: FAO (2015), based on PDNAs

Major challenges to fishing communities posed by climate change

Relocation of resources and replacement with less commercially valuable species requires diversification of fishing operations and markets.

Changes in the timing of fish spawning and recruitment will need adjustments to management interventions.

Increases in the frequency and severity of storms may affect infrastructure, both at sea and on shore.

In areas where production is already limited by temperature (e.g. tropics) traditional productive areas may be reduced. Dependent communities will need to diversify their livelihoods.

The impact of ocean acidification may be locally significant, for example in activities dependent on coral reefs.

Adaptation experiences from FAO and partners

Flexible and adaptable management and institutions, diverse and flexible livelihood strategies and risk reduction initiatives are at the core of adaptation. Example of issues and adaptation measures:

Reduced yields:

- secure access to higher value markets;
- selective breeding for faster growing strains or for disease resilient strains;
- improve water-use efficiency and sharing (e.g. with users of irrigated rice paddy);
- invest in aquaculture infrastructure improvement (e.g. net cages and raised dykes in flood prone pond systems).

Increased yield variability:

- diversify livelihoods (e.g. ecotourism);
- shift to culture based fisheries or shift to hatchery seed for previously wild caught seed stocks.

Increased risks:

- insurance;
- early warning, monitoring and communication;
- improved safety at sea.

Increased vulnerability :

- soft defences (e.g. wetland rehabilitation);
- disaster risk reduction and response.

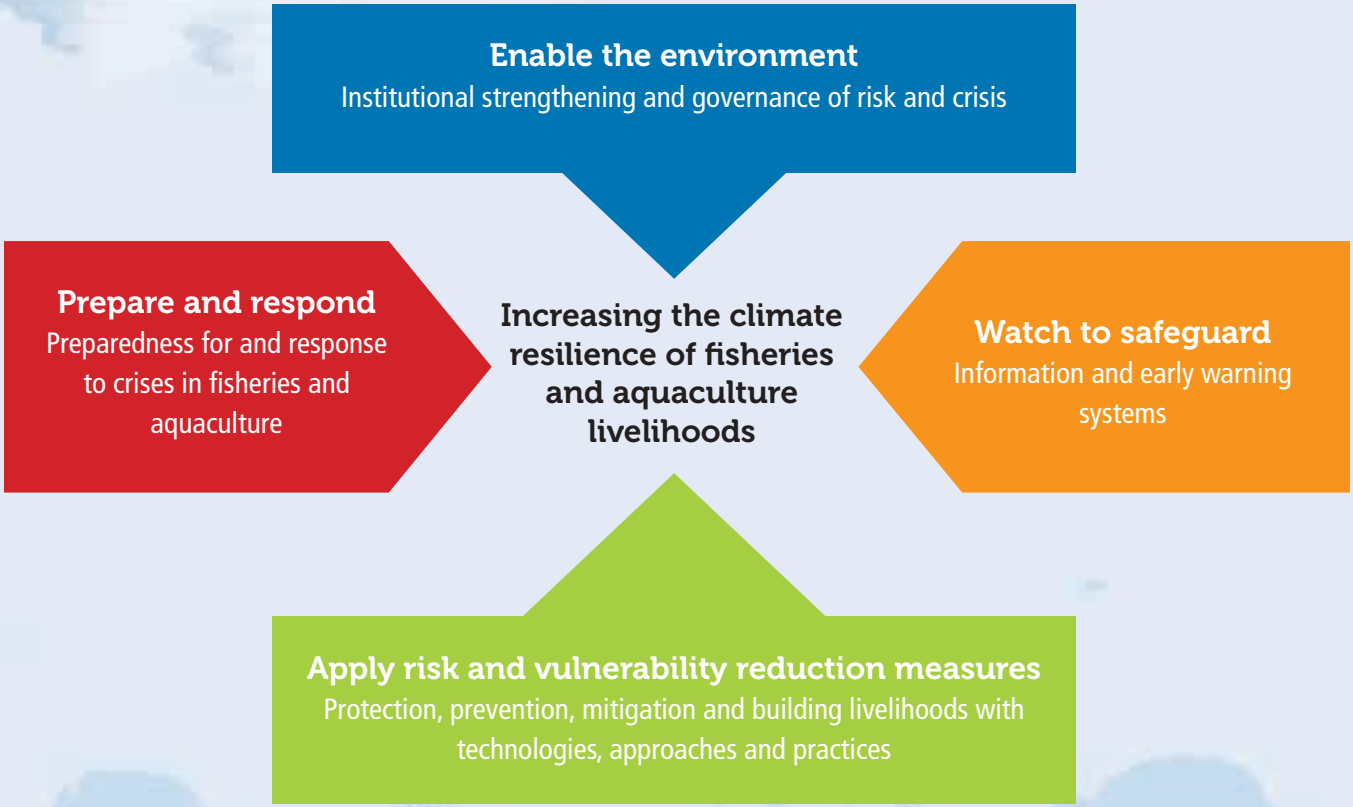
Mitigation

Although a relatively small global contributor, capture fisheries and aquaculture have a responsibility to limit GHG emissions as much as possible. A significant reduction of GHG emissions can be achieved by:

- Reducing energy consumption ☑
- Better feeds and feed management ☑
- Reduced transportation of fisheries and aquaculture products ☑
- Fuel efficiency of fisheries and aquaculture operations ☑
- Better engines ☑
- Low impact fishing methods and gears as ways to sequester carbon in aquatic ecosystems ☑

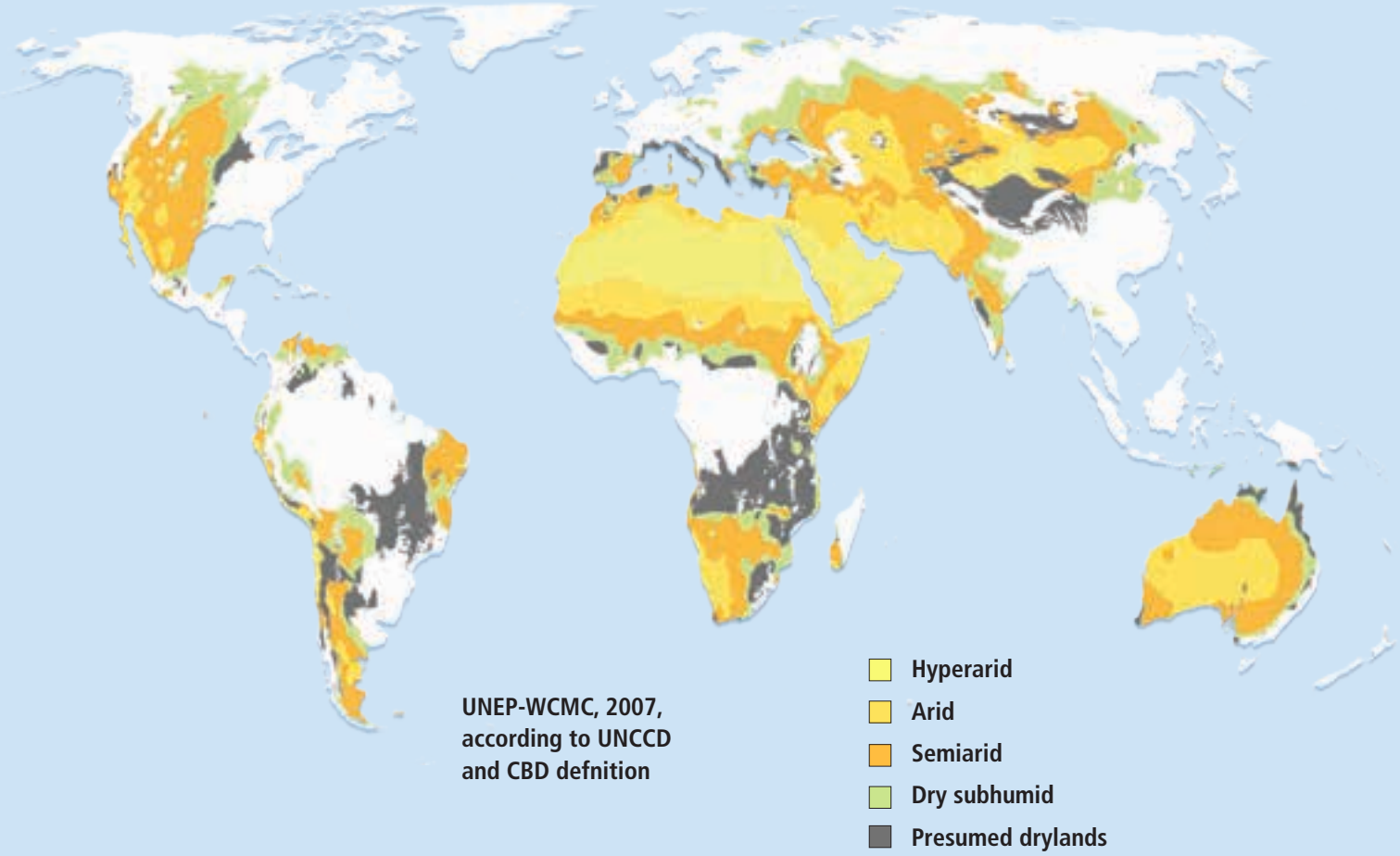
Resilience

Adopting a multihazard and cross-sectoral approach, increasing the climate resilience of fisheries and aquaculture livelihoods to threats require action across these four mutually reinforcing areas



Drylands

Small, fast growing wild fish can be crucial allies in the race to end hunger in the drylands where food and nutritional needs are unlikely to be satisfied by agricultural development alone.



UNEP-WCMC, 2007, according to UNCCD and CBD defnition

Fisheries and aquaculture in international instruments

COP21 for the first time featured the role of oceans, inland waters and aquatic ecosystems for temperature regulation and carbon sequestration.

Disaster risks and losses in fisheries and aquaculture can be prevented and minimized by implementing the Sendai Framework.

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Blue growth

Oceans and inland waters can sequester up to five times the amounts of carbon absorbed by tropical forests and function as important nursery, feeding and reproduction areas for many species. Supporting sustainable fisheries and healthy ecosystems will help mitigate and reduce impacts from climate change and variability and unlock the Blue Growth potential of aquatic systems in line with the principles of the Code of conduct for responsible fisheries and related instruments.

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