Impacts of climate change on small-scale fisheries in Africa

CFFA
COALITION FOR FAIR FISHERIES ARRANGEMENTS

Introduction

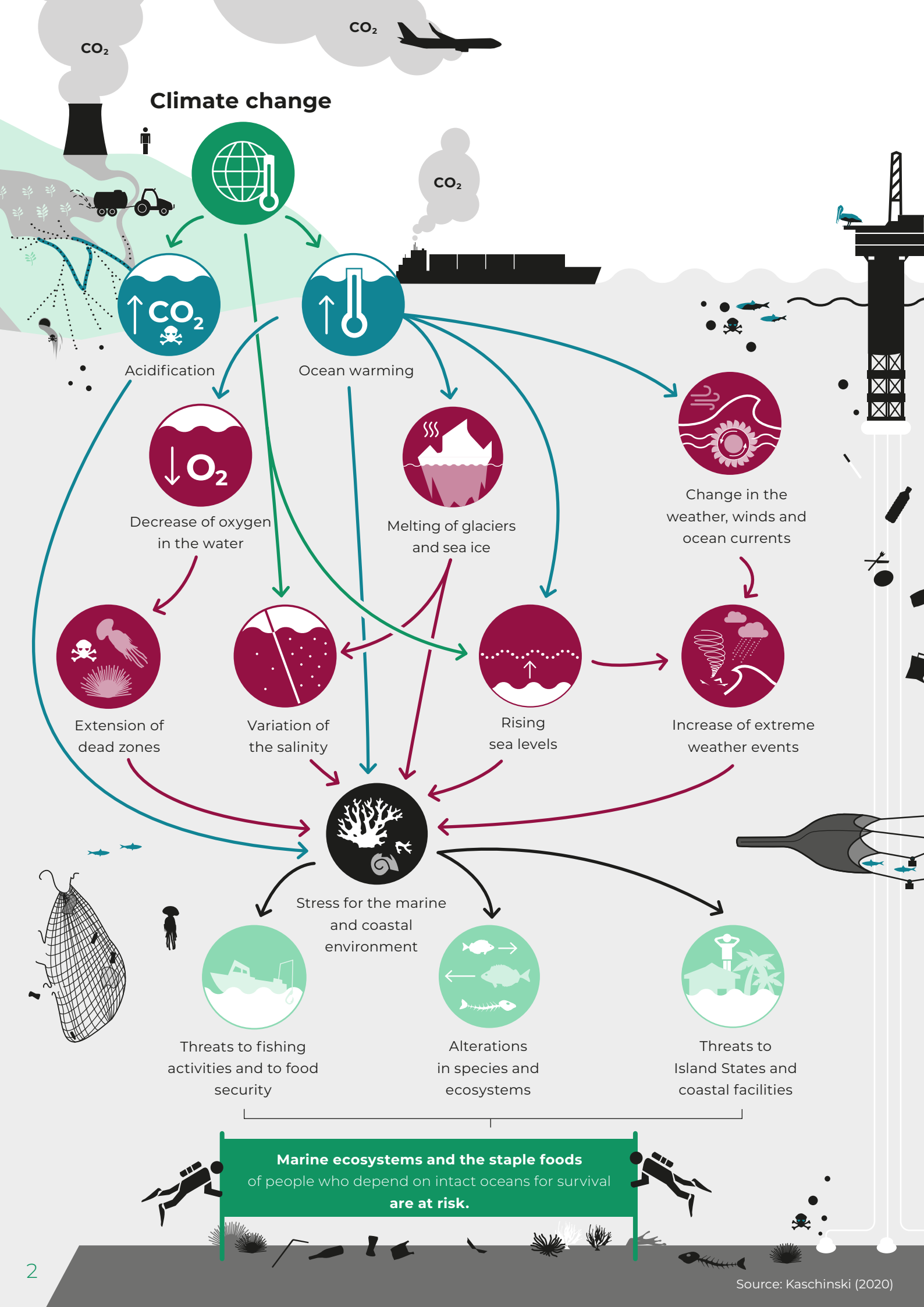
The oceans play a fundamental role in regulating the world's climate. They are the main 'dampeners' of climate change through, among other things, the absorption of carbon dioxide emissions and solar radiation, as well as the production of water vapour that helps cool the atmosphere.

However, the health of the oceans is itself now being affected by climate change, attributed by the UN Framework Convention on Climate Change (UNFCCC) "*directly or indirectly to human activity, which is altering the composition of the global atmosphere and is in addition to natural climate variability observed over comparable time periods.*"[1]

As the Intergovernmental Panel on Climate Change (IPCC) has been pointing out in its reports for years, this human-induced global warming[2] is leading to higher surface water temperatures, rising sea levels, oxygen deficiency zones, acidification and changes in ocean currents. This has a significant impact on coastal ecosystems, biodiversity and the distribution of marine organisms, particularly in tropical regions such as Africa.

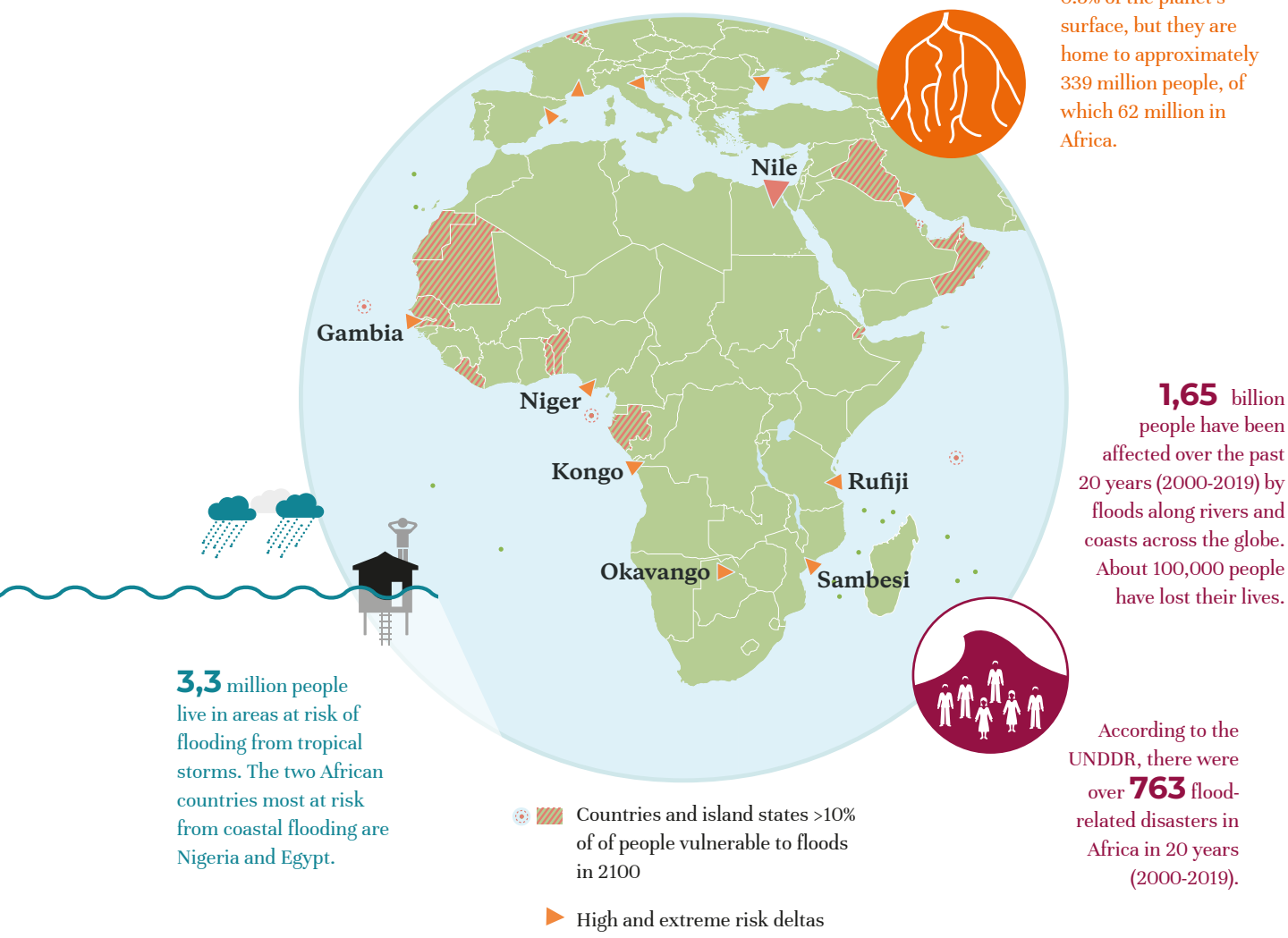
Much of coastal Africa will be heavily impacted by climate change, which is already beginning to be visible in some places: the south-eastern coast of Africa in the Indian Ocean is one of the regions where the greatest temperature increases have been recorded.[3]

Artisanal fishing communities in African countries will be the first to experience the impacts of climate change on the oceans surrounding the continent, due to their geographical location, but also due to the limited means African countries have to deal with this phenomenon.



Source: Kaschinski (2020)

The risk of flooding due to extreme weather events is increasing



Deltas represent only 0.5% of the planet's surface, but they are home to approximately 339 million people, of which 62 million in Africa.

1,65 billion people have been affected over the past 20 years (2000-2019) by floods along rivers and coasts across the globe. About 100,000 people have lost their lives.

3,3 million people live in areas at risk of flooding from tropical storms. The two African countries most at risk from coastal flooding are Nigeria and Egypt.

According to the UNDDR, there were over **763** flood-related disasters in Africa in 20 years (2000-2019).

1. Impacts on artisanal fishing communities and populations

According to a high CO_2 emissions scenario, by 2050, fisheries catches will decrease by 7.7% worldwide due to climate change.[4] This decrease could reach 26% in West Africa and even more in countries closer to the equator: 53% in Nigeria, 56% in Côte d'Ivoire and 60% in Ghana.

This decline in catches will affect the livelihoods of the more than 12 million men and women who work in Africa's artisanal fishing sector, including in post-harvest activities such as processing and marketing, where women are particularly numerous. In turn, this will also affect the availability of and access to fish for millions of African families for whom fish is an essential source of protein, vitamins and minerals.

A) CHANGES IN AFRICAN ARTISANAL FISHING ACTIVITIES

The increase in ocean temperature caused by climate change is forcing fish to migrate from equatorial areas to colder areas. When thermally stressed, the largest and most active fish, such as tropical tunas that travel thousands of kilometres in the oceans, are usually able to expand their range and seek out new, cooler water areas.

In tropical coastal regions, on the other hand, demersal (bottom-dwelling) fish species, crustaceans and molluscs, which are closely associated with reefs, mangroves, seagrass beds or sandy areas, cannot escape these climatic disturbances. The reproductive level and size growth of these species is reduced and stocks are declining. Reef-associated fish stocks

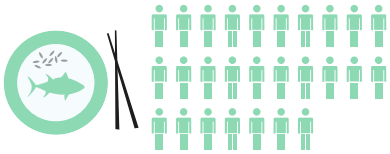
are projected to decline by 20-80% by the end of the century, and by 10-20% for bottom species.

By affecting the distribution of resources and their abundance, climate change is destabilising African artisanal fishing activities. It will force these fishing communities to diversify their livelihoods, adapt to species they do not normally consume, and adjust fishing schedules to the changing behaviour of certain migratory species that will no longer be available at certain times of the year.

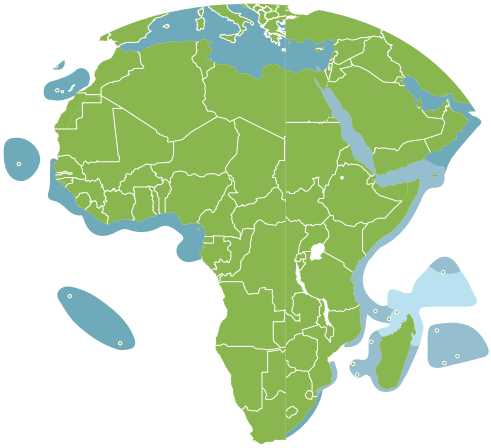
In addition, climate change is causing an increase in extreme weather events, such as cyclones, storms, floods and sea level rise. This poses increased risks to the lives of fishermen, who already have one of the most dangerous jobs in the world.

B) LOSS OF MANGROVES AND CORAL REEFS, NURSERIES FOR MANY SPECIES

Coastal areas such as estuaries and deltas with rich mangrove forests are threatened by rising sea levels. Although mangroves are able to move inland during moderate sea level rise (e.g. Gazi Bay in Mombasa), if sea levels rise rapidly, the influx of salt water reduces the growth of these plants. In addition, increased construction measures to protect the coastline can impede the growth of mangroves. As one third of marine fish species have their nursery in mangrove forests, the loss of this habitat will have a strong negative impact on fish resources. The same effect is observed in coral reefs due to heat stress and coral bleaching.



Mauritius, Tanzania and Comoros are the most reef-dependent countries in Africa and the southwest Indian Ocean.



The positive effects of intact coral reefs are of fundamental importance to the vast majority of small island developing states.

Coral reefs are the most rich-in-species marine ecosystems and of great importance for the life cycle of many marine species.

Up to 50% of wave energy can be absorbed by an intact coral reef

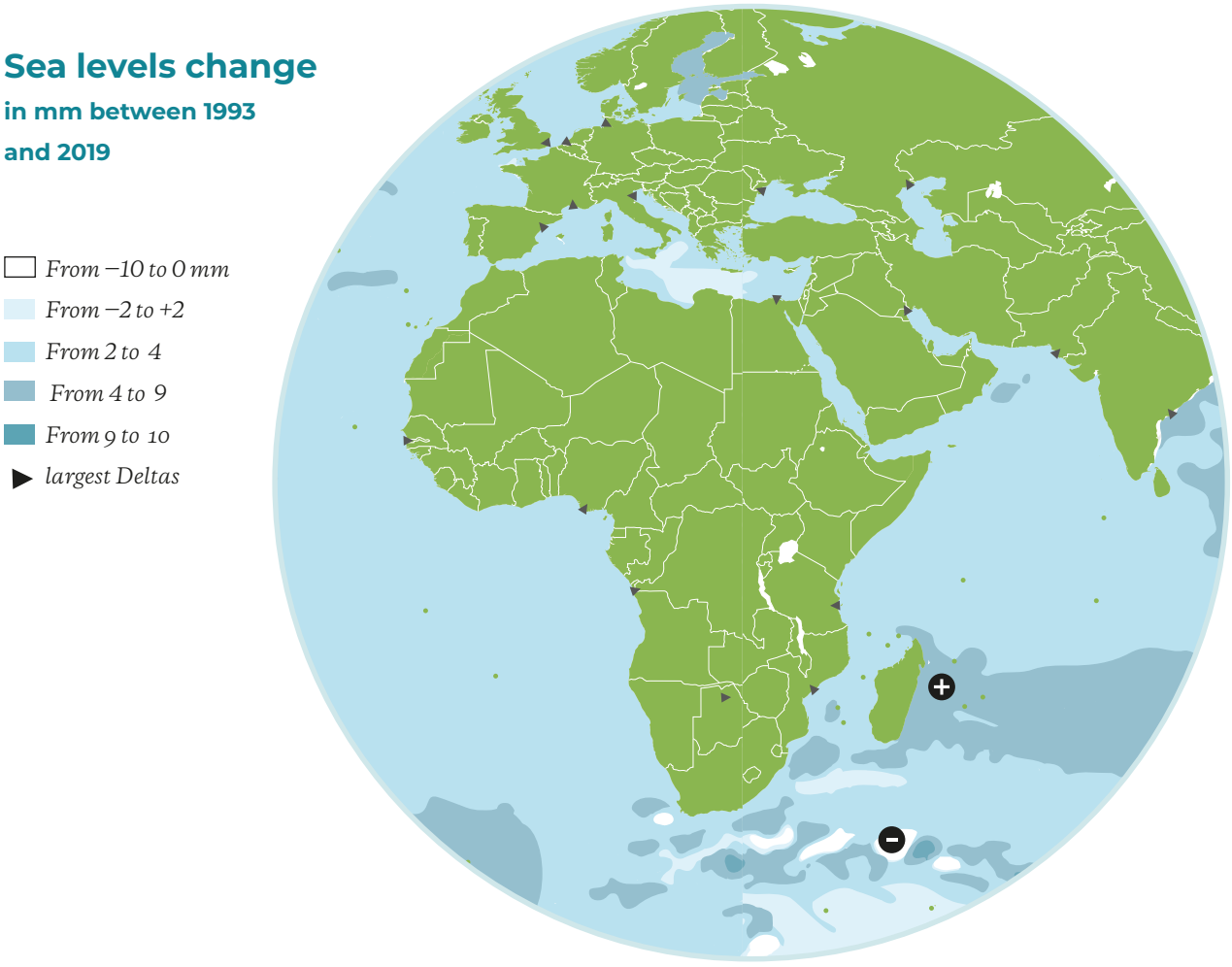
>60 % of coral reefs are already threatened by global warming.

70-90 % coral reef decline and bleaching in a global environment of +1.5°C.

>99 % of coral reefs cannot survive a warming of +2°C.

Sea levels change

in mm between 1993 and 2019



According to an article published on the World Bank blog, "*in East Africa, ocean warming has already destroyed much of the coral reefs that were home to some species and has significantly reduced fish stocks.*" The loss of coastal habitats may be the most serious long-term impact of climate change on African artisanal fisheries.[5]

C) COASTAL EROSION AND LOSS OF LAND ALONG THE COASTLINE

Finally, climate change can also cause or accelerate coastal erosion. In some West African countries, such as Sierra Leone, rising sea levels have caused flooding in coastal towns and villages, further exposing already highly vulnerable populations. A one-metre rise in sea level would result in the flooding and erosion of 1,800 km2 of low-lying land in Côte d'Ivoire, more than 6,000 km2 in Senegal and 2,600 km2 of land in Nigeria, most of which is wetland.[6] According to the World Bank, coastal erosion has already cost four West African countries (Benin, Ivory-Coast, Senegal and Togo) 5.3% of their GDP, or US$3.8 billion.[7]

For artisanal fishing communities, coastal erosion means the disappearance of infrastructure linked to their activities and even the destruction of their homes, which are often located on the edge of the coast. Measures taken to combat coastal erosion can themselves negatively affect artisanal fishing, as in Ghana, where the construction of dykes prevents fishermen from bringing in their nets.[8]

2. Aggravating factors

African ecosystems and fisheries resources have been intensively exploited in recent decades. This situation, combined with weak and non-transparent fisheries management systems and inadequate control in many African countries, has led to the overexploitation of many fish stocks. Overall, almost half of the assessed stocks in the eastern central Atlantic coastal zone off the Atlantic coast of Africa are exploited at biologically unsustainable levels.[9]

Other anthropogenic pressures on marine, coastal and wetland ecosystems come from coastal land use.

Increasing coastal populations have led to urbanisation with consequences for many natural habitats. Mangroves have suffered losses due to conversion to agriculture, urbanisation and timber harvesting, including artisanal fish smoking. Between 20 and 30% of the original mangrove vegetation has been lost in less than a quarter of a century in the West and Central Africa region.[10] Athough conservation efforts have led to a global reduction in mangrove losses due to human activity in the last decade, Africa remains, however, the only continent where non-productive conversion of mangroves is the primary cause of loss.[11]

Other threats to many ecosystems include pollution from sewage, chemicals (including fertilisers and pesticides) and waste, dam construction, sand mining and oil extraction in several EEZs, especially in the Gulf of Guinea.

Eutrophication, the excessive input of nutrients into waters, accelerated by higher surface water temperatures, leads to plant growth and oxygen depletion. This is a major concern, for example in the Guinea Current Large Marine Ecosystem[12] where human-induced eutrophication has led to the formation of several dead zones (e.g. Korle Lagoon in Ghana).

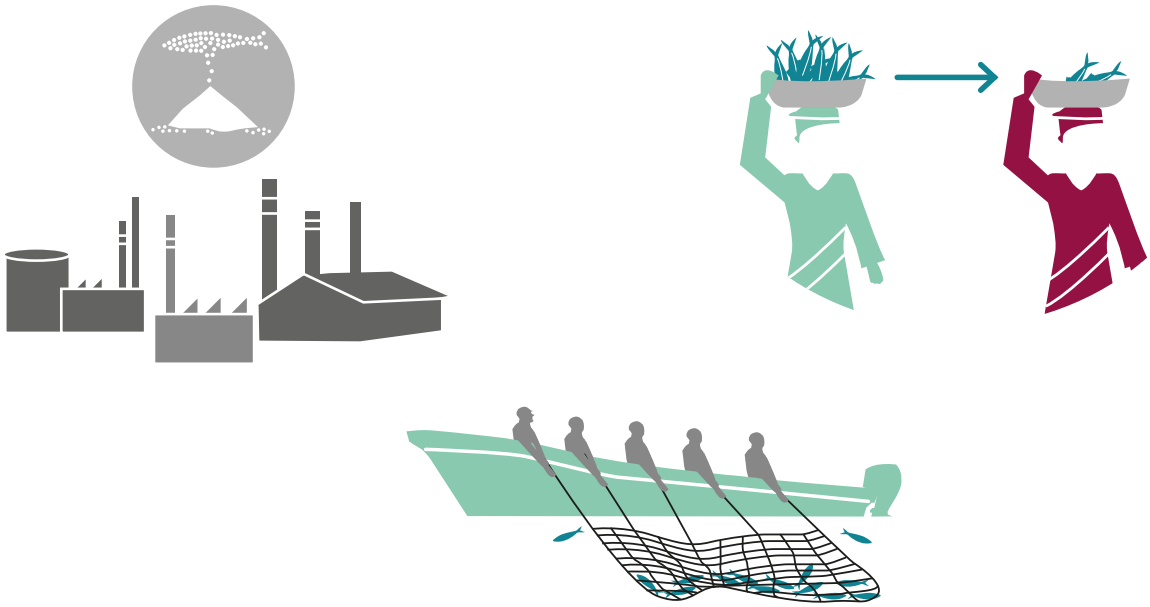
These stressors are often transboundary problems, requiring regional solutions.

A) OVEREXPLOITATION OF SMALL PELAGICS AND RISKS TO FOOD SECURITY IN WEST AFRICA

The overexploitation of small pelagic fish in West Africa is an example of a cross-border problem that requires cooperation between countries, or else it will trigger a serious food crisis in the region. Indeed, small pelagic fish resources, such as sardinella, play an essential role in food security and poverty reduction in West Africa.

In Benin, Ghana, Mali, Mauritania and Senegal, more than half of the population consumes small pelagic products on a daily basis. In countries such as Senegal, Gambia, Sierra Leone and Ghana, artisanal fishing communities, both fishermen and women fish processors, are highly dependent on small pelagic resources.

The abundance of small pelagics is strongly influenced by the upwelling phenomenon, which occurs when strong sea winds push the surface water of the oceans out to sea, forming a void where bottom waters can rise, accompanied by a significant amount of nutrients that species such as small pelagics feed on. The north-west African upwelling off Morocco, Mauritania, Gambia and Senegal is the most productive system in the world and therefore has a large fish biomass dominated by small pelagic fish.[13]



A study conducted off the coast of North-West Africa suggests an increase in surface water temperature in the region, which would result in a gradual migration of plankton further downstream.[14] In general, higher water temperatures, reduced oxygen saturation in seawater and acidification are causing plankton communities to shift towards smaller, less productive species.[15] These phenomena will result in a decrease in the abundance and size of the small pelagic fish that feed on them. The activities of the men and women involved in artisanal fishing, as well as the food security of the population, will be negatively affected.

This phenomenon is aggravated by overfishing, partly encouraged by the fishmeal and fish oil industry in Mauritania and other countries in the region. For many years, the FAO working group on the assessment of small pelagics off Northwest Africa[16] has recommended every year to reduce the fishing effort on sardinella, but no action has been taken by the countries concerned. The lack of scientific data makes it impossible to know the real state of the stocks and to actually determine whether there is a surplus. While the precautionary approach is necessary in such cases, the lack of consultation between countries makes it difficult to take decisions on the conservation of these shared stocks.

Conclusions and reasons for hope

Africa will be one of the regions most affected by the adverse effects of climate change on the oceans, including where artisanal fishing communities live. The disruption in the distribution and abundance of fish stocks, and the increasing intensity of the effects of natural phenomena will cause an alarming situation for these communities.

It is imperative, as proposed in the FAO Voluntary Guidelines for Sustainable Artisanal Fisheries in its chapter on climate change,[17] that States put in place, in consultation with artisanal fishing communities, specific policies and plans for climate change adaptation and mitigation. States should also introduce measures to reduce disaster risks and respond to emergency situations, while addressing issues such as coastal erosion, pollution and habitat destruction.

In line with the FAO Guidelines, several initiatives that improve the resilience of African artisanal fisheries to climate change have already been taken, such as the replanting of mangroves, or the popularisation of a new fish smoking technique, the FTT smoking oven, which decreases post-harvest losses, costs, smoking time and labour for women, lessens risk to their health, while contributes to environmental conservation (by using half as much wood to burn) and reduces CO_2 emissions into the environment.[18]

Note :

This study focusing on the impacts of climate change on artisanal fisheries in Africa was compiled by Mohamed Ali Jebali and Béatrice Gorez, CFFA, based on a global study written by biologist Dr. Onno Gross and published in German by the NGOs Bread for the World and Fair Oceans.[19]

Publisher: Coalition for Fair Fisheries Arrangements
- Coalition for Fair Fisheries Arrangements (CAPE-CFFA)
Chaussée de Waterloo 266, 1060 Brussels, Belgium
Telephone +32 2 652 52 01 / +32 493 390 634
E-mail: secretariat@cffacape.org
Web: www.cffacape.org
Author: Dr. Onno Gross
Adaptation: Mohamed Ali Jebali
Editor: Beatrice Gorez
Layout: Esther Gonstalla (Erdgeschoss Grafik)
October 2021

Sources

1 This is the author translation, source: IPCC, "Special report: Global warming of 1.5ºC", Glossary, 2018. Available at: https://www.ipcc.ch/sr15/chapter/glossary/
2 IPCC, "Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change", Summary for policymakers, Cambridge University Press, 2021. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf
3 IPCC, "Special report on the Ocean and Cryosphere in a Changing Climate", September 2019. Available at: https://www.ipcc.ch/srocc/
4 LAM, Vicky, et al., "Projected change in global fisheries revenues under climate change". Scientific Reports 6, No 32607, 2016. Available at: https://www.nature.com/articles/srep32607
5 LOVEI, Magda, "Climate Impacts on African Fisheries: The Imperative to Understand and Act ", World Bank blogs, 11 November 2017. Available at: https://blogs.worldbank.org/nasikiliza/climate-impacts-on-african-fisheries-the-imperative-to-understand-and-act
6 IPCC, "Climate Change 2007 Impacts, Adaptation and Vulnerability", Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change, Cambridge University Press. Available at: https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg2_full_report.pdf
7 The World Bank, "West Africa's Coast: Losing Over $3.8 Billion a year to Erosion, Flooding and Pollution", Publication, 14 March 2019. Available at: https://www.worldbank.org/en/region/afr/publication/west-africas-coast-losing-over-38-billion-a-year-to-erosion-flooding-and-pollution
8 KNOT, Stacey, "Ghana Working to Save Eroding Coastlines", Voice of Africa News, 12 octobre 2020. Available at: https://www.voanews.com/a/africa_ghana-working-save-eroding-coastlines/6197006.html
9 FAO, "The State of World Fisheries and Aquaculture 2020. Sustainability in action.", Rome 2020. Available at: https://www.fao.org/documents/card/fr/c/ca9229en/
10 AJONINA, Gordon et al., "Current status and conservation of mangroves in Africa: An overview", World Rainforest Movement Bulletin No. 133, April 2018. Available at: https://www.researchgate.net/publication/324784251_Current_status_and_conservation_of_mangroves_in_Africa_An_overview
11 GOLDBERG, Liza, et al. "Global declines in human-driven mangrove loss", Global Change Biology, 12 July 2020. Available at: https://onlinelibrary.wiley.com/doi/10.1111/gcb.15275
12 SCHEREN, Peter, "Environmental pollution in the Gulf of Guinea – A regional approach", Marine Pollution Bulletin, 44(7):633-41, August 2002. Available at: https://www.researchgate.net/publication/11166452_Environmental_pollution_in_the_Gulf_of_Guinea_-_A_regional_approach
13 JEYID, Mohamed A. A., "Relations environnement et évolution spatio-temporelle des petits poissons pélagiques dans le système d'upwelling de la zone NW Africaine", University of Littoral Cote d'opale, PHD, 2016. Available only in French at: https://tel.archives-ouvertes.fr/tel-01551789/document
14 BARTON, E. D., et al., "Canary current upwelling: More or less?", Progress in Oceanography, Volume 116, 2013, p. 167-178. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0079661113001134
15 CBD, "Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity", Secretariat of the Convention on Biological Diversity, CBD Technical Series No. 46, Montreal, 2010. Available at: https://www.cbd.int/doc/publications/cbd-ts-46-en.pdf
16 FAO, "Report of the Fishery Committee for the Eastern Central Atlantic (CECAF) Working Group on the Assessment of Small Pelagic Fish off Northwest Africa, Casablanca, Morocco, 8–13 July 2019", Rome 2020. Available at: https://www.fao.org/documents/card/en/c/ca9562b/
17 FAO, "Voluntary Guidelines for securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication", San Salvador, 2018. Available at: https://www.fao.org/3/i8347en/I8347EN.pdf
18 FAP, "The FAO-Thiaroye processing technique How to construct it and assemble its components", Fisheries and Aquaculture Department, 8319, Rome, 2015. Available at: https://www.fao.org/3/CA2559EN/ca2559en.pdf#:~:text=The%20FTT-Thiaroye%20is%20a%20technique%20drawn%20from%20the,key%20to%20its%20adoption%20rests%20upon%20its%20benefits.
19 GROSS, Onno, "Wie der Klimawandel die Fischerei verändert - Auswirkungen auf die Ernährungsquelle Meer", Analyse 100, Brot für die Welt et Fair Oceans, June 2021. Only Available in German at: https://www.brot-fuer-die-welt.de/fileadmin/mediapool/blogs/Mari_Francisco/BfdW_Analyse_100_Klima_Fischerei_Gesamt_Web.pdf

---

Sources of Illustrations

Image de la première page: Efe Kurnaz/Unsplash

Page 2: KASCHINSKI, Kai, „Ozeane in der Klimakrise – Folge 1 – Zu den globalen Risiken des marinen Klimawandels", Fair Oceans, 2020. Available at: https://www.ozeanien-dialog.de/wp-content/uploads/2021/03/Ozeane-in-der-Klimakrise_Broschuere-Folge-1.pdf

Page 3: EDMONDS, Douglas et al., "Coastal flooding will disproportionately impact people on river deltas", Nature Communications 11, Nº 4741, 29 septembre 2020. Available at: https://www.nature.com/articles/s41467-020-18531-4
UNDDR, "The human cost of disasters: an overview of the last 20 years (2000-2019)", Centre for Research on the Epidemiology of Disasters, United Nations Office for Disaster Risk Reduction, Octobre 2020. Available at: https://www.preventionweb.net/files/74124_humancostofdisasters20002019reportu.pdf
KUZMA, Samantha et LUO, Tianyi, « The Number of People Affected by Floods Will Double Between 2010 and 2030", Insights, World Resources Institute, 23 avril 2020. Available at: https://www.wri.org/insights/number-people-affected-floods-will-double-between-2010-and-2030
KUENZER, Claudia et RENAUD, Fabrice G., « Climate and Environmental Change in River Deltas Globally: Expected Impacts, Resilience, and Adaptation", dans The Mekong Delta System: Interdisciplinary Analyses of a River Delta, Springer Environmental Science Engineering, Chapitre 2, juin 2012, p, 7-46. Available at: https://www.researchgate.net/publication/255720025_Climate_and_Environmental_Change_in_River_Deltas_Globally_Expected_Impacts_Resilience_and_Adaptation
NICHOLLS, Robert J., «Planning fort the Impacts of Sea Level Rise", Oceanography 24(2), 2011, p. 144-157. Available at: https://tos.org/oceanography/article/planning-for-the-impacts-of-sea-level-rise
UN-DESA. «Risks of Exposure and Vulnerability to Natural Disasters at the City Level: A Global Overview", Technical paper 2015/2, New York, 2015. Available at: https://population.un.org/wup/Publications/Files/WUP2014-TechnicalPaper-NaturalDisaster.pdf

Page 4: SILVERSTRI, Silvia et KERSHAW, Francine, "Framing the Flow: Innovative Approaches toUnderstand, Protect and Value EcosystemServices Across Linked Habitats", UNEP World Conservation Monitoring Centre, Cambridge, 2010. Available at: https://www.academia.edu/565851/Framing_the_flow_innovative_approaches_to_understand_protect_and_value_ecosystem_services_across_linked_habitats
BURKE, Lauretta et al., "Reefs at risk – Revisited", World Resources Institute, Report, 23 février 2011. Available at: http://pdf.wri.org/reefs_at_risk_revisited.pdf

Page 5: IPCC, "Special report on the Ocean and Cryosphere in a Changing Climate", September 2019. Available at: https://www.ipcc.ch/srocc/