WOMEN SHELLFISHERS AND FOOD SECURITY PROJECT

Literature Review for Activity 1:

Participatory Regional Assessment of the Shellfisheries in 11 Countries from Senegal to Nigeria

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Cover photo: Women harvesting oysters in the Whin Estuary (see mangrove vegetation fringing the estuary), Ghana.

Photo credit: Ernest Chuku, Africa Centre of Excellence in Coastal Resilience (Centre for Coastal Management), UCC.

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1. INTRODUCTION

This report is a Draft Literature Review for Activity 1 of the USAID Women Shellfishers and Food Security Project, which is a co-creation of the University of Rhode Island and partners from West Africa – the University of Cape Coast in Ghana, the University of Ghana, TRY Oyster Women's Association in The Gambia, and World Agroforestry. This project seeks to address the need for greater attention to food security for women shellfishers and their families while improving biodiversity conservation of the ecosystems on which their livelihoods depend. More robust models, tools, approaches, and processes are needed to enable and promote these sustainable food systems and natural resource management in coastal West Africa. The project will strengthen the evidence base, increase awareness, and equip stakeholders to adapt and apply successful approaches in areas of high potential for replication and scale-up in the eleven coastal West African countries from Senegal to Nigeria. It will draw on successful cases of a rights-based, ecosystem-based, participatory co-management approach to shellfish management by women in mangrove ecosystems in The Gambia and Ghana developed with USAID assistance. Knowledge and experience generated through the project will open up opportunities for improvement and broader application of these promising approaches in West Africa through these key project components:

1) *Conduct the first-ever participatory regional assessment of the situation*, unmet needs, and promising approaches to shellfish co-management led by women across the eleven countries and the scope and scale of the potential sectoral and cross-sectoral benefits.

2) *Elaborate and test elements of models based on existing approaches through site-based research in The Gambia and Ghana to strengthen the evidence base for successful elements of the model.* The project will conduct six technical studies covering the field research to document linkages in a Theory of Change and conceptual results chain between women's shellfish co-management and livelihoods, mangrove conservation, and nutrition. It will examine existing elements in the approach that are not well documented, and that could enhance the approach if they are better-understood. It will document both sectoral and cross-sectoral findings.

3) *Foster a community of practice around the development and dissemination of a toolkit on a rights-based, ecosystem-based, participatory co-management of shellfish by women in mangrove ecosystems in West Africa with and for community*, national, and regional level stakeholders. The toolkit will integrate findings from the participatory regional assessment and site-based research. Building on these activities, the toolkit development and dissemination will build a community of practice and provide capacity development support of 37 stakeholder institutions in West Africa. It will provide the first practical guide for the design and implementation of women's shellfish co-management in West Africa, supported by a network of practice, among other elements such as policy briefs and case studies.

2. OBJECTIVE OF THE LITERATURE REVIEW

A participatory assessment of shellfishing in 11 countries is outlined as a core outcome of the USAID Women Shellfishers and Food Security Activity. This is an initial assignment and a precursor to understanding the scale and scope of women-led artisanal shellfisheries, from both natural harvests and aquaculture, across the West Africa region. The participatory regional assessment to follow this task, together with other mechanisms including site based research on various parameters in The Gambia and Ghana as well as the development of toolkits, is expected to amplify the evidence-base for empowerment of women in shellfish livelihoods as a driver of mangrove conservation and strengthening food security and nutrition outcomes.

In view of that, this literature review was conducted to collate the available information, data, and a bibliography from all sources within reach (mainly on-line peer reviewed and grey literature). It helps to identify the gaps in information and types of information to be assessed and summarized in the Participatory Regional Assessment (PRA) in the 11 coastal West Africa countries that are the focus of this project and also of the site-based research in The Gambia and Ghana.

The content focuses on information on mangrove ecosystems and shellfisheries, food security, nutrition, and anemia in coastal communities, gender dimensions in shellfisheries and mangrove exploitation, and the associated food systems. For each country, basic contextual information was collated on; population, percentage population living in/near the coast, gross domestic product (GDP), human development index (HDI) rank, length of coastline, fish consumption (as a percent of animal protein), anemia prevalence, estimated mangrove cover, estimated estuarine/freshwater area for shellfisheries, presence of women shellfishers, number of women shellfishers in mangrove zones, number of coastal systems with mangrove-based shellfishing, and shellfish and mangrove management plans/ regulations.

Ultimately, the rationale for the Literature Review was to identify gaps to be addressed, within the context of the Project, and to narrow in on priority gap areas during the participatory regional assessment instead of spending time and resources documenting information that is already readily available. In the participatory regional assessment to follow, the recommendations of this report will be adopted in addition to any evolving information needs that come to light during the Project's implementation.

3. REGIONAL OVERVIEW

The West Africa region comprises 11 coastal countries of the Economic Community of West African States (ECOWAS) where coastal shellfisheries is noted to provide livelihood, income, and nutrition, and is of conservation value to the natural habitats, mangrove vegetation, and swamps from which the food species are derived. Available literature within the scope of this activity is replete with information on the existence of mangrove ecosystems across the coastal nations of

West Africa, from Senegal to Nigeria. In fact, some countries like Guinea-Bissau and Guinea have a large share of their coastline covered by mangroves (Figure 1). The literature shows the strong relevance of this forest type for wood supply, livelihoods, and other mangrove-based income generating activities along the West African coast. However, the overall regional trend in mangrove cover in West Africa for the period from 1975 to 2013 shows a 4.8 percent decrease in the area, with a net loss of 984 sq km. Between 1975 and 2013, Nigeria had the largest loss of mangroves (432 sq km), followed by Senegal and Guinea-Bissau (288 sq km and 220 sq km, respectively). Combined, the other eight countries lost only 44 sq km over this time period.

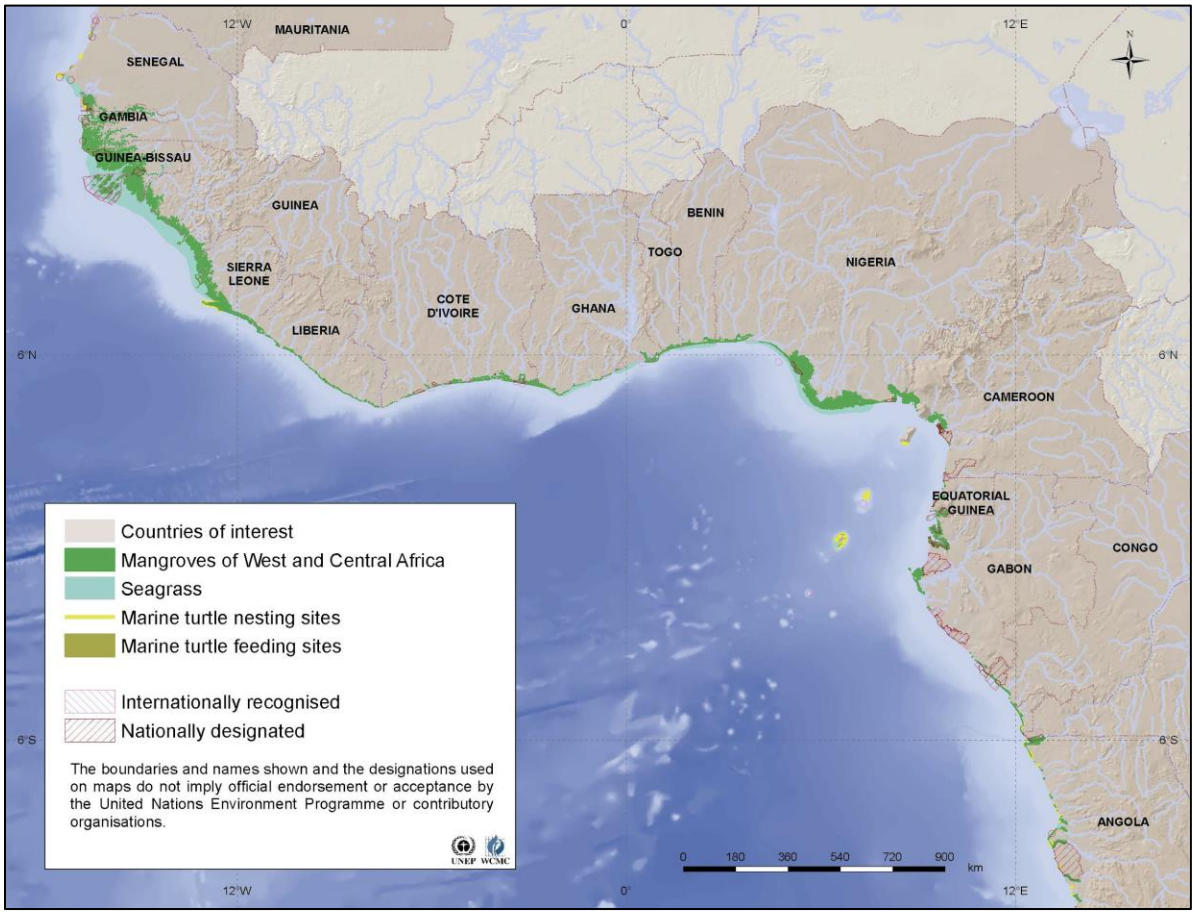

Figure 1: Distribution of mangroves and other coastal habitats in West-Central Africa. Green zones show the spatial coverage of mangroves

(Source: UNEP WCMC as illustrated in Feka & Ajonina (2011).

Further trend analysis (see Table 1 below), based on the data from Global Mangrove Watch (GMW), indicates that most of the countries in the region experienced declines in mangrove extent. Following numerous reforestation activities, which have multi-stream funding in a number of countries in the region, some countries e.g., Guinea, Gambia, and Senegal, have shown gains in

mangrove cover between 2000 and 2013. Recent data from GMW show that The Gambia and Benin are the only countries with an increase in mangrove area over the last two decades. In The Gambia, the gains were marginal (0.4%) but in Benin, there were double digit gains (14%). Ghana showed the most severe losses at 12%, and four countries showed losses over the period of time of one percent or less; Guinea Bissau, Guinea, Nigeria, and Sierra Leonne.

The coastlines of West Africa have some of the largest and fastest-growing human populations. Many communities rely on mangrove wood as a primary source of fuel for the processing of fish and other uses, and urban growth and increased demand for charcoal, fuel wood, and agricultural land are key drivers of deforestation and destruction of mangroves (USAID, 2014). Combined with rising sea level, severe weather, erosion, and more violent storm surges, these pose major and increasing threats to mangroves (Corcoran, Ravilious, and Skuja, 2007). The coastline length estimates reported in this review are those of the offshore boundaries of the coastal zone (see Bunting et al., 2018) as defined by the GMW.

Table 1: Summary attributes of mangrove conditions in West Africa.

Country	Mangrove area (2016) (km^2)	Mangrove area change (1996-2016) (km^2)	Percent Change (1996-2016) (km^2)	Coastline length (km)	Mangrove coastline (km)	Non-mangrove coastline (km)	Mean mangrove height (m)	Mean carbon stock (t /ha)
Gambia	597.17	+2.45	+0.4%	195.64	83.11	112.46	9.30	54.98
Ghana	204.18	-23.78	-12%	620.43	72.70	547.74	5.89	40.47
Senegal	1,247.84	- 52.16	-4%	865.82	271.51	594.31	6.27	28.55
Liberia	189.23	- 3.62	-2%	619.31	153.79	465.52	6.85	35.58
Guinea-Bissau	2,571.69	- 3.28	-0.1%	2,822.09	1659.54	1162.55	11.45	70.51
Guinea	2,225.98	- 16.82	-0.8%	2,216.19	1361.66	854.52	9.80	58.16
Cote d'Ivoire	57.92	- 4.91	-8%	540.14	108.63	431.51	13.02	95.65
Nigeria	6,894.17	-93.88	-1%	2,010.85	980.17	1030.68	12.03	82.69
Benin	1.41	+0.20	+14%	127.73	4.03	123.70	2.44	7.19
Sierra Leone	1,264.03	- 4.51	-0.4%	1,085.87	434.25	651.62	9.79	61.59

*Table excludes mangrove data for Togo which is not provided in GMW data. Other estimates place the extent of mangroves between 112-1,000 hectares.

A detailed breakdown of the changes for The Gambia and Ghana are provided in Table 2 and annual trends on net gains and losses for The Gambia and Ghana are shown in Figure 1. The Gambia has seen net losses in 2015 and 2016 compared to previous reporting periods, and Ghana has shown very little net loss since 2008. It is important to recognize that investments in mangrove restoration are contributors to some of these changes in the region although explicit data on total areas reforested per country are not widely available.

Table 2: Detailed overview of mangrove cover change over time in Ghana and Gambia.

Year	Mangrove area change attribute	Gambia	Ghana
		Value (km^2)	Value (km^2)
2007*	Gains	15.54	1.08
	Loss	**7.89**	**24.36**
	Net change	7.65	-23.28
2008	Gains	4.34	0.80
	Loss	1.56	0.50
	Net change	2.78	0.30
2009	Gains	1.61	0.02
	Loss	0.48	0.22
	Net change	1.13	-0.20
2010	Gains	4.35	0.11
	Loss	2.85	0.66
	Net change	1.50	-0.55
2015	Gains	2.19	2.11
	Loss	11.21	0.26
	Net change	-9.02	1.85
2016	Gains	5.55	1.37
	Loss	7.14	3.25
	Net change	-1.59	-1.88

Source: Authors' computation based on data extracted from Global Mangrove Watch.
Note: Red – showing net loss year, Green - net gain year.
*Base reference for the 2007 change values is 1996 (11 year change).

Changes in mangrove cover alone does not tell the full story of changes over time, and there is good anecdotal evidence that mangrove forest degradation is occurring from cutting, even though the overall forest cover is not fully lost in many locations.

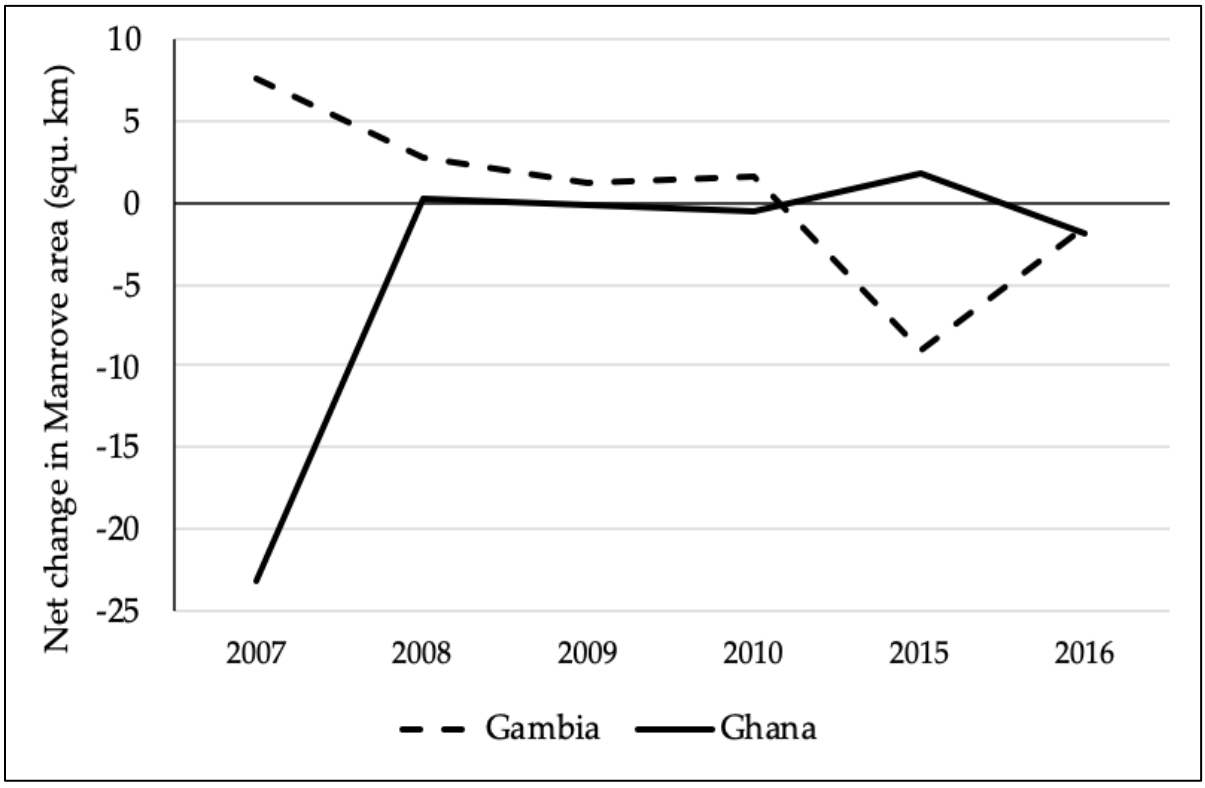

Figure 2: Net changes in mangrove area over time in The Gambia and Ghana

Fisheries resources play an integral role in food and nutrition security, contributing up to 80% of animal protein in some of these coastal communities of West Africa, and about $400 million annually to the regional economy. These are, however, countries that record minimal human development indices with very low ranking compared to other nations. Shellfisheries, especially of mollusks and bivalves such as oysters, clams and periwinkles that are collected in the shallow intertidal areas of coastal ecosystems, provide critical livelihood and nutritional support for the women and their children in coastal estuarine communities. Of the shellfish types harvested in coastal ecosystems closely associated with mangroves, women are observed to overwhelmingly dominate the harvesting of oysters and generally feature prominently in the fisheries of bivalves and some gastropods. The literature search, however, yielded very scanty detail on the shellfishing livelihoods of women within lagoonal/estuarine mangrove ecosystems in the coastal countries of West Africa.

Annual catch and culture statistics of important bivalves such as oysters, cockles, clams, and some gastropods, including periwinkles, that are found within mangrove and estuarine systems, are not available from FAO's FishStat-J database for many coastal West African countries. Where

information is available, they are not up to date. For instance, there are gaps for Senegal and The Gambia for aquaculture production, and capture production for Sierra Leone. Information about the climate risks to coastal mangrove ecosystems in West Africa with regards to the impact of rainfall on shellfish growth rates, abundance, habitat extent, etc., was not available for most of the coastal West African countries under consideration. In order to contribute to addressing this dearth in information availability, seven priority information gaps have been identified for the participatory regional assessment (Activity 1) and the site-based in-depth research activities in The Gambia and Ghana (Activity 2). These gaps are:

1. The types of shellfisheries (by species, mode of fishing or gear type) within estuarine-mangrove ecosystems and the gender and age dynamics of harvesters – total approximated number of women/men by age categories.
2. The identity, description, location, and total area (ha) of the land- and seascapes of mangrove areas where shellfishing by women is of significance to the food and nutrition security of adjacent communities. Significance here is defined by the use of shellfish for food and the extent and composition of shellfish in diets (protein supply) of people in communities adjacent to these habitats.
3. The extent or percent composition of shellfish in diets (protein supply) of people in communities adjacent to these habitats.
4. The contribution of women-led shellfisheries in terms of their economic value and volume of landings relative to national fisheries production.
5. Stakeholder institutions and individuals who are directly and indirectly involved in the management and use of mangrove and shellfish resources – including ministries, fisher associations, NGOs, research and academic institutions, and individuals.
6. Legislative frameworks tailored towards the regulation and sustainable use of shellfish-mangrove interconnected resources.
7. Climate risks to the livelihoods and food security of women who depend on coastal mangroves and estuarine ecosystems. This includes specific climate impacts on mangrove habitat and whether this may exacerbate anthropomorphic drivers of mangrove deforestation and degradation in West Africa, as well as successful examples of mitigation efforts for shellfisheries and mangrove systems.

Table 3 below provides information on a number of regional organizations relevant to this project's goal, and Table 4 shows ongoing regional projects that can be important stakeholders for this project.

Table 3: Regional stakeholders.

Stakeholder/Institution	Description and Countries
ECOWAS MESA	The ECOWAS Coastal and Marine Resources Management Centre is the regional implementation center for the monitoring of coastal and marine resources management in the ECOWAS sub-region.
FAO	The Food and Agriculture Organization of the United Nations is a specialized agency of the United Nations that leads international efforts to defeat hunger and improve nutrition and food security.
BIOPAMA	The Biodiversity and Protected Areas Management (BIOPAMA) programme aims to improve the long-term conservation and sustainable use of natural resources in African, Caribbean, and Pacific (ACP) countries, in protected areas and surrounding communities. It is an initiative of the ACP Group of States financed by the European Union's 11th European Development Fund (EDF), jointly implemented by the International Union for Conservation of Nature (IUCN) and the Joint Research Centre of the European Commission (JRC).
IUCN	The International Union for Conservation of Nature is an international organization working in the field of nature conservation and sustainable use of natural resources. It is involved in data gathering and analysis, research, field projects, advocacy, and education.
Abidjan Convention	The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (Abidjan Convention in short), covers a marine area from Mauritania to South Africa which has a coastline of just over 14,000 km. It provides an overarching legal framework for all marine-related programs in West, Central and Southern Africa. The Convention's mission is to "Protect, Conserve and Develop the Abidjan Convention Area and its Resources for the Benefit and Well-being of its People."
AWFishNET	African Women Fish Processors and Traders Network (AWFishNET) operates as a non-profit making, non-political and non-religious network that brings together women fish processors and traders from all over Africa.
FCWC - Fisheries Committee for the West Central Gulf of Guinea	FCWC facilitates cooperation in fisheries management between the member countries: Benin, Cote d'Ivoire, Ghana, Liberia, Nigeria, and Togo. The countries have several shared fish stocks and identified a need for cooperation and shared management of these resources.

Stakeholder/Institution	Description and Countries
WACA/WB - West Africa Coastal Areas Management	The West Africa Coastal Areas Management Program (WACA) supported by the World Bank, helps countries access expertise and finance to sustainably manage their coastal areas. It was created in response to countries' request for solutions and finance to help save the social and economic assets of coastal areas, and coastal erosion and flooding.
RAMPAO Network	Supports the maintenance of critical habitats that support dynamic ecological processes which are essential to the conservation of biodiversity and regeneration/replenishment of natural resources within the West African marine ecoregion that encompasses Cape Verde, the Gambia, Guinea Bissau, Guinea, Mauritania, Senegal, and Sierra Leone.
REPAO (Reseau sur les Politiques de Peche en Afrique de l'Ouest)	REPAO is a network of stakeholders in the fisheries sector in West Africa working together to ensure the sustainable development of the fisheries sector emphasizing participatory measures and policies
Institut de la Francophonie pour le développement durable (IFDD)	A subsidiary body of the Organization Internationale de la Francophonie (OIF) the IFDD contributes to the implementation of 2030 Agenda for Sustainable Development and multilateral agreements on the environment in French speaking countries in Africa, Asia, and Indian Ocean. They have implemented projects in Senegal for example related to sustainable artisanal fisheries including reforestation of mangroves to support oyster culture and small pelagic fisheries.
The Sub-regional Fisheries Commission (SRFC)	The SRFC is an institution with diversified expertise to enforce the mechanisms of sustainable governance of fisheries resources. The commission's goal is to reinforce coordination among member states (Cabo Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal, Sierra Leone) with respect to management of fisheries resources within the sub-region and also building research capacity of member states with regard to fisheries science.
Committee on Inland Fisheries and Aquaculture of Africa (CIFAA)	Promote the development of inland fisheries and aquaculture in Africa. Headquartered in the FAO Regional Office for Africa in Ghana, its members include Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Dem. Rep. of the Congo, Congo, Côte d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Eswatini, United Rep. of Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Stakeholder/Institution	Description and Countries
Regional Partnership for Coastal and Marine Conservation (PRCM)	The PRCM is a coalition of actors working on the problems facing the West African coastline. PRCM works in Cape Verde, the Gambia, Guinea, Guinea Bissau, Mauritania, Senegal, Sierra Leone, Ghana, Benin

Table 4: Regional Projects.

Project	Duration & Funding amt.	Objective/Scope/ Description	Funder/ Implementer	Country
USAID/ WaBiCC	May 2015 – May 2020 (U.S. $48.9 million)	Improve conservation and climate-resilient, low-emission growth across West Africa	Funded by USAID and implemented by Tetra Tech ARD, in association with five subcontractors: • Center for International Earth Science Information Network (CIESIN) • Population Communications International (PCI) Media Impact • Wetlands International Africa (WIA) • Pact World	ECOWAS countries
Coastal Fisheries Initiative	5 years USD 6.5 million in GEF funding and USD 45 million in co-financing	Coastal Fisheries Initiative (CFI) team works with stakeholders in Senegal, Cote d'Ivoire, and Cabo Verde to make coastal fisheries more sustainable while protecting the environment and delivering economic and social benefits for these West African countries.	Funded by Global Environmental Facility (GEF) and Led by Food and Agriculture Organization in partnership with United Nations Development Programme United Nations Environment Programme World Bank World Wildlife Fund	Senegal Cote d'Ivoire Cabo Verde
Strengthening Conservation and Monitoring Initiatives In West African Marine Protected Areas	5years Jan. 01, 2009 - Dec. 31, 2014 (completed) Program amount: 9,680,000 Euros FFEM funding: 1,600,000Euros	The project had three main components, a. To strengthen the functionality and efficiency of Marine Protected Areas (MPAs) b. Show the positive effects of MPAs c. Promote better	Funded by Fonds Francaise Pour L'Environnement Mondial co-funded by MAVA foundation and led by French Development Agency	Sierra Leone, Gambia, Guinea, Guinea Bissau, Senegal, Mauritania, Cabo Verde

Project	Duration & Funding amt.	Objective/Scope/ Description	Funder/ Implementer	Country
		mobilization in favor of MPAs		
Project for the conservation of mangroves on the Tristao islands and Cacine Peninsula	2018- 2022	The project is implemented through a community approach whereby local people are fully involved in activities aimed at enhancing their living condition to sustainably expand mangrove areas. The project focuses on rehabilitating and planting trees in mangroves over 600 ha and reducing the pressure of human activities on mangroves by promoting alternative techniques and supporting income-generating activities. Focal areas are Tristao islands in Northern Guinea and the Cacine Peninsula in Guinea-Bissau	Funded by the DOB Ecological Foundation. The project is implemented by the PRCM in collaboration with the organizations of the PRCM network, Guinée Ecologie and Office Guinéen des Parcs et Réserves (OGUIPAR), the body tasked with the management of MPAs	Guinea Bissau and Guinea
Mangrove forests management from Senegal to Benin.	2019-2024 US$ 10,781,670	Achieve integrated protection of the diversity and fragile ecosystem in West Africa and reinforce their resilience to climate change	European Union Implemented by: IUCN in association with Wetland International Africa and the 5 Deltas collective	Senegal to Benin
PESCAO			Implemented by ECOWAS, SRFC, FCWC, EFCA, FAO, the University of Portsmouth, and Agro Campus.	Actions cover the 13 countries that are members of ECOWAS: Benin, Cape Verde, Cote

Project	Duration & Funding amt.	Objective/Scope/ Description	Funder/ Implementer	Country
				dIvoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Nigeria, Senegal, Sierra Leone, and Togo.
PAPBio Mangroves - Management of mangrove forests from Senegal to Benin.	A total budget of 53.5 million euros, including 45 million euros from the 11th FED-PIR-AO. Grant period for 24 months 2021-2022.	The grants program aims to achieve integrated protection of biodiversity and fragile mangrove ecosystems in West Africa and their enhanced resilience to climatic changes.	Implemented by IUCN and Wetlands International, funded by EU.	PAPBio is carried out in 14 countries (Benin, Burkina Faso, Ivory Coast, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo).

4. COUNTRY PROFILES

Senegal

Basic Contextual Information	
Country	Senegal
Total land area	196,722 km^2
Population	15.85 million (2018)
Percentage population living in/near the coast	60%
Gross Domestic Product (GDP)	24.13 billion
Human Development Index Rank	0.505 (164 out of 189) (2017)
Length of coastline	531km
Fish consumption (as a percent of animal protein)	43%
Anemia prevalence	49.9% among women of reproductive age (15 - 49) as of 2016
Estimated mangrove cover	185,000 ha
Estimated estuarine/freshwater area for shellfisheries	-
Presence of women shellfishers	Present
No. of women shellfishers in mangrove zones	4000 approx. in Casamance and 270 approx. women within the Dionewar Island in the Sine Saloum
No. of coastal systems with mangrove-based shellfishing	3 (Sine Saloum, Casamance River System, Allahein River Estuary)
Shellfish management regulations	
Mangrove management regulations	
Mangrove-Shellfish systems with protection status	15 MPAs (Cormier-Salem, 2014;http://www.rampao.org/-Senegal-.html?lang=en) (See mangrove governance section for details)

Mangroves
Two main species of mangroves can be found in the Casamance estuary area - *Rhizophora racemosa* and *Avicennia nitida*. Along the northern bank of the Casamance river, there is a 6km wide dense mangrove forest between the Ziguinchor and Tobor rivers. Along the southern bank, mangroves are less abundant , however two distinct stands can be observed. One 10km wide mangrove area between Kabrousse and Karabane river to the West and another 1.5 – 2km mangrove area between Kamabeul and Ziguinchor rivers (Corcoran, Ravilious, & Skuja, 2007). The mangroves and the coastal ecosystems of the Casamance region are on a decline due to overexploitation and increasing soil salinization. In Casamance, 670 km^2 of the ecosystem has disappeared over 30 years (Cormier-Salem, 2017). There is no documentation of protection for Casamance. Control and responsibility for mangroves here fall under three departments within the Ministry of Environment and Protection of Nature. A number of codes contain measures to protect mangrove forests.). Among restaurant managers Casamance is the most preferred source of shellfish. The Sine Saloum Delta is a large estuarine complex of about 29,720km^2 made up of 4,309km^2 estuarine area. It is made up of three main rivers, the Saloum to the north which is up to about 110km long, 2km wide and between 13 to 25m deep, the Diomboss in the middle which is 30km long, about 4km wide with a depth ranging from 10 – 25m and the Banidala to the south which is 18km long. It represents 21% of the Sine-Saloum region, and 2.5% of the whole territory of Senegal (Corcoran et al., 2007; ICOMOS, 2011). Sine-Saloum is preferred by 35.3% of restaurant managers and ranks second among preferred origins for all species of shellfish. The mangrove forest is the most extensive forest system in The Sine Saloum Delta extending to about 650km^2 around the complex networks of tributaries that characterize this ecosystem (EC, 2003 as cited in Corcoran et al., 2007). However, land loss around the Saloum estuary is already occurring due to inundation of the coastal zone by sea water. The land area of the estuary is low lying therefore sea level rise of just 1m can result in flooding of about 27% of the land area. Only about 50% of the land area is covered by mangroves as a result of overexploitation and salinization of the Saloum Delta (Diallo et al., 2015). The Saloum Delta Biosphere Reserve has had over 40% of its mangrove area removed over the past 30 years, which amounts to about 750 km^2(Cormier-Salem, 2017). In 1980, 180,000 ha of the Saloum Delta was designated as a Biosphere Reserve. Within the reserve is the 76,000ha Saloum Delta National Park (SNDP) of which 73,000ha was designated on the 4th of March 1984 as a Ramsar site((https://rsis.ramsar.org/ris/288;IUCN, 2011). *Governance mechanisms* The Saloum Delta is primarily managed by public authorities and has allowed for the recognition and designation of the protected areas within the delta. This has reduced the pressures of overexploitation of land and natural resources within the area. However, the government has also integrated the private sector into the management of the delta to provide needed support in terms of human, material, and financial resources to improve the conservation of the natural resources and ecosystem as a whole (Diallo et al., 2015). Senegal has some existing Marine Protected Areas (MPAs)

including the Somone Nature Reserve of Community Interest (RNICS) (created 1999, 700ha), Palmarin Community Nature Reserve (RCP) (created 2003, 10.430ha), Kayar (created 2004, 17,100ha), Joal-Fadiouth (created 2004, 17,400ha), Abéné (created 2004, 11,900ha) and Saint Louis MPA (created 2004, 49,600ha), the Bamboung Community-Managed MPA (created 2004, 7000ha) in the Saloum Delta, and the Mangagoulack Indigenous and Community Conserved Area - Kawanana (ICCA) (created 2010, 9,665ha) in Casamance, Sangomar MPA (created 2014, 87,437ha), Kassa-Balantacounda MPA (created 2016, 23,300ha), Niamone Kalounayes MPA (created 2015, 66,032ha), Gandoul MPA (year of creation not available,15,732ha), Nature reserve of Popenguine (created 1986, 1,009ha), National Park of Madeleine Islands (created 1976, 45ha), Langue de Barbarie Park (created 1976, 2000ha) (Cormier-Salem, 2014;http://www.rampao.org/-Senegal-.html?lang=en)

Shellfisheries

In Casamance, oyster harvesting, processing, and marketing occurs in all villages within the Casamance river estuary or Lower Casamance, notably in the islands of Blis-Karone, Boulouf, and Bandial. The oyster work is reserved for women from the Diola tribe, one of the largest ethnic groups in southern Senegal. About 4000 women from this tribe engage in oyster related commercial activities annually (https://www.fondazioneslowfood.com/en/ark-of-taste-slow-food/mangrove-swamp-oyster-from-casamance/). Here, women mainly collect oysters (*Crassostrea gazar*), fixed on the Rhizophora roots (Cormier-Salem, 2017)

About 92% of women in the Sine Saloum Delta are involved in shellfish harvesting and processing in the Sine Saloum Delta. This vocation is traditionally reserved for women while fishing is predominantly done by men. However, more men are turning to shellfish harvesting as an alternative source of income due to declining fish stocks as a result of overfishing and the lack of alternative sources of income (Omar, Queffelec, Cormier-Salem, & Boncoeur, 2016). The women, working in groups, harvest the shellfish such as the bloody cockle with their bare hands, spoons or whatever simple tool are available. The oysters generally are harvested by cutting off the mangrove roots with a machete. However, in some areas the women have found harvesting techniques that ensure that the mangrove roots are not cut and thus preserving the mangrove forest. The mangroves are also used as firewood to cook the shellfish (Airaud, Sy, & Campredon, 2011). The Dionewar Island located within the delta has about 18 groups of shellfish harvesters and processors with 270 members (Centre de Suivie Ecologique, 2016).

The shellfishes that can be found in this region include the mangrove oyster (*Crassostera gasar*) locally called 'yokhos' which lives in clusters on roots of mangroves, on water bottoms and on rocks. The volutes (*Cymbium spp.)* called 'yeet' locally, the melongena (*Pugilina morio*) also known as 'toufa' in Senegal, the murex (*Murex spp*.) and cockles (*Anadara senelis*) locally referred to as 'pagne' (Airaud et al., 2011; Omar et al., 2016) can also be found in the region. However, the shellfish industry is faced with decline in both numbers and size even though July through to September has been earmarked as a closed season for shellfish harvesting (Airaud et al., 2011; Centre de Suivie Ecologique, 2016). This decline could be attributed to overexploitation, the cutting of mangrove roots during

harvesting, and pollution of water from sewage and industrial discharge from the urban centers which also continues to affect shellfish production (Airaud et al., 2011).

Governance

Fisheries in Senegal is governed by the Fisheries Act of 2015–18 which has undergone reforms to ensure the protection of fisheries resources. The introduction of a licensing system in 2005 ensured that access to resources by artisanal fishers was restricted however its implementation was weak. The implementation of this licensing system was therefore made more effective by the law 2015-18 enforcing registration of artisanal fishers and collecting payments (FAO, 2011). This law also provided the legal structure for the establishment of the co-management approach to creating marine protected areas, managing fisheries resources and habitat restoration (Diedhiou & Yang, 2018). In some areas also traditional governance mechanisms support the protection of mangrove resources and shellfish. The Joola tribe in the lower Casamance have resource management practices based on ancient animist traditions such as mangrove area which are forbidden from harvesting as well as taboos against shellfish consumption. These traditional rules and taboos have supported the conservation of mangrove habitats particularly areas designated as sacred sites (Diatta et al., 2020). Also, women especially the older ones in the Kawanana ICCA play an important role in the governance of the area. They provide regulations for oyster harvesting, resolve conflicts and use animist traditions to manage the use and protect the environment (https://news.mongabay.com/2018/10/womens-work-in-senegalese-conservation-includes-exorcising-demons/).

Health

Of the 11 coastal West Africa countries, Senegal has the highest average life expectancy at 67.9 years, indicating a generally favorable environment for health relative to the region. Across the region, the country has the lowest burden of infectious diseases, highest neonatal/maternal care response capacity, lowest burden of nutritional deficiencies (equivalent to 16,768 years of healthy life lost per 100,000 persons) and the second lowest incidence of malaria (97.6 cases/1000 persons). Senegal also has the lowest maternal mortality ratio (number of women who die from pregnancy/childbirth related causes 100,000 births per year) in the region with 315 maternal deaths/100,000 live births.

Anemia prevalence among women of reproductive age in Senegal is 49.9%, which is around the average prevalence for the region. The prevalence of undernourishment (chronic low calorie intake), is 11.3% in the general population, which is relatively low within the region. The Global Hunger Index score for Senegal (17.2) is also relatively low and represents a moderate hunger concern. Approximately 24.6% of the population is estimated to have a zinc deficiency, which is average for the region. The prevalence of stunting (18.8%), underweight (15%), and wasting (7.8%) in children below 5 years of age are some of the lowest in the region, and the prevalence of exclusive breastfeeding is 45.8%.

Stakeholders	
Institution	Role
Resource users	
Fédération Locale des GIE de Niodior (FELOGIE-Niodior, Local Federation of Economic Interest Groups of Niodior)	This group is made up of Local women in Ziguinchor that implement Sustainable harvesting and reforestation strategies *(Won Equator Prize 2010)*
The Fédération Régionale des Groupements de Promotion Féminine de la Région de Ziguinchor (FRGPF-Z) 1987	Local women in Ziguinchor working in mangrove restoration (184 hectares of mangrove restored) *(Won Equator Prize 2008)*
Conseil Locaux de Peche Artisanale (CLPA) (Local artisanal fishing councils (Karp, 2011)	The goal of these councils is to contribute to the development and lead the implementation of local fisheries co-management plans that are consistent with National fisheries management plans and that ensure participatory methods are used in local fisheries management process.
Collectif des Groupements d'Interest Economiques des Femmes pour la Protection de la Nature (COPRONAT, Collective of Women's Groups for the Protection of Nature) 1989	Protection of Popenguine nature reserve Made up of Local women communities and Senegalese government *(Won Equator Prize in 2006*
Association des Pêcheurs de la Communauté Rurale de Mangagoulack (APCRM, Fishers' Association of the Rural Community of Mangagoulack)	Manages a community conserved area with the aim of improving local incomes, strengthening food security and sovereignty, and protecting biodiversity. Fishers from eight villages in Casamance *(Won Equator Prize in 2012)*
Government	
Ministry of Fisheries and Maritime Economy	Ministry of Fisheries and Maritime Economy develops and implements policies related to fisheries, fish farming, and also seabed, port infrastructure and maritime transport. It is responsible for developing and enforcing policies that ensure sustainable fishing practices and protects the marine environment. It promotes and

	monitors the development of fish farming and aquaculture, in conjunction with the Ministry of Environment and Sustainable Development
Department of Maritime Fisheries (DPM)	Working as a department under the Ministry of Fisheries and Maritime Economy, the DPM is responsible for sustainable management of fisheries resources through, among others, developing fisheries management plans, establishment of local artisanal fisheries councils and organization of actors or stakeholders in the sector
La Direction des Industries de Transformation de la Pêche (DITP) (Directorate of Fisheries Processing Industries)	This directorate under the Ministry of Fisheries and Maritime Economy is responsible for developing and implementing policies and standards regarding the quality of fisheries and aquaculture products both for import and export.
Ministry of Environment and Sustainable Development	This Ministry develops and implements policies related to environmental monitoring, environmental pollution prevention, and protection of nature.
Academic/Research	
Institut universitaire de Pêche et Aquaculture (IUPA)	The University Institute of Fisheries and Aquaculture (IUPA) is a regional training and research institute on fisheries and aquaculture issues. It was created in 2003 within the Cheikh Anta Diop University of Dakar with the active support of the French Ministry of Foreign Affairs within the framework of the PROSENSUP Project.
Centre de Recherche Océanographique de Dakar Thiaroye (CRODT/ISRA) - Oceanographic Research Centre of Dakar	The design and execution of research programs on plant, forestry, animal, and fishery production and in the rural economy.
Centre de Suivi Ecologique	The Ecological Monitoring Centre is a center of excellence specializing in environmental monitoring and sustainable management of natural resources
Private/NGOs/CSOs	

West African Association for Marine Environment (WAAME)	WAAME is a multi-disciplinary organization whose objective is to contribute to, encourage and develop, through appropriate supervision, the basic initiatives of the populations working around issues related to the rational exploitation of natural resources and the protection of natural resources. environment in marine and coastal environments.
Enda Energie	The aim of this organization is to support human populations in Senegal to achieve sustainable development
Oceanium	Oceanium is an organization that works in conservation of marine resources including using participatory methods to support the establishment of marine protected areas,

Projects			
Project	Timeframe and Budget	Objective	Funder/Implementer
Sustainable Fisheries Management in Senegal (Dekkal Geej)	03/28/2019 - 03/27/2024 Budget: NIA	The Senegal project is working with local fishers, the Senegalese government, and the private sector to improve food security, increase incomes and strengthen resilience	Funded by the United States Agency for International Development (USAID) and implemented by Winrock International
USAID/COMFISH and COMFISH Plus Projects Collaborative Management of Sustainable Fisheries in Senegal	(5 years and 2 years: May 1, 2009 – September 30, 2018) US$11 million and $4.5 million	Project is dedicated to the collaborative management of sustainable fisheries in Senegal	Funded by USAID and implemented by the University of Rhode Island
Strengthening SPS Capacity in The	28/02/2020 - 28/08/2020	A project preparation grant to develop a project proposal to address SPS	Funded by Standards and Trade Development

Shellfish Sector In Senegal	$35,450	challenges in the shellfish value chain in Senegal, with the aim of developing export markets and contributing to the protection of public health	Facility (STDF) to the Senegalese Government
Sustainable artisanal fisheries in Senegal	January 2018 - December 2020 130,000 Euros	A project to develop sustainable artisanal fishing including reforestation of mangroves for small pelagic and oyster reproduction, the seeding and production of shellfish, and the promotion of alternative energy services to prevent unsustainable cutting of mangroves	Institut de la Francophonie pour le développement durable (IFDD), financed by MAVA Foundation pour la Nature, and implemented by the NGO Enda Énergie,
Development of a Sustainable Livelihood Action Plan for West African Coastal Protected Areas in the Context of Climate Change	2013 - 2016 Budget: NIA	The overall goal of the project was to enhance livelihoods and increase socio-ecological resilience in West African coastal protected areas to the negative effects of climate change	Funded by the MAVA Foundation and executed by the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and ENDA Energie
Women & Shellfish project	June 2018 - end of 2020 334,637 Euros	Support and assistance in the exploitation of oysters with the female EIGs of the Saloum delta (installation of oyster farms, training of harvesters, monitoring and evaluation of production, donation of equipment, construction of shellfish processing unit, etc.).	Institut de Coopération pour le Développement en Afrique (ICD-Afrique) in partnership with RAJA-Danièle Marcovici Foundation, Government of Monaco, Palmarin Community Nature Reserve (RNCP), Water & Forests Services and the CURAAN Center

			(Unified Center for Beekeeping and Agro-ecological Research of Niombato)
Livelihoods carbon fund (2011 to date)	2011 to date Budget: NIA	The largest mangrove restoration programme in the world to restore the mangrove forests	Livelihoods carbon fund in association with Oceanium
Establishment of a community marine protected area in the Casamance River Delta (Senegal)	Jan 2006 - Feb 2009 (completed) Program budget: 430,000 Euros Foundation Ensemble grant: 190,000 Euros	To conserve marine and coastal biodiversity in West Africa through establishment of Community Marine Protected Areas in order to achieve sustainable development. At the end of the funding, the establishment of two MPAs in Casamance had been started but were yet to be financially autonomous	Funded by Fondation Ensemble Implementing partners Banc d'Arguin International Foundation (FIBA), FFEM, organizations of artisanal fishermen, rural communities.

Priority Data Gaps

Total number of women involved in shellfishing
No. of coastal systems and the hectares of mangrove areas where shellfishing activities take place
Quantity of shellfish harvested from different shellfish locations

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The Gambia

Basic Contextual Information	
Country	The Gambia
Total land area	11,295 km^2
Population	2.28 million (2018)
Percentage population living in/near the coast	-
Gross Domestic Product (GDP)	1.633 billion USD (2018)
Human Development Index Rank	0.466 (174 out of 189)
Length of coastline	80km
Fish consumption (as a percent of animal protein)	40%
Anemia prevalence	57.5% among women of reproductive age (15 - 49)
Estimated mangrove cover	60,000 - 67,000 ha
Estimated estuarine/freshwater area for shellfisheries	6,300ha wetland reserve (Tanbi). hectares for shellfisheries in other areas not available
Presence of women shellfishers	Present
No. of women shellfishers in mangrove zones	500 (Tanbi only)
No. of coastal systems with mangrove-based shellfishing	4 (Tanbi, Niumi, Baobolong, Allahein)
Shellfish management regulations	https://www.crc.uri.edu/download/Oyster_Plan_Jan_2012_508_Signatures.pdf
Mangrove management regulations	-
Mangrove-Shellfish systems with protection status	Tanbi Wetland National Park (TWNP) which was declared a Ramsar site in February 2007 (https://rsis.ramsar.org/ris/860)

	Niumi National Park (13°34'N 16°31'W) has an area of 4,940 ha was declared a Ramsar site on the 13th October 2008 (https://rsis.ramsar.org/ris/1840) Niumi Marine National Park Management Plan (2011) Baobolon Wetland Reserve (13°31'N 15°52'W) has an area of 20,000 ha was declared a Ramsar site on 16th September 1996 (https://rsis.ramsar.org/ris/860)
Mangroves	
Mangroves in The Gambia occupy nearly 581 km^2 area. The main species include *Avicennia africana, Rhizophora racemosa, Laguncularia racemosa*, and *Rhizophora mangle*. The mangroves serve as habitat for oysters which provide income for coastal communities living in these areas. The mangroves also serve as a source of fuelwood which is used for cooking the oysters both smoking and steaming (Crow & Carney, 2013). Tanbi Wetland National Park (TWNP) which was declared a Ramsar site in February 2007 (ramsar.org) stretches from Banjul to Mandinari with the Gambia river to the east and mangrove swamps near the ocean to the north. It was gazetted as a national park in 2008. Its mangrove system covers a 6,304ha area. Nine shellfish harvesting communities are located within the Tanbi Wetlands National Park and it is a major economic activity for women living within these communities. A large portion of the Tanbi wetland complex is composed of several species of mangroves including the *Alder conocarpus, Avicennia africana, Laguncularia racemosa, Annona glabra* and the Rhizophora. The key human activities in and around the park include shellfishing, vegetable gardening and rice production (USAID, 2014). The Allahein River estuary covers an area of about 1133ha with a mangrove system of about 424ha. Both communities from The Gambia and southern Senegal depend on this estuary for shellfish, and this estuary is an area of high ecological importance. The threat of overexploitation of the shellfish in this area is due to the high dependence on the resource and unsustainable harvesting techniques (Ministry of Fisheries Water Resources and National Assembly Matters, 2012). The Niumi National Park is a protected marine delta in the North Bank Region of the Lower Niumi District of The Gambia. It covers an area of 4900ha and was gazetted in 1986 under section 5.2 of the Wildlife Conservation Act of 1977. The Niumi national park has a diverse range of habitats, a brackish coastal lagoon, freshwater lagoon, mangrove forest, rice paddies, saltwater marsh wetlands among many others. Shellfish populations include mangrove oysters, west African fiddler crabs and African ghost crabs (https://www.accessgambia.com/information/niumi-national-park.html) The Bao *bolong* Wetland Reserve (BWR) is named after the Bao *bolong* tributary, one of six tributaries branching from the main River Gambia. The reserve therefore is located about 100km from the river mouth on the north bank of the River Gambia. The Bao *bolong* tributary has formed	

a maze of other smaller tributaries and has become a complex water system supporting many economic activities of communities that live around it. It contains four habitats: high mangrove including *Avicennia africana* and *Laguncularia racemosa,* salt marsh, seasonal freshwater marsh, ando wooded grassland. The flora and fauna associated with these diverse habitats are therefore also very diverse. The aquatic invertebrates in this reserve include crabs, mangrove oysters and whelks (National Environment Agency, 2014).

Governance mechanisms

The Government of The Gambia has created an enabling environment for the adoption and implementation of co-management systems in the fisheries sector by enacting the Fisheries Act of 2007 that support this type of management. The Act incorporates national and international fisheries issues in a holistic manner at the same time incorporating FAO Code of Conduct for Responsible Fisheries and other conventions and protocols that the country has signed on to (USAID, 2014)

Shellfisheries

Number of people involved in shellfishing: Oyster and shellfish production data are currently limited as this does not form part of the data collection scope of the Fisheries Department in The Gambia. Some surveys conducted in The Tanbi National Park however estimate 500 oyster harvesters (mostly women) aged between 25 and 45 years and over a hundred involved in related activities such as oyster shell waste management (Njie & Drammeh, 2011; United Nations Development Programme, 2013).

Status of the shellfish: In The Gambia, the bivalve industry consists mainly of oyster and cockle harvesting which plays a vital role in the livelihoods of coastal communities around Tanbi National Park, the Allahein "Bolong" in Kartong, the north bank villages of Tambana and Bakang, and Kemoto in the Lower River Region (Gambia Investment and Export Promotion Agency, 2015).
Harvesting is predominantly done by women who belong to the Jola, Balanto and Manjago ethnic groups. The harvest of these shellfish is seasonal from March to June for oysters and from July to November for cockles. There is limited information on this type of fisheries in The Gambia. (UNCATD, 2014).

Governance

The 2007 Fisheries Act and the 2008 Fisheries Regulations provide the policy, legal and management framework for fisheries in The Gambia as well as international fisheries issues. The Act incorporates international fisheries conventions which The Gambia is signatory to such as the FAO Code of Conduct for Responsible Fisheries. As mandated by the Fisheries Act, a Fishery Advisory Committee and Community Fisheries Centres ensure a decentralized fisheries co-management structure and also ensures inclusivity in the oversight of the fisheries sector (USAID, 2014). The Gambia-Senegal Reciprocal Maritime Fishing Agreement signed in 1982 stipulates "The Government of each State shall allow artisanal fishers of the other State to fish in the waters under their jurisdiction under the same conditions as those applicable to its nationals (Avadi et al., 2020). To boost consumer confidence in oysters and improve its potential for export the Government of

The Gambia through the Department of Fisheries and Water resources and sister department is working towards developing a National Shellfish Sanitation Program which will improve the microbial quality of the oysters (Rice et. al, 2015).
Health
The Gambia has an average life expectancy of 62.0 years, which is about the average life expectancy for the region. The Gambia has the second lowest burden of infectious diseases in the region, neonatal/maternal care response capacity, and the burden of nutritional deficiencies (equivalent to 19,228 years of healthy life lost per 100,000 persons). The incidence of malaria is 208.8 cases/1000 persons) which is in the lower range for the region. The maternal mortality ratio is 706 maternal deaths/100,000 live births which is in the higher range for the region. Anemia prevalence among women of reproductive age is 57.5%, which is the highest in the region. Prevalence of undernourishment is 10.2% among the general population, which is relatively low for the region. The Global Hunger Index score for The Gambia is 22.3, which is moderately low for the region but represents a serious hunger concern. Approximately 34.9% of the population is estimated to have a zinc deficiency, which is the second highest in the region. In terms of child nutrition, the prevalence of exclusive breastfeeding is 46.8%. About a quarter of children (24.5%) are stunted while 16.2% are underweight. The prevalence of child wasting is 11.5%, which is the highest among the 11 coastal West Africa countries.
Stakeholders

Institution	Role
Resource users	
TRY Oyster Women's Association	A group empowering women's livelihoods from harvesting and farming of oysters in mangrove and estuarine areas in the Gambia. Delegated exclusive user rights to the oyster and cockle fishery in the TWNP by the Government of The Gambia.
Government	
National Environment Agency (Coastal and Marine Environment Unit)	The ultimate goal of NEA is to achieve the essential policy objectives of the Gambia Environmental Action Plan : ensuring environmentally sustainable economic and social development; to have a legal recognition of the fundamental right to a sound environment, and ensuring the health and well-being of all those living in the Gambia
Ministry of Environment, Climate Change and Natural Resources	This Department serves as the focal institute for several biodiversity/conservation related international treaties and agreements

(Department of Parks and Wildlife Management) (Department of Forestry)	such as the Conventional on Biological Diversity (CBD), and the Ramsar Convention on Wetlands (Ramsar).
Ministry of Fisheries and Water Resources (Fisheries Department)	The Department is responsible for the management, development, and conservation of fisheries resources in The Gambia. Anna Mbenga (higher level and on TRY Board) and Kanyi Babanding (lower level) are potential contacts.
Academic/Research	
University of The Gambia, Department of Agriculture and Environmental Science	The main goal of the Department is to build requisite human capacity for the development and management of The Gambia's natural resources including aquatic/marine resources in a sustainable manner to ensure that they meet the socio-economic needs of its people.
The Great Institute	The Great Institute was founded out of the need to expand research on the Gambia's marine and coastal ecosystems. The mission of the institute is to address through scientific research and education pertinent climatic issues affecting The Gambia.
Private/NGOs/CSOs	
Gambian Marine and Environmental Conservation Initiative	This initiative is a community organization aimed at protecting and preserving the environment in The Gambia. The initiative incorporates traditional practices with modern knowledge in their programs to improve the society through sharing information and immediate action.
Africa Catalyzing Action for Nutrition (AfriCAN)	AfriCAN is a network of advocates, champions and experts from different disciplines committed to driving Africa's nutrition agenda forward.

Projects			
Project	Timeframe & Budget	Objective	Funder/Implementer
USAID/BaNaFaa Project	May 1, 2009 – April 30, 2014 US$3.4 million	The focus was on sustainable fisheries management including the shared marine and coastal resources between The Gambia and Senegal. At the end of the project, among others, a fisheries	Implemented through the University of Rhode Island (URI)-USAID cooperative agreement on Sustainable Coastal Communities and Ecosystems (SUCCESS)

		management plan was developed, adopted and gazetted for the Gambia, closed seasons and gear restrictions instituted and joint bilateral discussions active between Gambia and Senegal towards managing shellfish in shared areas. For the first time a women's association were given exclusive rights to manage shellfishery	The World Wide Fund for Nature West Africa Marine Program Office (WWF-WAMPO) was a regional implementing partner Partners: TRY Oyster Women's Association (TRY), the National Sole Co-Management Committee (NASCOM), and the Water Resources Laboratory Department of Fisheries (DoFish)
UNDP-implemented Global Environment Facility Small Grants Programme (SGP)	2010 - 2012 $20,000	Training in mangrove reforestation and aquaculture	TRY Oyster Women's Association Department of Parks and Wildlife Management, association members *(won Equator prize in 2012)*
Support to The Gambia for integrated coastal zone management (ICZM) and the mainstreaming of climate change	Jan 02, 2012 - Jan 02, 2015 3.86 million Euros	The Project seeks to benefit coastal communities and help them to adapt to the impacts of climate change through institution strengthening, knowledge management and demonstrated implementation."	Funded by the Global Climate Change Alliance plus Initiative (GCAA+). Partners include Min. of Finance and Economic Affairs (MOFEA), National Environment Agency (NEA), Department of Water Resources of the Min. of Fisheries and Water Resources, Min. of Forestry, and the Environment (MOFEN)
Priority Gaps			
No. of women involved in shellfishing in all locations. Current number and size of shellfish harvested from all locations. No. of hectares of coastal systems allocated for shellfisheries.			

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Guinea Bissau

Basic Contextual Information	
Country	Guinea Bissau
Total land area	36,125 km^2
Population	1.874 million (2018)
Percentage population living in/near the coast	60%
Gross Domestic Product (GDP)	$1.44 billion (2019)
Human Development Index Rank	0.461 (178 out of 189)
Length of coastline	350km
Fish consumption (as a percent of animal protein)	35%
Anemia prevalence	Among non-pregnant women (ages 15 - 49) – 43.1% Among women of reproductive age (ages 15 - 49) – 43.8% Among children under 5 – 68% Among pregnant women – 51%
Estimated mangrove cover	326,000 ha
Estimated estuarine/freshwater area for shellfisheries	N/A
Presence of women shellfishers	Present
No. of women shellfishers in mangrove zones	N/A

No. of coastal systems with mangrove-based shellfishing	N/A
Shellfish management regulations	2010 Fisheries Management Plan and the Fisheries Law
Mangrove management regulations	(Forest Law), http://faolex.fao.org/docs/pdf/gbs118220.pdf, Articles 10-11 (classification of forests), 14, 18, 46 (logging restrictions), 26 (revocable contracts), 35 (community forests), 55 (conservation objectives) (Protected Areas Decree-law) http://faolex.fao.org/docs/pdf/gbs118220.pdf, Art. 24 (littoral and riparian forest protections), 3 and 26-29 (protected zones), 34 (protected area restrictions), Chapters II and III (classification)
Mangrove-Shellfish systems with protection status	88,615 ha of Rio Cacheu Mangroves Natural Park designated as Ramsar Site Also, 54,500 hectares of marine Area of the Urok Islands designated as Marine Protected Area
Mangroves	
Guinea-Bissau, regarded as a mangrove country with a forest cover of about 326,000 ha (Temudo & Cabral, 2017), has experienced a 32 % decline in mangrove cover over the past 80 years. There has been some recent restoration work which resulted in 200 ha of mangroves restored. Generally, the mangrove system is moderately degraded. Mangrove species present in Guinea Bissau include *Avicennia germinans, Rhizophora mangle, Laguncularia racemosa* (L.) C.F. *Gaertn, Conocarpus erectus, R. racemosa, R. harrisonii* and *Machaerium lunatum* (Temudo & Cabral, 2017), with the dominant species being *Avicennia germinans, Rhizophora mangle*. Rio Cacheu Mangroves Natural Park's total vegetation extends across an area of 88,615 ha., 68% of which is covered by 30,000 ha are mangroves (García del Toro & Más-López, 2019). This area was designated as a RAMSAR site in 2015. (https://www.africanbirdclub.org/countries/Guinea-Bissau/conservation). The Management Council of the Locally-Managed Marine Area of the Urok Islands created in 2005 was a 2019 Equator Prize Winner for their work around the islands of Chedia, Nago, and Formosa, including over 3,000 hectares of mangrove forests providing crucial fish habitat. This habitat located in the Marine Protected Area (MPA) covers 54,500 hectares of cultural and ecological importance (see https://www.equatorinitiative.org/equator-prize/all-winners/).	

Shellfisheries
Shellfisheries play a major role in the culture and local economy as a great diversity of shellfishes constitute the principal source of animal protein. Mangrove oyster is the most exploited shellfish for commercial purposes. There is however a ban on the sale of shellfish to limit mangrove resource exploitation. Thus, shellfishers take advantage of the trunks and / or branches of dead mangroves as a source of energy for lighting and cooking food (García del Toro & Más-López, (2019). Shellfish exploitation is almost exclusive to women who fish using circular nets and they collect oysters and crabs as well as other types of mollusks and crustaceans. Given the special value in different religious worship events and the concerns of food safety, in a lot of zones, the traditional use of shellfish, particularly mangrove oysters, is implemented with specific management rules. In Felupe and Bijagó's tradition, the oysters are not collected during the rainy season, for instance, and the rules interdict the cutting of the aerial roots of the mangroves where they are located. Even during the dry season, usually the open period for the exploitation of oysters, there are situations where the extraction of oysters in certain rivers is reserved for special ceremonies (Sá et al., 2015). There is limited information on the scope of the shellfishery in terms of annual catch, culture of shellfishes and associated challenges of shellfishing. Governance An appraisal conducted by the World Bank in 2018 highlighted the outdated fisheries regulatory framework which made no provision for fisheries co-management and user rights.
Health
Guinea-Bissau has an average life expectancy of 58.3 years, which is in the lower range for the region. The burden related to infectious diseases, neonatal/maternal care, and nutritional deficiencies is in the higher range for the region (equivalent to 28,742 years of healthy life lost per 100,000 persons). The incidence of malaria is 89.3 cases/1000 persons) which is the lowest for the region. The maternal mortality rate is 549 maternal deaths/100,000 live births which is average for the region. Anemia prevalence among women of reproductive age is 43.8%, which is the second lowest in the region. Prevalence of undernourishment is 28% among the general population, which is the second highest for the region. The Global Hunger Index score for Guinea-Bissau is 29.1, which is moderately high for the region and represents a serious hunger concern according to the index. Approximately 27.1% of the population is estimated to have a zinc deficiency, which is average for the region.
Stakeholders

Institution	Role

Resource Users	
Conselho de Gestão da Área Marinha Protegida Comunitária Urok (Management Council of the Locally-Managed Marine Area of the Urok Islands)	Created in 2005 by indigenous Bijagós communities to strengthen social, cultural, and environmental resilience. The council brings together indigenous communities, officials from the National Institute of Biodiversity and Protected Areas, and the non-governmental organization Tiniguena in a collaborative effort to safeguard key ecosystems, promote community development, and support local culture
Government	
Centre of Applied Fisheries Research (CIPA)	It has the capacity to generate, manage and utilize fisheries data. It regularly conducts stock assessment campaigns and prepares management plans. Responsible for fisheries research and sanitary controls.
Ministry of Agriculture and Fisheries	Provides oversight responsibility of the fisheries industry, particularly fisheries research and monitoring, information and surveillance systems, and enforcement revenue collection from foreign flagged vessels
Academic/Research	
Private/NGOs/CSOs	

Projects			
Project	Timeframe and/or Budget	Objective	Funder/Implementer
Conserving Biodiversity of the Mangroves National Park at Guinea-Bissau.	2015-2018	The initiative is to conserve the mangroves, tidal flats, dryland forests and seagrass beds of Cacheu national park and its buffer zone in Guinea Bissau. With assistance from	Funder: Turing Foundation Implemented by Wetlands International, IBAP and other partners

		communities and park authorities, the project has developed plans for improved management of the park and its buffer zone and also introduced ecological mangrove restoration to rehabilitate abandoned rice-fields. The project has implemented conservation measures on the ground and supported communities to reduce their impacts on natural resources by introducing sustainable livelihoods alternatives to harmful practices.	
Mangrove Guinea Bissau: Mangrove, mangrove rice and mangrove people - sustainably improving rice production, ecosystems, and livelihood 2020-2024	Fund volume: USD $3,900,040	The project seeks to contribute to poverty and hunger eradication and green growth in an inclusive and ecologically-sustainable way, through the transformation of agricultural and food systems in Guinea-Bissau— particularly those associated with mangrove swamp rice cultivation — and through the strengthening of researchers' and farmers' skills in the development and dissemination of innovations.	Directorate-General for International Cooperation and Development (DG DEVCO) Implemented by Universidade de Lisboa (ULisboa)
Project for the conservation of mangroves on the Tristao islands	2018- 2022	The project is being implemented through a community approach whereby local people are	Funded by the DOB Ecological Foundation. The project will be implemented by the Regional Partnership for

and Cacine Peninsula		fully involved in activities aimed at enhancing their living conditions, and to sustainably expand mangrove areas. The project focuses on rehabilitating and planting trees in mangroves over a surface of 600 ha and reducing the pressure of human activities on mangroves by promoting alternative techniques and supporting income-generating activities. Focal areas are Tristao islands in Northern Guinea and the Cacine Peninsula in Guinea-Bissau	Coastal and Marine Conservation (PRCM) in collaboration with the organizations of the PRCM network, Guinée Ecologie and OGUIPAR, the body tasked with the management of MPAs

Priority Gaps

A functional management plan for fisheries resources could not be found for Guinea-Bissau.
Estimated estuarine /freshwater areas for shellfishes are not documented
Number of women shellfishers in mangrove zone not known
Number of mangrove-based shellfishery not documented
There is no specific regulation for shellfishery management

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Guinea

Basic Contextual Information	
Country	Guinea
Total land area	245,857 km^2
Population	12.41 million (2018)
Percentage population living in/near the coast	50%
Gross Domestic Product (GDP)	10.91 billion USD (2018)
Human Development Index Rank	0.459 (2017)
Length of coastline	320 km
Fish consumption (as a percent of animal protein)	40%
Anemia prevalence	50.6% among women of reproductive age (15-49) 66% among pre-school aged children
Estimated mangrove cover	203,900 ha
Estimated estuarine/freshwater area for shellfisheries	-
Presence of women shellfishers	Present
No. of women shellfishers in mangrove zones	-
No. of coastal systems with mangrove-based shellfishing	-
Shellfish management regulations	-
Mangrove management regulations	-
Mangrove-Shellfish systems with protection status	552 ha
Mangroves	
The Mabala and Yélitono mangrove islands, located at the end of the Forécariah, Tana, and Mélacorée rivers in the most southern coastal region of Guinea, West, are covered by about	

10,442 ha of mangrove vegetation. Food systems near the mangrove areas of Guinea include subsistence fishing and rice production. The mangrove-fringed Konkoure River delta in Guinea is about 32000 ha in size. The mangroves directly fringing the main channel of the Konkoure River are well inundated intermittently whereas those mangroves fringing smaller coastal streams are least flooded by the tidal intrusion. Inundation of mangrove swamps by inland and marine water sources may be detrimental or beneficial to the ecosystem. That caused by floods from rapid riverine inflows may forcefully uproot shallow rooted mangrove vegetation and reduce salinity, leading to loss of habitats for sessile organisms including oysters and low survival of other biota (see Munji et al., 2014). Seasonal flooding may also enhance mangrove forests accessibility, thus, promote their exploitation for non-timber forest products including fuel wood and mangrove poles (Munji et al., 2014). Moderate flooding would typically inundate mangrove roots, making available a larger surface area of substrate for the attachment of oysters and other sessile organisms that use them as habitat. According to Feka and Morrison (2017) mangrove cover in Guinea increased by 45200 ha from 2000 to 2015.

Ramsar sites with mangroves and some shellfishing

Rio Kapatchez: The site includes a network of mangrove forests, intertidal mud and sand flats, and freshwater marshes, and includes marshy coastal plains bordered by a stabilized dune system. Various waterbirds are protected by these various ecosystems. The woolly-necked Ciconia episcopus, hamerkop (*Scopus umbretta),* African fish eagle (*Haliaeetus vocifer*) and yellow-billed stork (*Mycteria ibis*) are breeding bird species in the mangroves, while the osprey (*Pandion haliaetus*) winters there.

Rio Pongo is an extensive estuarine complex dominated by pristine mangrove forests, with some intertidal mudflats. Several small villages which depend on traditional fishing and subsistence rice growing are found on stabilized dune ridges within the site.

les Tristao. 18/11/92; 85,000 ha; 10°55'N 015°00'W. Kogon River Delta, an estuarine complex of extensive mangrove forests and sandy intertidal zones. The site contains several villages where activities include traditional fishing, rice cultivation, and small-scale horticulture. The area supports nesting and wintering birds. Mammals include hippopotamus. Ramsar site no. 572. Most recent RIS information: 1990.

Konkouré. 18/11/92; 90,000 ha; 09°45'N 013°41'W. Estuarine complex, forming part of the Konkouré River Delta, with extensive intertidal mud/sand flats, mangrove forests and adjoining marsh. Primary human activities include subsistence fishing and rice cultivation. Mangroves provide nesting sites for several rare bird species. Mudflats support large numbers of wintering Palearctic shorebirds. Ramsar site no. 575. Most recent RIS information: 1990.

Shellfisheries

There is very limited information available from online sources on shellfisheries in Guinea. The reports identified on mangrove areas do not specifically make mention of shellfisheries. Shrimps are, however, included in the fisheries of importance to Guinea in addition to cephalopods and pelagic species but whose fishery assessment is reported as a difficult venture.

Due to hypersalinity and slow flushing (residence time ≈ 14–30 days) in the dry season in some areas of the Konkouré River Delta, the area is deemed unsuitable for rice farming but recommended for fishery and forestry resources.

Governance

Fisheries in general is governed by:
Law No. 2015/026/AN of 14 September 2015 on the Code of Maritime Fishing,
Law No. 2015/027/AN of 14 September 2015 on the Code of Continental Fishing and
Law No. 2015/028/AN of 14 September 2015 on the Aquaculture Code.

Health

Guinea has an average life expectancy of 61.6 years, which is about the average life expectancy for the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is in the higher range for the region (equivalent to 29,971 years of healthy life lost per 100,000 persons). The incidence of malaria is 367.8 cases/1000 persons) which is in the second highest for the region. The maternal mortality ratio is 679 maternal deaths/100,000 live births which is slightly higher than average for the region.

Anemia prevalence among women of reproductive age is 50.6%, which is in the high range for the region. Prevalence of undernourishment is 16.5% among the general population, which is average for the region. The Global Hunger Index score for Guinea is 28.9, which is moderately high for the region and represents a serious hunger concern according to the index. Approximately 19.6% of the population is estimated to have a zinc deficiency, which is the second lowest in the region.

In terms of child nutrition, 30.3% of children < 5 y of age in Guinea are stunted, 33.4% are underweight, and the prevalence of child wasting is 8.8%. The prevalence of exclusively breastfeed is 16.1%.

Stakeholders	
Institution	Role
Resource Users	
Government	
Ministry of Fisheries, Aquaculture and Maritime Economy	- Ensuring the coherence of public and private interventions - Establishing a business-friendly climate - Promoting the financing of private businesses - Ensuring a sustainable management of resources - Boosting information systems in the sector (biological, social, economic, environmental data).
CNSHP (National Centre of Fisheries Science)	In charge of applied research in the fisheries and aquaculture sector
ONSPA (National Bureau for sanitary control of fisheries and aquaculture products)	In charge of controlling the quality of fisheries and aquaculture products.
Academic/Research	
Centre for Aquaculture Research, State University	Responsible for training mid-level to high level manpower in fisheries and aquaculture related programs
Private/NGOs/CSOs	
Slow Fish	A group of fishermen of Boulbinet (Guinea-Conakry) who certify fish produced as organic

Projects			
Project	Timeframe and Budget	Objective	Funder/Implementer
Project for the conservation of mangroves on	2015-2018 No budget info available	The project is expected to be implemented through a community approach whereby local people will	Funded by the DOB Ecological Foundation.

the Tristao islands and Cacine Peninsula		be fully involved in activities aimed at enhancing their living conditions, and to sustainably expand mangrove areas. The project focuses on rehabilitating and planting trees in mangroves over a surface of 600 ha and reducing the pressure of human activities on mangroves by promoting alternative techniques and supporting income-generating activities. Focal areas are Tristao islands in Northern Guinea and the Cacine Peninsula in Guinea-Bissau	The project will be implemented by the PRCM in collaboration with the organizations of the PRCM network, Guinée Ecologie and OGUIPAR, the body tasked with the management of MPAs
Integrated fisheries management for coastal communities' resilience in Guinea West Africa Regional Fisheries Program (WARFP) project	US $15 million	The project addressed the urgency to modernize management tools for better planning, surveillance, and monitoring of the resources and the need to provide direct support to coastal communities heavily dependent on fisheries. The project helped these communities secure access to the fisheries resources and to markets and diversify their sources of income. These results led to the reduction of pressure on fisheries while ensuring the resilience of coastal communities, especially those affected by the COVID-19 crisis A key result is the creation of two community co-management associations and related local co-management plans in 2020.	World Bank investments in Guinea totaled $15 million, including $10 million IDA funding and $5 million GEF funding in 2017. The project implementation has been supported by technical assistance developed through the Regional Partnership for African Fisheries Policy Reform ($2 million).
Priority Gaps			
1. The reports identified on mangrove areas do not specifically make mention of shellfisheries. 2. Currently, there is no published information on the number of women fishers/shellfishers in Guinea Conakry. 3. There is limited information on the number of mangrove-based shellfishery locations in the country.			

4. There is no readily available information on existing regulations governing the management of shellfishery and mangrove ecosystems

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https://www.thegef.org/news/integrated-fisheries-management-coastal-communities-resilience-guinea

Sierra Leone

Basic Contextual Information	
Country	Sierra Leone
Total land area	71,740 km^2
Population	7.65 million (2018)
Percentage population living in/near the coast	35%
Gross Domestic Product (GDP)	4.085 billion USD (2018)
Human Development Index Rank	0.438 for 2018 (181 of 189)
Length of coastline	506km
Fish consumption (as a percent of animal protein)	80%
Anemia prevalence	76% (children under 5yrs); 70% (pregnant women); 48.0% among women of reproductive age (15-49)
Estimated mangrove cover	295,000ha
Estimated estuarine/freshwater area for shellfisheries	-
Presence of women shellfishers	Present
Mangrove-Shellfish systems with protection status	Ramsar Sites

Mangroves
Six (6) species of mangrove have been identified along the coast of Sierra Leone namely, Rhizophora racemosa, Rhizophora mangle, Rhizophora harrisonii, Laguncularia racemosa, Avicennia africana and Conocarpus erectus. About 80% of the population of Sierra Leone heavily depend on biodiversity resources for food, fiber, medicine, income for their wellbeing (Ndomahina, 2002; Fifth National Biodiversity and Government of Sierra Leone (GoSL), 2015). Mangroves serve as a habitat for fish and shellfish, which eventually serve as a source of food for the people of Sierra Leone (Chong, 1987; Garnett & Mansaray, 2007).

The key drivers of mangrove loss in SL include; conversion for rice fields and salt production, overexploitation and logging for wood and timber (GoSL, 2015; Garnett & Mansaray, 2007). There is still a scarcity of information with regards to the status of mangrove ecosystem in Sierra Leone and linkages between the social and economic conditions of coastal communities and mangrove resource utilization in the Scarcies Estuaries. It has been postulated that the conflict between human needs and preferences and the conditions favored by mangroves is the fundamental driver for the loss and degradation of these ecosystems (UNEP, 2008), and this decline continues in many regions (UNEP, 2008; Polidoro et al. 2010).

Some mangrove lands have also been cleared to provide new areas for rice production, and trees have also been cut to provide cheap fuel for fish smoking, a major way of preserving food and for salt production. Siltation and pollution of estuaries are also major threats to mangroves (UNEP, 2007; Konoyima & Johnson, 2020).

Ramsar sites with mangroves:

Sierra Leone River Estuary. 13/12/99; 295,000 ha; 08°37'N 013°03'W. The Estuary, near Freetown Peninsula, is dominated by mangrove systems, with lowland coastal plains to the north. As it enters the Atlantic Ocean, the estuary widens to about 11km and deepens to form a natural harbor said to be the third largest in the world. 19% of Sierra Leone's total mangrove is included within the site.

Shellfisheries

The major shellfish exploited (mostly by men) is shrimp and their fishing grounds are mainly around estuaries of the following rivers; Sherbro, Sierra Leone, Moa, Scarcies, Sulema, Sewa and Panifana. Thus, the good shrimping grounds are off the Freetown Peninsula, Banana Island (Yawri Bay) and Bullom/Turners Peninsula. The major species landed are *Penaeus notialis* and *Parapenaeopsis atlantica*.

The mangrove oysters are an important source of protein in Sierra Leone for the poorest people. Oysters are normally classified as rocky, muddy, or mangrove type based on the substrates on which they are found. Mangrove roots with oysters attached to them are cut by men using dug-out canoes and machetes. A small amount is also gathered by women mostly from mud banks and rocks. Oysters are usually boiled in a large drum, shucked, and sold fresh. Since they are so small, collection and processing are laborious, production is limited, and distribution is localized.

Governance

Fisheries and Aquaculture Acts, 2018
Fisheries and Aquaculture Regulations , 2019

Health
Sierra Leone has an average life expectancy of 54.7 years, which is tied with Nigeria for the lowest for the region. Sierra Leone has the highest burden of disease in the region related to infections, neonatal/maternal care, and nutritional deficiencies (equivalent to 33,709 years of healthy life lost per 100,000 persons). The incidence of malaria is 302.8 cases/1000 persons) which is average for the region. The maternal mortality ratio is 1,360 maternal deaths/100,000 live births which is the highest in the region. Anemia prevalence among women of reproductive age is 48.0%, which is average for the region. Prevalence of undernourishment is 25.6% among the general population, which is high within the region. The Global Hunger Index score for Sierra Leone is 35.7, which is the highest in the region and represents an alarming hunger concern according to the index. Approximately 27.2% of the population is estimated to have a zinc deficiency, which is average for the region. Among children < 5 y of age, 29.5% are stunted, 13.3% are underweight, and 5.3% are wasted (defined as low weight-for-height). The prevalence of exclusive breastfeeding in Sierra Leone is 54.1%.

Stakeholders	
Institution	Role
Resource Users	
Fish Marketing Association (FMAs)	Work with fishers to market their products (Post harvest techniques)
Sherbro Women's Oyster Gathers Association	Working with remote communities in the Sherbro River Estuary in Southern Province, Sierra Leone to offer sustainable income for local women through the culture, processing, and marketing of native mangrove oysters.
Mobanda Community Conservation Project (MCCP) (Tacugama Oyster Harvesting Outreach Project)	To promote community-based forest management in combination with wildlife conservation through programs that benefit communities, wildlife, and ecologically significant habitats

Government	
Ministry of Fisheries and Marine Resources	Responsible for the management, development, and conservation of the fisheries resources of Sierra Leone, involving the marine, inland and aquaculture fisheries
Private/NGOs/CSOs	
Environmental Justice Foundation (EJF)	Working with local communities to bring illegal trawlers to justice and protect local fish populations. They also give communities trainings on ways to manage their coastal resource sustainability

Projects			
Project	Timeframe/Budget	Objective	Funder/Implementer
Darwin Sherbro Oyster Project	(2014-2019)	To support remote communities in the Sherbro River Estuary in Southern Province, Sierra Leone to offer sustainable income for local women through the culture, processing, and marketing of native mangrove oysters.	The Darwin Initiative

Priority Gaps

1. No specific mangrove management regulations
2. No known Governance in Shellfish
3. The number of women engaged in shellfishes in mangrove zones are not documented
4. Number of coastal systems with mangrove-based shellfishing not documented
5. No known shellfish management regulations
6. Mangrove shellfish systems with protection status not documented
7. National shellfish production by weight and value (for coastal estuarine and mangrove shellfishing areas)

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Liberia

Basic Contextual Information	
Country	Liberia
Total land area	111,369 km^2
Population	4.819 million (2018)
Percentage population living in/near the coast	-
Gross Domestic Product (GDP)	3.264 billion USD (2018)
Human Development Index Rank	0.465 (176 out of 189)
Length of coastline	565 km
Fish consumption (as a percent of animal protein)	15%
Anemia prevalence	34.7% among women of reproductive age (15-49)
Estimated mangrove cover	12-20 million ha
Presence of women shellfishers	Present

Mangroves
These ecosystems are found mostly along the mouth of rivers especially from Cape Mesurado to Cape Palmas in Liberia. Six different species of mangroves are found along the coast of Liberia namely *Rhizophora racemosa, Conocarpus erectus, Avicennia germinans, Rhizophora racemosa, Acrostichum aureum, and Rhizophora harrisonii*. The most common one is the *R. racemosa*. Species of mangrove found along coastal communities of Cape Palmas in South-Eastern Liberia grow to a height of 3m and are dominated by *C. erectus* but also contain *A. germinans* and *R. racemosa. A. germinans* and *Rhizophora spp*. Which hardly grow beyond a height of 6 meters. This lack of stature is generally attributed to poor soil conditions (UNEP, 2007). Most of the mangroves in Liberia are cleared for fuelwood, urban expansion, road building, mining, and oil exploitation. The loss of mangroves in Liberia is due to pollution, runoff from agricultural lands, oil exploration and the impact of climate change (FAO, 2007). Information on the distribution and status of mangroves along the coast of Liberia is still limited.

Ramsar sites with mangroves

Lake Piso Ramsar Site

This is an open lagoon near Robertsport, which is fed by many streams and rivers and the lagoon contains areas of mangroves in the lagoon. Behind the dune ridge on the west side of the mouth of the lake and at other creek mouths, other patches of mangroves are found. The site serves as a significant breeding ground for sea turtles, fish, feeding and nesting for sea birds. The region is also home to antelopes, duikers, chimpanzees, bushbucks, and a few crocodiles. Around 38 villages are dependent on Lake Piso for transport, fishing, and sand for construction. Farm to Market Infrastructure was established before the 1990's civil crisis. ("Annotated Ramsar List" 2013).

Marshall Wetlands Ramsar Site

This site comprises three small rivers with rocky and sandy banks, as well as secondary forests and woodlands of savanna. In the forest, wildlife species include the Red Colobus monkey, the Glossy Ibis, the Lesser Kestrel and the Common Petrel The site regulates erosion and recharges subterranean water and is a sediment trap. The three rivers are be used for transport and are navigable. The site is facing serious threats, such as from contamination resulting from rubber production, mangrove forest harvesting and dynamite fishing by local people. A major concern for farmers is the presence of *Chromolaena odorata*, an invasive alien species hosting harmful agricultural insects. ("Annotated Ramsar List" 2013).

Mesurado Wetlands Ramsar Site

This Ramsar site is in Monrovia, in the district of Montserrado. The site is essential for the conservation of three species of mangroves (*Rhizophora harrisonii*, *R. mangle*, and *Avicennia africana*) severely threatened with cutting for fuel wood and charcoal production. This site provides good habitat and food for many bird and crocodile species and plays an important role in the stabilization and trapping of sediments on the shoreline. The site is currently used for the dumping of trash, car washing, fishing, and fuel wood collection, and is further threatened by industrial pollutions. ("Annotated Ramsar List")

Shellfisheries

Liberia is a low fish-eating country whose shellfishery is poorly documented. The main shellfish of commercial importance are shrimp and there are limited data on bivalves and other shellfish associated with mangrove ecosystems. Three important species of penaeid shrimps have been identified namely, *Penaeus notialis and Penaeus kerathurus* in the coastal zone and *Parapenaeuus longirostis* in deeper waters (UNEP, 2007). The species of shrimp mostly landed include *P. notialis*, which is by far the most dominant species in the catch, followed by *P. longirostris*, which occurs in waters at low levels of depth 100-400m. The pink shrimp (*P. notialis*) is by far the most dominant and lives in the same areas as *P. keraturus* (Caramote creeks). *P. longirostris* is less common and found in deeper waters. Resource and commercial fishing knowledge has shown that the northern region of Liberia bordering Sierra Leone is richer in coastal penaeid shrimps (UNEP, 2007).

Another species, *Parapenaeopsis atlantica* (aka Guinea shrimp), which is a littoral species, is also present in Liberia but its economic potential is not understood.

Shellfish species that depend on mangrove tree/root surfaces as habitats for growth, (e.g. oysters, and other estuarine bivalves and gastropods) and that are used as food and provide livelihoods in coastal areas of other West African countries, are not well documented for Liberia.

Governance

National Fisheries and Aquaculture Act (Law on Marieb Fishers)
The act seeks to ensure the long-term management, conservation, development and sustainable use of the fisheries and aquaculture resources and related ecosystems for the benefit of the people of the Republic of Liberia. The Act establishes the National Fisheries and Aquaculture Authority of Liberia.

Health

Liberia has an average life expectancy of 64.1 years, which is tied with Ghana for the second highest for the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is average for the region (26,183 years of healthy life lost per 100,000 persons). The incidence of malaria is 246.2 cases/1000 persons) which is average for the region. The maternal mortality ratio is 725 maternal deaths/100,000 live births which is in the high range for the region.

Anemia prevalence among women of reproductive age is 34.7%, which is the lowest for the region. Prevalence of undernourishment is 37.2% among the general population, which is the highest for the region. The Global Hunger Index score for Sierra Leone is 33.3, which is the second highest in the region and represents a serious hunger concern according to the index. Approximately 35.2% of the population is estimated to have a zinc deficiency, which is the highest for the region.

Among children < 5 y of age, 31.6% are stunted, 15% are underweight, and 6% are wasted. A little more than half (55.2%) of children < 6 month of age are exclusively breastfed. This is one of the highest exclusive breastfeeding rates among the 11 coastal West Africa countries.

Stakeholders

Institution	Role
Resource User	
Liberia Artisanal Fishers Association	This association works with government and NGOs to combat illegal and unsustainable fishing

Government	
National Fisheries and Aquaculture Authority (NaFAA)	This a government agency responsible for managing and developing Liberia's fishery resources.
Environmental Protection Agency (EPA), Liberia	They effectively monitor and manage the Liberian environment to prevent these precious resources from being overexploited, by implementing policy to ensure good governance and conservation
Ministry of Agriculture (MOA)	Has the mandate to coordinate effective organizational structure for planning, coordinating, implementing, monitoring, and evaluating agricultural development programs. The ministry oversees training of its staff and farmers to cope with the challenges of the agriculture sector development. The ministry also investigates and proposes lasting solutions and supportive services for an enabling environment to produce agricultural products. The core general areas of responsibility of the Liberian MOA are; agriculture, both smallholder and commercial; plantation crops; fisheries; and livestock
Bureau of National Fisheries (BNF), Liberia	A government agency responsible for the development and management of the national fisheries of Liberia. They implement fisheries policies, formulate guidelines, rules, and regulation of the fisheries sector.
Private/NGO/CSO	
Environmental Justice Foundation, Liberia	Support the country to combat illegal fishing and unsustainable fisheries. Also, provide capacity building training for communities on the sustainable use of the marine and coastal resources.

Projects			
Project	Timeframe/ Budget	Objective	Funder/Implementer
Sustainable mangrove conservation	2019-2022 € 300,000	To improve management of five protected nature reserves and increase their number to fourteen protected nature conservation areas in Liberia,	Conservation International (CI) Government and Communities

		including the Marshall coastal area.	
Improve sustainability of mangrove forests and coastal mangrove areas in Liberia through protection, planning and livelihood creation	2016-2019 $4,704,994	To strengthen the conservation and sustainable use of globally important mangrove forests through effective participatory land-use planning and establishment of marine and coastal protected areas in at least 35% of Liberia's mangroves.	Conservation International (CI) & Environmental Protection Agency, Liberia; CI-Liberia Implemented by Environmental Protection Agency (EPA) and the Forestry Development Authority (FDA)

Priority Gaps

1. Estimated estuarine /freshwater areas for shellfishes not documented
2. Number of women shellfishers in mangrove zone not known
3. Number of coastal systems with mangrove based shellfishery not documented
4. No specific shellfish and mangrove management regulations
5. No information on mangrove-shellfish systems with protection
6. National shellfish production by weight and value (for coastal estuarine and mangrove shellfishing areas)

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Côte d'Ivoire

Basic Contextual Information	
Country	Ivory Coast
Total land area	322,463 km^2
Population	25.07 million (2018)
Percentage population living in/near the coast	-
Gross Domestic Product (GDP)	43.01 billion USD (2018)
Human Development Index Rank	0.516 (165 out of 189)
Length of coastline	590 km
Fish consumption (as a percent of animal protein)	38.7%
Anemia prevalence	63% in preschool children, 47% in school-age children, 41% in women, and 13% in men. About 66% of the preschool children, 50% of the school-age children and women, and 30% of the men with iron deficiency were anemic. And 52.9% among women of reproductive age (15-49)
Estimated mangrove cover	0.3% of national landmass of 322,463 km^2, 26.9% of which lies with Ramsar site protected by the country's Ministry of Water of Forestry
Presence of women shellfishers	Present (About 70% of shellfishers are women)
Mangroves	
Shellfisheries	
Shrimp is one of the important fisheries species caught in Cote d'Ivoire and are found mainly in the mouths of rivers. They are also targeted by foreign vessels. For the commercial group of shrimps of the Penaeus species, the name "langoustine" is used. The Ivory Coast fisheries sector is both an importer and an exporter and produces 30% of the fish consumed locally (consumption estimated	

at 275,000 tons is 16.2 kg/capita per year). Shrimp fishing is the most significant coastal resource on the Côte d'Ivoire. No annual fishing and shellfish culture data are available (UNEP, 2007). Documentation on the participation of women in coastal shellfishing in Ivory Coast is unavailable online.

Governance

Co-management Plan in Aby Lagoon

Health
Cote d'Ivoire has an average life expectancy of 57.8 years, which is in the low range within the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is average for the region (equivalent to 26,925 years of healthy life lost per 100,000 persons). The incidence of malaria is 348.8 cases/1000 persons) which is in the high range for the region. The maternal mortality ratio is 645 maternal deaths/100,000 live births which is average for the region. Anemia prevalence among women of reproductive age is 52.9%, which is the second highest for the region. Prevalence of undernourishment is 19.0% among the general population, which is in the high range for the region. The Global Hunger Index score for Sierra Leone is 25.9, which is average for the region and represents a serious hunger concern according to the index. Approximately 33.4% of the population is estimated to have a zinc deficiency, which is high for the region. Among children < 5 years of age, 29.8% are stunted, 14.9% are underweight, and 7.5% are wasted. The percentage of children < 6 months of age who are exclusively breastfeed (12.1%), is the lowest among the 11 Coastal West Africa countries.

Stakeholders	
Institution	Role
Government	
Ministry of Animal and Fish Resources	Responsible for the implementation and monitoring of the government policy on animal production and fisheries resource
Ministry of Water and Forestry	Implementation of environmental code and legislation on the protection of Nature and the environment as well as planning and controlling of environment policy, assessment, strategies, and plans

Ministry of Agriculture and Rural Development	The ministry is responsible for food security and sovereignty, sustainable management of cash and export crops; private sector engagement through increased investment

Projects			
Project	Timeframe/Budget	Objective	Funder/Implementer
Protection of Mangroves through the Creation of a Firewood Plantation	2008-2009 GEF Small Grants/UNDP SGP Contribution: USD$ 21,694 Cash Co-Financing: USD$ 2,000 In-Kind Co-Financing: USD $ 1,000	To contribute to the protection and restoration of mangrove ecosystems	Implemented by Association pour le Reboisement de Bingerville (ARB)

Priority Gaps

1. Estimated estuarine /freshwater areas for shellfishes not documented
2. Number of women shellfishers in mangrove zone not known
3. Number of coastal systems with mangrove based shellfishery not documented
4. No specific shellfish and mangrove management regulations
5. No information on mangrove-shellfish systems with protected
6.

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Ghana

Basic Contextual Information	
Country	Ghana
Total land area	238,535 km^2
Population	29.77 million (2018)
Percentage population living in/near the coast	25%
Gross Domestic Product (GDP)	65.56 billion USD (2018)
Human Development Index Rank	0.596 (142 out of 189)
Length of coastline	550 km
Fish consumption (as a percent of animal protein)	50–80%
Anemia prevalence	78.4% among under-five children 46.4% among women of reproductive age (15-49)
Estimated mangrove cover	1.6 million ha
Presence of women shellfishers	-
Estimated estuarine/freshwater area for shellfisheries	-
No. of women shellfishers in mangrove zones	-
No. of coastal systems with mangrove-based shellfishing	-
Shellfish management regulations	Oyster Fishery Co-Management Plan for the Densu Delta
Mangrove management regulations	-
Mangrove-Shellfish systems with protection status	-

Mangroves

Mangroves are a conspicuous vegetative cover occupying 14,000 ha of the coastal zone of Ghana and fringing the lagoons, estuaries, and coastal marshlands (see, Ajonina et al., 2014). Their distribution is sparse but generally healthy albeit with evident degradation in some areas emanating from cutting for fuelwood and conversion of mangrove areas to salt pans, among other anthropogenic pressures. They are more prevalent along the eastern coastal areas of Ghana especially at the Volta delta whereas smaller stands occur along the western coastline in areas such as the Amansuri River estuary, Pra River Estuary and Kakum River estuary at Iture.

The species of mangrove found along the Ghana coast are the red mangroves, *Rhizophora racemosa, Rhizophora mangle* and *Rhizophora harrisonii;* the white mangroves *Avicennia germinans* and *Laguncularia racemosa* as well as the closely associated mangrove fern *Acrostichum aurerum*; and mangrove shrub *Conocarpus erectus* (Ajonina et al., 2014). The mangrove areas of Ghana form highly productive coastal ecosystems that provide ecological services to marine and brackishwater fauna and flora; bivalves, gastropods, crustaceans, invertebrates, birds, and fish. These species are often harvested as food and traded for income for coastal households.

Shellfisheries

Generally, the shellfisheries of Ghana are not well documented in isolation. There are only a couple of reference materials that detail, to some extent, aspects of research/information on specific shellfish species. Shellfish harvested and traded in coastal communities of Ghana include bivalve mollusks, crustaceans, and other gastropods. Whereas the fishing of shrimp is largely done by shrimpers with some untargeted harvests from coastal intertidal ecosystems such as lagoons and estuaries, the fishing of bivalves is often a coordinated activity among community groups and families.

In recent years, in three coastal communities, namely Elmina and Ekumfi Narkwa in the Central Region and Tsokome in the Greater Accra Region, exploitation of oysters has been reported on a small scale. In addition to the three, due to the presence of oysters both on the roots of mangrove vegetation surrounding the borders and a few on the sandy-mud bottom of the estuary, the Whin Estuary was noted to have an appreciable oyster harvesting activity. In shallow coastal intertidal areas especially during low tides, women and children are the majority of those typically involved in collecting oysters from either mangrove roots or oyster beds.

Harvesting is typically conducted at low tides by handpicking when the oysters and/or other shellfish are uncovered. Improvised foot safety gear, normally old clothing, e.g. trouser legs, are attached to the feet for protection at high water levels during underwater harvesting. At present, oyster harvesting in Ghana is laborious and exploitation remains unsustainable, as a specific legislative framework on the use rights is not fully in place, making shellfisheries free and

uncontrolled. However, of note is that the oyster fishery at the Densu Delta is currently regulated by a community-based management plan by the Fisheries Commission of the Ministry of Fisheries and Aquaculture Development of Ghana, developed with the assistance from the Development Action Association (DAA), an association of women fish processors, traders and farmers.

An association of oyster pickers, the Densu Oyster Pickers Association (DOPA), has been formed and officially registered and the management plan grants them use rights to the oyster fishery. A closed oyster fishing season is observed for a total of six months every year from November to April and July-August. The plan, although yet to be signed by the Minister of Fisheries, is being implemented by the Association and respected by formal and traditional local authorities. There have been oyster aquaculture experimental trials conducted in the estuary by UCC. Household Hunger is low as well as dietary diversity for the communities around the Delta. Preliminary results of a study by URI and Univ. of Ghana shows high levels of anemia among shellfishers.

There is an active and very large clam fishery in the Volta River estuary. Harvesting of *Galatea paradoxa* is conducted mainly by men and processing and sale of shucked clams conducted by women. Approximately 2000 people are employed in the fishery and approximately 7700 MT harvested annually (Adjei-Boateng et al., 2012).

Governance

Oyster Fishery Co-Management Plan for the Densu Delta

Fisheries Act 2019

Health

Ghana has an average life expectancy of 64.1 years, which is tied with Liberia for the second highest for the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is low for the region (equivalent to 20,500 years of healthy life lost per 100,000 persons). The incidence of malaria is 266.4 cases/1000 persons) which is average for the region. The maternal mortality ratio is 319 maternal deaths/100,000 live births which is in the second lowest in the region.

Anemia prevalence among women of reproductive age is 46.4%, which is average for the region. Prevalence of undernourishment is 5.5% among the general population, which is the lowest for the region. The Global Hunger Index score for Ghana is 15.2, which is also the lowest in the region and represents a moderate hunger concern according to the index. Approximately 21.6% of the population is estimated to have a zinc deficiency, which is in the low range for the region.

Among children < 5 y of age, 18.8% are stunted, 11% are underweight, and 4.7% are wasted. Ghana has the lowest prevalence of underweight among the 11 Coastal West Africa countries. The prevalence of exclusive breastfeeding in children < 6 months of age in Ghana is 52.3%.	
Stakeholders	
Institution	Role
Resources Users	
Densu Oyster Pickers Association	Women's association of oyster pickers from communities near the Densu Estuary
NGOs	
Development Action Association (DAA)	An association of rural women farmers that works to reduce poverty by empowering group members to be self-reliant and to participate fully in their own development.
Hen Mpoano	NGO looking at coastal issues
Friends of the Nation	Environmental NGO
Blue Resources Research and Policy (BlueRRP) Institute	NGO dealing with research into accountable stewardship of under water resources
Government	
Forestry Commission, Ghana, Wildlife Division	To ensure conservation, sustainable management, and development of Ghana's wildlife resources for socio-economic benefit to all segments of society. To conserve wildlife in Ghana in general and manage wildlife protected areas in particular within representative ecological zones of the country.
Fisheries Commission	Fisheries regulator in Ghana
Ministry of Fisheries and Aquaculture development (MOFAD)	Governing body of Ghana's fisheries and aquaculture sector

Academic/Research	
Department of Fisheries and Aquatic Sciences, University of Cape Coast	Teaching and research into the fisheries and aquaculture of shellfish (oysters and cockles research)
Department of Fisheries and Watershed Management, Kwame Nkrumah University of Science and Technology	Teaching and research into the fisheries and aquaculture of shellfish (clams research)
Centre for Coastal Management, University of Cape Coast (CCM)	Community engagement on supplementary livelihoods including oyster farming

Projects			
Project	Objective	Timeframe/Budget	Funder/Implementer
USAID Sustainable Fisheries Management Project	To improve/rebuild small pelagic stocks	Ongoing	USAID University of Rhode Island
USAID/UCC Fisheries and Coastal Management Capacity Building Support Project	To improve institutional capacity and train young scientists in fisheries, aquaculture, oceanography, and coastal management	US$ 5.5 million 2015-2019	USAID US$ 5.5 million Implemented by: University of Cape Coast

Priority Gaps

1. Presence of women shellfishers
2. Estimated estuarine/freshwater area for shellfisheries
3. No. of women shellfishers in mangrove zones
4. No. of coastal systems with mangrove-based shellfishing
5. National shellfish production by weight and value (for coastal estuarine and mangrove shellfishing areas)

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Togo

Basic Contextual Information	
Country	Togo
Total land area	56,785 km^2
Population	7.889 million (2018)
Percentage population living in/near the coast	21%
Gross Domestic Product (GDP)	5.592 billion USD (2019)
Human Development Index Rank	0.513 (167 out of 189)
Length of coastline	56 km
Fish consumption (as a percent of animal protein)	40%
Anemia prevalence	70.9% with 2.6% of severe anemia among these children 48.9% among women of reproductive age (15-49)
Estimated mangrove cover	1000 ha
Estimated estuarine/freshwater area for shellfisheries	-
Presence of women shellfishers	-
No. of women shellfishers in mangrove zones	-
No. of coastal systems with mangrove-based shellfishing	-
Shellfish management regulations	-
Mangrove management regulations	1. Forestry code (2008) 2. National Forest 3. Action Plan (PAFN, 2011) 4. National REDD + Strategy (2010)

	5. National Program of Reforestation of Togo (PNR, 2017-2030) 6. National Biodiversity Strategy and Action Plan (NBSAP) 2014 7. National strategy for the conservation, restoration, and sustainable management of mangroves (2007) 8. National Action Plan for the Sustainable Management 9. of Marine and Coastal Ecosystems (2014)
Mangrove-Shellfish systems with protection status	215.23 ha

Mangroves

The banks of channels such Gbaga, Rhinzi, etc. and the mouth of the river Mono, are the habitats of mangrove ecosystems in Togo (Akpagana et al., 1993). These ecosystems are poor in terms of floristic diversity and are reportedly reduced to two species of mangroves which include the *Rhizophora racemosa* and *Avicennia africana*. However, Folega et al. (2017) have identified about other twenty-one species which are poorly represented. The total mangrove area is estimated to be about 112.53 ha and mostly found in the prefectures of Lacs (95%) and Vo (5%) (see Kudzo, Hodabalo and Oyétoundé, 2020).

The height of the trees rarely exceeds 10 m reaching at maximum 20 m. The authors reported high degradation of identified mangrove ecosystems (Kudzo et al., 2020). There are several incidences of threats to the mangrove forests. Anthropogenic stressors include wood extraction, fishing, aquaculture, salt production and industrialization (e.g. construction of Lomé Container Terminal) (Emily et al., 2007). The impacts recorded include pollution (e.g. phosphate mud fluxes), uncontrolled water releases from Nangbéto dams (Saenger & Bellan, 1995; Folega et al., 2017; WACA, 2017; Kudzo, Hodabalo and Oyétoundé, 2020).

An eight-year record shows that Togo's mangroves systems have declined by 40% during the year period 1999-2012, from about 1000 ha to 550 ha. Mangrove forests have some level of protection as enshrined in the Forestry Code (2008) whose provisions enshrine the notion of private forest estates. Mangroves have a legal protection status. For instance, lake Togo which traverses the entire coast of Togo is legally protected but there is weak enforcement of the law. In the case of Adame, the community employs co-management to protect the mangrove ecosystem.

Shellfisheries

Women are reported to have been introduced to a novel approach to fishing in Lake Togo in which about 1,750 of them from 230 villages have mastered the art of using ropes and bait to fish

in mangroves instead of nets. The approach is proven to be a sustainably one as it allows women fish while protecting the mangroves from being harvested. It is also touted to have improved the nutrition of children through the inclusion of fish in their diet. Nonetheless, there is no clear indication of the shellfish component of this initiative.
https://womengenderclimate.org/gjc_solutions/women-introduce-new-climate-adapted-fishing-technique-on-lake-togo-and-gain-foot-in-a-male-dominated-sector/

There is inadequate information on the locations of thriving shellfish populations and women's involvement in the shellfishing activity, thus, very limited information on governance and management instruments in place at such locations.

Governance
No published management plan/document was encountered during the review

Health
Togo has an average life expectancy of 61.0 years, which is average for the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is average for the region (equivalent to 24,041 years of healthy life lost per 100,000 persons). The incidence of malaria is 345.1 cases/1000 persons) which is in the high range for the region. The maternal mortality ratio is 368 maternal deaths/100,000 live births which is in the low range for the region. Anemia prevalence among women of reproductive age is 48.9%, which is average for the region. Prevalence of undernourishment is 16.1% among the general population, which is average for the region. The Global Hunger Index score for Togo is 24.3, which is average for the region and represents a serious hunger concern according to the index. Approximately 25.8% of the population is estimated to have a zinc deficiency, which is average for the region. Among children < 6 y of age, 27.5% are stunted, 16% are underweight, and 6.5% are wasted. The prevalence of exclusive breastfeeding in Togo is 57.5%, which is the highest among the 11 coastal West Africa countries.

Stakeholders	
Institution	Role
Resource Users	
Government	

Academic/Research	
Department of Zoology and Animal Biology, University of Lomé	Training and research in fisheries related issues
Centre de Gestion Intégrée du Littoral et de l'Environnement (CGILE) / Centre of Integrated Management of the Littoral and the Environment -	Focal center in Togo involved in coastal management as well as run degree programs.
Private/NGOs/CSOs	
Les amis de la terre / Friends of the Earth	NGO into advocacy on climate change, desertification, gender, Genetically Modified Organisms (GMO), ozone, International Financial Institutions (IFIs), forestry, mining, and sustainable societies. FoE Togo is a volunteer association, and holds international work camps each summer to construct schools and plant trees, among other activities. The group recently opened their center for Documentation and Information on the Environment and Sustainable Development, part of their environmental education work
Togolese Society for Nature Conservation (AGBO-ZEGUE NGO)	NGO specialized in monitoring populations of endangered marine and coastal species in Togo and West Africa

Projects (Mangrove and Shellfish)			
Project	Timeframe and Budget	Description/Objective	Funder/Implementer
Activités Génératrices de Revenus (AGR) / Income-Generating Activities	2019-2024	Plant along 6km of Lake Togo mangroves to reinforce fishery production and mitigate the erosion of the banks of the lake. The project seeks to also to help fishmongers, fishermen, fish sellers and increase their income.	FAO and Government of Togo Implemented by: ction d'Aide Humanitaire pour le Développement (AHD) / NGO Humanitarian Aid Action for the Development

		Covers: Anyrokope, Togoville, N'lessi (3 ha of mangroves in total).	
XOF6 billion project	2019 - 2023	The International Union for the Conservation of Nature (IUCN) and Wetlands International will work together to reinforce mangrove ecosystems	European Union Implemented by: International Union for the Conservation of Nature (IUCN) and Wetlands International
PGICT/BM (Projet de Gestion Intégrée des Catastrophes et des Terres) / Project of Integrated Management of Catastrophes and Lands	2015-2017 US$ 13,746	Support to local communities for mangrove restoration along the Gbaga channel in the villages of Klouvidonou, Agokpamé and Zébé:	World Bank Implemented by: ONG Action d'Aide Humanitaire pour le Développement (AHD)/ NGO Humanitarian Aid Action for the Development
Expertise Universitaire Mangrove / University Expertise Mangrove		Contribute to the management and the sustainable enhancement of mangroves by and for the population	Région Wallonne Implemented by: ULB COOPERATION
Mangrove relocation	2015 to unknown US$ 45,000	Destruction of 6.3 ha of forage and mangrove in Sarakawa and relocation of 12.6 ha of mangrove and monitoring of activities for 5 years.	LCT (Lomé Container Terminal)
Mangrove Restoration at Aného-Landjo		Restoration of 40 ha at Aného-Landjo	PGICT AVOTEDE

			(Association des volontaires togolais et togolaises pour le développement) / (Association of Togolese Volunteers for the Development)
Mangrove Restoration		Restoration of 415 ha mangroves and associated formations	AVOTODE and CAPSUDEST TOGO
Sustainable management of mangroves	US$ 900,000	Reducing pollution and the impacts of inundation, protecting natural resources, and creation of new income generating activities through reforestation and raising awareness.	World Bank Implemented by: NGO ANCE (Alliance Nationale des Consommateurs et de l'Environemnet) / National Alliance of Consumers and the Environment.

Priority Gaps

There is inadequate information on the locations of thriving shellfish populations and women's involvement in the shellfishing activity, thus, very limited information on governance and management instruments in place at such locations.

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Benin

Basic Contextual Information	
Country	Benin
Total land area	114,763 km^2
Population	11.49 million (2018)
Percentage population living in/near the coast	17%
Gross Domestic Product (GDP)	10.35 billion USD (2018)
Human Development Index Rank	0.520 (163 out of 189)
Length of coastline	121 km
Fish consumption (as a percent of animal protein)	38 %
Anemia prevalence	62% for children under 5 56% among pregnant women 46.9% among women of reproductive age (15-49)
Estimated mangrove cover	9,452,52 ha
Estimated estuarine/freshwater area for shellfisheries	
Presence of women shellfishers	Present
No. of women shellfishers in mangrove zones	2000+
No. of coastal systems with mangrove-based shellfishing	-
Shellfish management regulations	-
Mangrove management regulations	-
Mangrove-Shellfish systems with protection status	Entire coast of Benin is designated as a Ramsar Site. This includes 9,452,52 ha of mangroves and associated ecosystems

Mangroves
Along the Ahémé, Nokoué, Lagune cotiere du Benin and Porto-Novo lagoons in southern Benin, mangroves and associated oyster farms are found. Lagune cotiere du Benin alone occupies about 12,000 km2, equivalent to 10.5 percent of Benin's total land area (Teka et al., 2017). Species described include *Avicennia germinans* and *Rhizophora racemosa*. Recognized for their importance, mangrove habitats are properly classified under Ramsar sites 1017 and 1018. However, there are records of mangrove destruction, leading to the loss of more than 31% (Midinoudewa, E. pers. comm. November 2020) of the mangrove cover (Satoyama Initiative, 2020) which constitutes 4312.46 hectares. This is mainly due to the fact that while mangroves and associated wetlands are delineated as Ramsar sites, there is no formal and/or legal protection status for mangroves in Benin. There is an annual deforestation rate of 1.9%. Due to fuel cutting and roof building, assembly of Akaja/fish traps, and to make more room for fishermen to throw their nets, mangroves are seriously deteriorated. Community members are of the notion that mangroves attract mosquitoes, hence, they cut them in order to reduce the threat of malaria. In recent times, however, there appears to be, minimally, a form of community stewardship towards mangrove ecosystems. Community leaders have reintroduced traditional rules, regulated uncontrolled settlements, promoted the planting of mangrove trees and of alternative fuelwood (Teka et al., 2017). The whole Benin coast has been designated as a Ramsar site. Basse Vallée de l'Ouémé, Lagune de Porto-Novo, Lac Nokoué, for example (Ramsar Site no. 1018), has been expanded to cover 652,760 ha from its original area of 91,600 ha (https://www.ramsar.org/news/benin-extends-two-ramsar-sites-to-cover-entire-coastal-area). Likewise, from the original area of 47,500 hectares designated in 2001, the Basse Vallée du Couffo, Lagune Côtiere, Chenal Aho, Lac Ahémé (Ramsar Site no. 1017) was expanded to cover more than 524,000 ha, including the valleys of the rivers Couffo, Mono and Sazué. The municipalities of Ouidah and Grand Popo are home to much of the coastal mangroves of the Mono River delta, which fall within the scope of the RAMSAR sites. A significant number of coastal villages compose these districts, whose operations basically include the extraction of natural mangrove resources. Salt development is the primary, and often the only, source of income for the local population in the lakeside villages of Ouidah, putting immense pressure on the mangroves. As a result, many areas have been completely deforested around these villages. Law No. 2017-15 amending and supplementing Law No. 2013-01 of 14 August 2013 on the Land and State Land Code in the Republic of Benin regulates access to land in all private State domains. The management of natural resources was transferred to the communities with the advent of decentralization (Article 82 of Law No. 97-028 of 15 January 1999 on the Organisation of the Territorial Administration of the Republic of Benin). With specific regard to mangrove areas, Law No. 97-028 authorizes communities to define a master plan for the development of the commune. It is under this plan that the communities provide for the zones that are the subject of mangrove

reserve and restoration. Under the customary regime, the land belongs to the first occupants who pass it on as an inheritance. Therefore, access to the land to be restored first requires an agreement with the various communities identified. In a second step, the local communities are involved in the participatory delimitation of the restoration areas granted by the town hall and give their agreement for the restoration.

In villages, mangroves play an important role in people's livelihoods. Therefore, they are in favor of all initiatives that allow for the sustainable conservation of these ecosystems. In 2016, the cutting of mangroves was banned by the government of Benin (https://bit.ly/2n7O18P), thus reinforcing conservation measures for these ecosystems. Furthermore, since the 2000s, there has been strong community mobilization in mangrove restoration and preservation projects, which has resulted in a significant increase in these ecosystems between 2005 and 2015 in certain municipalities such as Abomey-Calavi and Grand-Popo. However, in the other communes, restoration initiatives are in their infancy and the lessons learned in the two previous communities are being used to foster a positive attitude among the populations.

Shellfisheries

In addition to the significant oyster collection on the coast of Benin, women have been practicing traditional oyster farming for many years and generate sustainable income for the activity. Oysters have become a resource of high commercial value, mainly used as a valuable food source for the indigenes of coastal communities. Alphonse et al. (2018) documented a vibrant shellfishery industry in Benin where about 2,000 women from 25 coastal villages engage in oyster farming which yield an average of 30 kg/m2 annually. A traditional oyster fishing system is practiced where communities, for instance in Degoué, agree to 12-month growth cycle to enable them to harvest the largest oysters. During off seasons, alternative livelihoods such as selling fish and salt production are exploited in lean oyster seasons. Women are more directly involved in oyster culture in Benin compared to men.

There is also the harvesting of freshwater oyster as an important source of protein and income in the Pendjari River located in the Northern part of Benin and bordering with Burkina Faso. The river crosses the Pendjari Biosphere Reserve, a protected area in Northern Benin. Oyster harvesting is the main traditional activity of Berba women in the dry season, at low water level period. The oyster collectors used artisanal tools such as chisel-like metal, stone-hammer, rope, metal pan and pot. (Akele et al., 2015)

The challenge with the shellfishery focuses on influx of freshwater which affects the salinity. Another issue is lack of safety equipment for the collection of the shellfish.

In conclusion, the coastal zone of Benin has a vibrant oyster shellfishery largely engaged in by women. There is no documented evidence of a formal governance system practiced in sites of oyster culture. The next phase of the regional assessment will focus on documenting the acreage of the mangrove systems which are associated with thriving oyster farms. Another gap in the

foregoing analyses highlights the interplay of activities of men and other livelihood activities in existing mangrove systems and associated oyster farms. This relationship will have to be further examined.

Governance

Health
Benin has an average life expectancy of 61.8 years, which is average for the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is average for the region (24,311 years of healthy life lost per 100,000 persons). The incidence of malaria is 293.7 cases/1000 persons) which is average for the region. The maternal mortality ratio is 405 maternal deaths/100,000 live births which is moderately lower than average for the region. Anemia prevalence among women of reproductive age is 46.9%, which is average for the region. Prevalence of undernourishment is 10.1% among the general population, which is the second lowest for the region. The Global Hunger Index score for Benin is 24.3, which is average for the region and represents a serious hunger concern according to the index. Approximately 17.9% of the population is estimated to have a zinc deficiency, which is the lowest for the region. Among children < 5 y of age, 32.2% are stunted, 16.6% are underweight, and 4.9% are wasted. The prevalence of exclusive breastfeeding in children < 6 months of age is 41.5%.

Stakeholders	
Institution	Role
Resource Users	
Government	
Benin Department of Fisheries	A state institution with oversight responsibility in the fisheries industry
Beninese Ministry of the Living Environment and Sustainable Development	Its mission is to develop and ensure the implementation and monitoring and evaluation of policies and strategies of the environmental state of climate change management, reforestation, protection of natural resources and forestry, conservation of urban ecosystems, protection of riverbanks and coastlines, sanitation

Academic/Research	
University of Abomey Calavi	A State Institution responsible to the Ministry of Higher Education and Scientific Research.
Institut de Recherches Halieutiques et Océanologiques du Bénin (IRHOB)	The IRHOB's objective is to contribute to the management of living and non-living aquatic resources, based on the integration of scientific, economic and sociological opinions.
Private/NGOs/CSOs	
Interim Board for Promotion of Sustainable Oyster Production by Women	The interim Board seeks to promote the work on sustainable livelihoods of women's oyster communities through sustainable oyster production as part of collaborative efforts to establish a national association to work on oysters
EcoBenin	The activities of the NGO aim to develop simple tourist services which benefit above all the host communities and which participate in the protection of their natural resources and their cultural identities. To do this, the NGO Eco-Bénin is committed to developing and enhancing natural resources. With around ten development projects established since its creation in 1999, Eco-Bénin has set up a Carbon Action plan whose objectives are the planting of mangroves in Ramsar site 1017 and the promotion of improved stoves around national parks.

Projects			
Project	Timeline and Budget	Description/Objective	Funder/Implementer
Conservation and sustainable management of mangrove forests in Benin trough local capacity building and	US$ 75,920	This project aims to contribute to restoration and sustainable management of mangrove forests in Benin for improvement of livelihood and reduction of the vulnerability of ecosystems and the population to harmful effects of climate change.	Secretariat of the International Partnership for the Satoyama Initiative Implemented by:

community development		The project will be implemented in the main mangroves of Benin. The main beneficiaries of the project are women, youth and other social and community users of mangroves such as small farmers and fishers.	NGO Circle for Conservation of Natural Resources
Board of Directors of the West African Development Bank (BOAD) XOF6 Billion Project	2019 - 2023	The International Union for the Conservation of Nature (IUCN) and Wetlands International will work together to reinforce mangrove ecosystems	European Union Implemented by: International Union for the Conservation of Nature (IUCN) and Wetlands International
Restoration, conservation and sustainable management of mangroves in Benin in the face of climate change	2017 - 2021	The project involves managing hydrological dynamics using hydrodynamic models and chemical analyses of water quality, and then reinstating vegetation cover using propagules of the Rhizophora, Laguncularia and Avicennia species. Covers 30 hectares in Benin	Implemented by: Initiative Mangroves du Fonds Francais pour l'Environment Mondial
Mangrove plantation and environmental education in Benin		This project seeks to contribute to a mangrove reforestation program in Ahémé Lake and Avloh in Benin and environmental education. This program is led by a local NGO and integrates the local population so as to enable them to develop sustainable economic activity.	local NGO

The GIZMaC (Integrated Marine and Coastal Zone Management) project in Benin	September 2018 to September 2020	Improving the governance framework of the marine and coastal zone through Marine Spatial Planning (MSP); assessing the state of the marine and coastal environment in Benin, through State of the Marine Environment (SoME) reporting; identifying two Environmentally and Biologically Significant Marine Areas (EBSAs); and enhancing project governance, capacity building, and communication.	German Ministry for the Environment, Nature Conservation and Nuclear Safety's International Climate Initiative (IKI), Implemented by: Ministry of the Environment and Sustainable Development (MCVDD)
Adaptation of the Cotonou Lagoon ecosystems and human systems to the sea level rise and extreme weather phenomena impacts.	US$ 8,788,000	The general objective of this project is to contribute to the execution of the Benin National Action Programme of Adaptation to climate changes through its coastal component (PANA - Benin) developed in 2007	Adaptation fund Implemented by: National Environment Facility (FNE)

Priority Gaps

1. There is no documented evidence of a formal governance system practiced in sites of oyster culture. The next phase of the regional assessment will focus on documenting the acreage of the mangrove systems which are associated with thriving oyster farms.
2. Another gap in the foregoing analyses highlights the interplay of activities of men and other livelihood activities in existing mangrove systems and associated oyster farms. This relationship will have to be further examined.
3. National shellfish production by weight and value (for coastal estuarine and mangrove shellfishing areas)

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Nigeria

Basic Contextual Information	
Country	Nigeria
Total land area	923,768 km^2
Population	195.9 million (2018)
Percentage population living in/near the coast	-
Gross Domestic Product (GDP)	448.2 billion USD
Human Development Index Rank	0.534 (158out of 189)
Length of coastline	853 km
Fish consumption (as a percent of animal protein)	40%
Anemia prevalence	49.8% among women of reproductive age (15 - 49) as of 2016
Estimated mangrove cover	801, 774 (Niger Delta only)
Estimated estuarine/freshwater area for shellfisheries	-
Presence of women shellfishers	Present
No. of women shellfishers in mangrove zones	-
No. of coastal systems with mangrove-based shellfishing	-
Shellfish management regulations	-
Mangrove management regulations	-
Mangrove-Shellfish systems with protection status	-
Mangroves	
The Nigerian coastline is made up of complex coastal ecosystems ranging from lagoons systems in the west to an extensive mangrove swamp, and a delta to the east. Four major coastal ecosystems	

dominate namely, the Barrier Lagoon Coast between Badagry and Ajumo east of Lekki, the Mahin mud coast lying between Ajumo and Benin river estuary in the north western flank of the Niger Delta and The Niger Delta lying between Benin River in the west and Imo River in the east and the strand coastline lying between Imo River and the Nigerian/Cameroon border in the east with the Cross River inclusive (Awosika 1991).

Mangrove forests of Nigeria are the largest in Africa, ranking third in the world with 504,800 hectares in the Niger Delta and 95,000 hectares in Cross River State (UNIDO, 2007).

The Barrier Lagoon Coast complex is made up of the Lagos, Lekki and Yelwa lagoons. The most dominant vegetation in this area is palms, coconut trees, herbs and climbers. The Mahin mud coast stretches to about 20km inland dominated by mangroves particularly the red mangrove *Rhizophora racemosa* and the white mangrove *Avicennia spp.* Grasses and climbers are also present in this area (Awosika & Folorunsho, 2005)

The Niger Delta system is the second largest in the world spanning a distance of 500km covering almost two-thirds of Nigeria's coastline. The Niger Delta is made up of rivers Benin, Escravos, Forcados, Ramos, Dodo, Middleton, Fish town, Nun, Brass, San Batholomeo, Bonny and Opobo. A majority of the country's mangrove forests are found in this area particularly between the Benin and Cross-rivers and are dominated by *Rhizophora racemosa.* However other species include *R. harrisonii, R. mangle* and the white mangrove *Avicennia nitidae are also present.* Most shellfish resources in Nigeria are found within this region including sand crab, (*Ocypoda Africana*), ghost crab (*Ocypoda cursor*), barnacles, oysters and periwinkles (Amosu A. O, 2012; Jimoh & Lemomu, 2010)

The Strand coast constitutes about 85km of the Nigerian coastline with species of mangrove similar to the Niger (Awosika & Folorunsho, 2005)

Mangrove forests in Nigeria have been degraded over the years and continue to face some threats including destruction due to oil exploitation and mining, urbanization, commercial shrimp farming, tourism. Oil and gas exploration activities are one of the main causes of the destruction of mangroves in the Niger Delta since it began in 1956 (Numbere, 2018). Degradation also results from overexploitation of the mangroves for fuelwood, charcoal production and building materials.

Ramsar Sites:

Apoi Creek Forests. 30/04/08; Bayelsa; 29,213 ha;05°47'N 004°42'E. Forest Reserve located in the Central Niger Delta is the only Ramsar site close to the coastal areas in Nigeria (https://rsis.ramsar.org/ris/1751)

Shellfisheries

According to Ajana (1980), oysters (*Crassostrea gasar*) occurs throughout the year in the Niger Delta of the River state and also in the coastal saline swamps of Bendel, Cross River and Rivers State. It is an important fishery resource in the Rivers state. *C. gasar* can also be found in Lagos State along the Badagry Creek (Sandison and Hill, 1966). Again, it can be found during the dry

season (between November and Mid-May) along the harbor, Apapa and Iddo areas and Kuramo waters throughout the year.

The mangrove oyster *Crassostrea gasar* is harvested in the coastal swamps in Nigeria. The local consumption of oysters is restricted to the coastal areas with very little known about it in other Northern parts of the country. The more popular bivalves in Nigeria include the estuarine ark clams (*Senila senilis* and *Anadara senegalensis*), cockles (*Cardium costatum*), donacid clams. Other species found in Nigerian estuaries include univalves such as *Pachymelina quadriserata*, *Tympanotamus fuscatus* (periwinkle), which lie in or on the sediment of the mangrove swamp submerged and exposed at low tides (Jimoh & Lemomu, 2010).

Governance

Fisheries in Nigeria is governed by a Sea Fisheries Act of (1992 No. 71) and an Inland Fisheries Act of (1992 No. 108) which provide regulation for licensing of vessels and guidelines for the use of appropriate fishing gears and prohibition of unorthodox fishing methods. Ajana (1980) reported that in some villages a license is necessary to harvest oysters and a catch quota month is imposed during the oyster season. In Kuramo, there is a closed season (February-April) when no oyster fishing is allowed.

Health

Nigeria has an average life expectancy of 54.7 years, which is tied with Sierra Leone for the lowest for the region. The burden of disease related to infections, neonatal/maternal care, and nutritional deficiencies is the second highest for the region (31,191 years of healthy life lost per 100,000 persons). The incidence of malaria is 380.8 cases/1000 persons) which is the highest in the region. The maternal mortality ratio is 814 maternal deaths/100,000 live births which is in the second highest for the region.

Anemia prevalence among women of reproductive age is 49.8%, which is average for the region. Prevalence of undernourishment is 13.4% among the general population, which is average for the region. The Global Hunger Index score for Nigeria 31.1, which is high in the region and represents a serious hunger concern according to the index. Approximately 20.6% of the population is estimated to have a zinc deficiency, which is low for the region.

Among children < 5 y of age, 36.8% are stunted, 21.4% are underweight (which are the highest prevalence among the 11 Coastal West Africa countries) and 6.7% are wasted (defined as low weight-for-height). The prevalence of exclusive breastfeeding in children < 6 months of age is 28.7%.

Stakeholders

Institution	Role

Resource Users	
The Society for Women and Vulnerable Groups (SWOVUGE)	This society is helping communities in five villages of the Ukpom Okom District in South east Nigeria to restore and sustainably manage mangrove forests
Government	
Federal Ministry of Environment	This Ministry works to protect the environment, conserve natural resources and contribute to sustainable development
Federal Ministry of Agriculture and Rural Development	The mandate of this Ministry is to "Ensure food security in crop, livestock and fisheries, stimulate agricultural employment and services, promote the production and supply of raw materials to agro-industries, provide markets for the products of the industrial sector, generate foreign exchange and aid rural socio-economic development"
The Federal Department of Forestry	The Federal Department of Forestry is mandated to "propose policies, to oversee forestry administration nationwide, and to coordinate forestry development" supported by the state forestry departments who execute/implement proposed policies towards protecting, conserving and managing forest resources
Forestry Commission, Cross River State, Calabar	The Commission is responsible for the implementation of Ecosystem Based Adaptation approaches to both mangrove and the Atlantic Ocean coastline in Cross River State, Nigeria through institutional and capacity strengthening, fighting coastal degradation and promoting sustainable livelihoods
Academic/Research	
Nigerian Institute for Oceanography and Marine Research (NIOMR)	A multidisciplinary marine research institute and Nigeria's prime institute for Marine Sciences. The headquarters of the institute is located at the Bar Beach, contiguous with the Atlantic Ocean. Our scientific research activities encompass virtually all aspects concerned with ocean and marine science namely Aquaculture, Biological oceanography, Biotechnology, Fisheries resources, Fish

	technology & Product development, Physical & Chemical oceanography, and Marine geology/geophysics.
Department of Marine Sciences and Technology, The Federal University of Technology Akure	The Department's main objective is to use a multi-disciplinary approach to impart basic and fundamental knowledge of marine science, train students with the capability to explore and exploit the marine environment; and equip the students with result–oriented research capability for industrial, technological and academic development of the country.
Faculty of Oceanography and Department of Forestry and Wildlife Resources Management , University of Calabar	The Faculty of Oceanography trains and conducts research in marine sciences. The Department of Forestry and Wildlife Resources Management conducts research on forest resources
Department of Aquaculture and Fisheries Management, University of Ibadan	The department aims to train graduates to contribute to sustainable exploitation of biodiversity and fisheries resources to guarantee food security and support livelihoods. The areas of training include aquaculture, fisheries management, extension, economics, postharvest management and recreation as well as biodiversity management
Private/NGOs/CSOs	
Fisheries Society of Nigeria (FISON)	Fisheries Society of Nigeria (FISON) is responsible for promoting and coordinating activities in the Fisheries subsector of the Nigerian economy
Bioresources Development and Conservation Programme (BDCP)	BDCP and its affiliates promote high quality scientific research on sustainable utilization of biological resources for health, economic development and conservation of the environment; create knowledge in the application of technology and global commerce for poverty alleviation; and develop partnerships with agencies, communities and governments for sustainable development.
Marine and Coastal Conservation Society of Nigeria	A Nigerian Society dedicated to conservation of the sea, shore and wildlife for both the present and future generation. Aims for cleaner seas.

Integrated Mangrove Watch Association of Nigeria		A Non-Governmental Organization in Cross River State, Nigeria promoting smart/sustainable forest practice in Mangrove dependent communities	
Projects			
Project	Timeframe & Budget	Description/Objective	Funder/Implementer
UN-REDD Programme	Ongoing Since 2010 US$ 800,000	Cross River State, is host to a community-based REDD+ programme that promotes activities for poverty reduction, improvement of crop varieties and yields, gender empowerment, biodiversity, conversation and climate change mitigation.	Funded by Small Grants Program of the Global Environment Fund UN-REDD Programme
Ukpom-Okon Community Mangrove restoration and tree planting project, Nigeria	2016 - 2021	Mangrove restoration within the Ukpom Community Mangrove in Akwa Ibom State including five villages of the Ukpom Okom District in South East Nigeria.	Critical Ecosystem Partnership Fund (CEPF) Implemented by: The Society for Women and Vulnerable Groups (SWOVUGE)
USAID Feed the Future Innovation Lab for Fish, Nourishing Nations, Nigeria	2 years	Research project in Delta State on Women's post-harvest processing and marketing hygiene.	WorldFish is the Implementing partner with Mississippi State University, Univ of Calabar etc.
Priority Gaps			
Coastal estuarine and mangrove areas of shellfish activity No. of women involved in shellfish activity Market potential of shellfish in Nigeria Shellfish/mangrove community groups National shellfish production by weight and value (for coastal estuarine and mangrove shellfishing areas)			

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5. CONCLUSIONS

The information presented in this study represents an initial summary of existing literature in the region based mainly from web searches. It, therefore, is quite preliminary and additional information is likely once the project's in-country focal persons are engaged. They are likely to be aware of and can compile existing literature, especially "grey" non-peer reviewed or published literature that may be available within their country. The information in this report focuses on mangrove and estuarine habitats that support shellfishing activities of women in 11 West African countries. For each country, basic contextual information on population, percentage population living in/near the coast, gross domestic product (GDP), human development index (HDI) rank, length of coastline, fish consumption (as a percent of animal protein), anemia prevalence, estimated mangrove cover, estimated estuarine/freshwater area for shellfisheries, presence of women shellfishers, number of women shellfishers in mangrove zones, number of coastal systems with mangrove-based shellfishing, and shellfish and mangrove management plans/ regulations were considered.

Literature on mangrove ecosystems across the coastal nations of West Africa was more available than that on the shellfishery and shellfishing livelihoods of women within the mangrove ecosystems. It is quite evident in the literature that the nations of West Africa show a general decline in mangrove vegetation. Nonetheless, over the last four decades, some countries including Ghana, Côte d'Ivoire, Liberia and Sierra Leone, seem to have had either no change or an overall increase in the mangrove cover. Numerous reforestation activities, with multi-stream funding in a number of countries in the region, have contributed significantly to the improvement of mangrove cover in Guinea, Gambia and Senegal from 2000 to 2013. Shellfisheries, especially of sessile species in the shallow intertidal areas of coastal ecosystems, which appears to provide critical livelihood and nutritional support for the women and their children in coastal communities are not well documented for many countries along the coast of West Africa. This confirms our initial premise that they represent an "invisible" fishery. With respect to governance of oyster fisheries, there are few examples of "official" regulations controlling harvests. However, there are several cases where traditional management and traditional authorities place restrictions on harvesting which will be an important consideration for any future management interventions.

The literature review also revealed the presence of freshwater oyster fisheries (and freshwater clams/mussels) in rivers and lakes in West Africa and these also seem to be dominated by poor women harvesters (see Benin review and article by Akele et al, 2015). While this project's focus is on estuarine systems, it is important to note that the "invisible" women dominated shellfisheries, and for bivalves in particular, extends well beyond coastal and estuarine areas, contributing to food security of households far from the coast.

The review reveals seven main gap areas described below. The project's regional eleven-country assessment should attempt to fill these gaps. It will provide a better perspective of the regional and

country-specific contribution of women shellfisheries to food security and coastal conservation, especially covering the first three gaps by providing for a fuller characterization of this fishery region-wide. That information will be needed to make convincing arguments for allocating more resources for their management and as part of project outreach. The fifth gap on identifying key institutions and stakeholders provides a baseline and initial list of potential partners for interventions and for project workshops and outreach targets. The last two identified gaps, on the need for legislative frameworks and information on climate risks, point to possible objectives for future interventions, even if they are not directly related to the project's site based research and the model or theory of change being tested. The gap areas are:

1. The types of shellfisheries (by species, mode of fishing or gear type) within estuarine-mangrove ecosystems and the gender and age dynamics of harvesters – total approximated number of women/men by age categories.
2. The identity, description, location, and total area (ha) of the land- and seascapes of mangrove areas where shellfishing by women is of significance to the food and nutrition security of adjacent communities. Significance here is defined by the use of shellfish for food and the extent and composition of shellfish in diets (protein supply) of people in communities adjacent to these habitats.
3. The extent or percent composition of shellfish in diets (protein supply) of people in communities adjacent to these habitats.
4. The contribution of women-led shellfisheries in terms of their economic value and volume of landings relative to national fisheries production.
5. Stakeholder institutions and individuals who are directly and indirectly involved in the management and use of mangrove and shellfish resources – including ministries, fisher associations, NGOs, research and academic institutions, and individuals.
6. Legislative frameworks tailored towards the regulation and sustainable use of shellfish-mangrove interconnected resources.
7. Climate risks to the livelihoods and food security of women who depend on coastal mangroves and estuarine ecosystems. This includes specific climate impacts on mangrove habitat and whether this may exacerbate anthropomorphic drivers of mangrove deforestation and degradation in West Africa, as well as successful examples of mitigation efforts for shellfisheries and mangrove systems.

APPENDIX: Health Data on the 11 Regional Countries

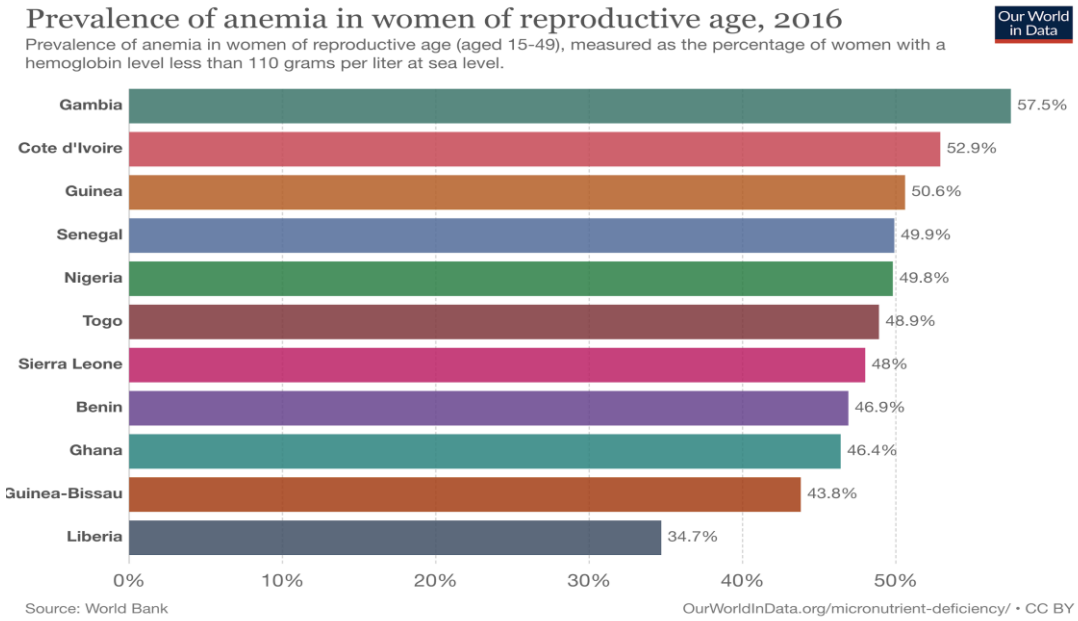

Figure 3: Prevalence of anemia in women of reproductive age, 2016

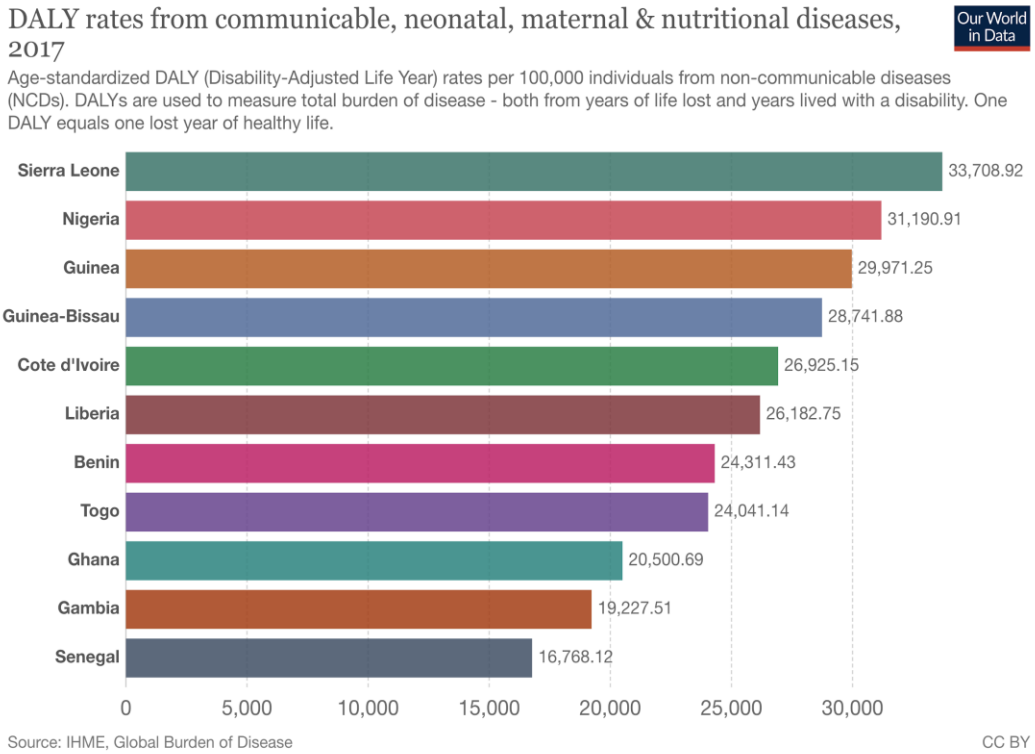

Figure 4: DALY rates from communicable, neonatal, maternal & nutritional diseases

Figure 4:

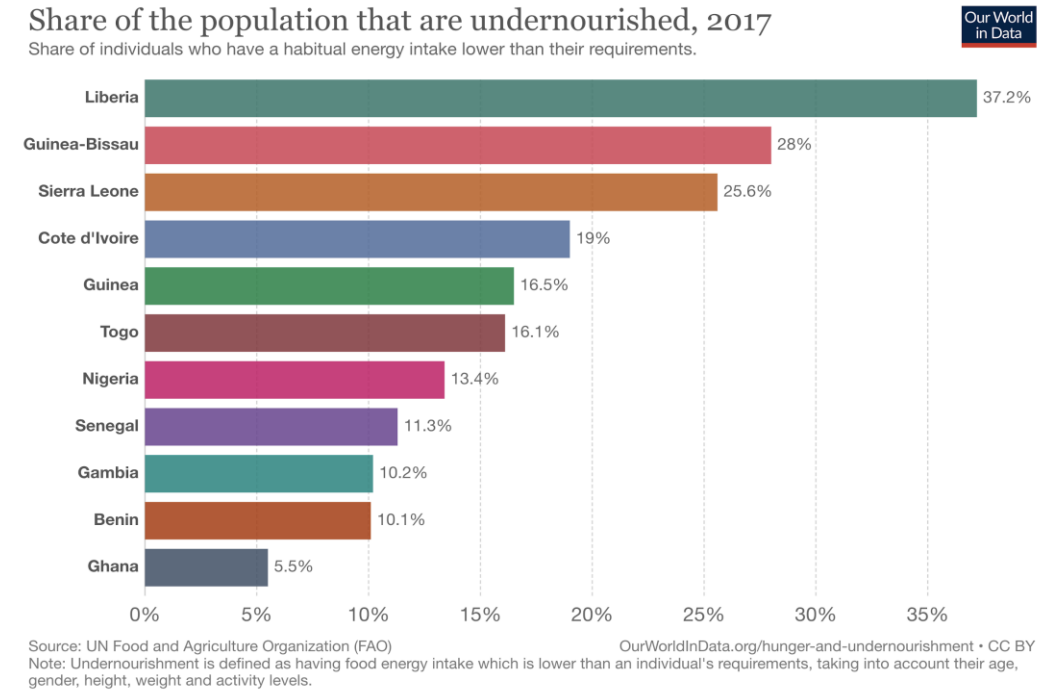

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Figure 5: Share of the population that are undernourished, 2017

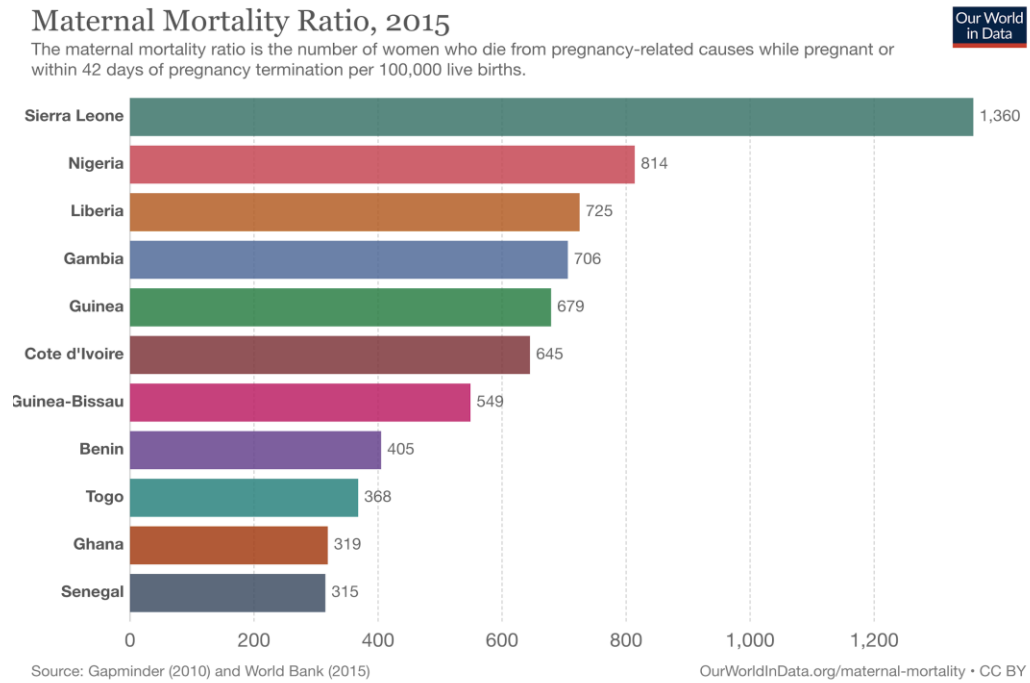

Figure 6: Maternal Mortality Ratio, 2015

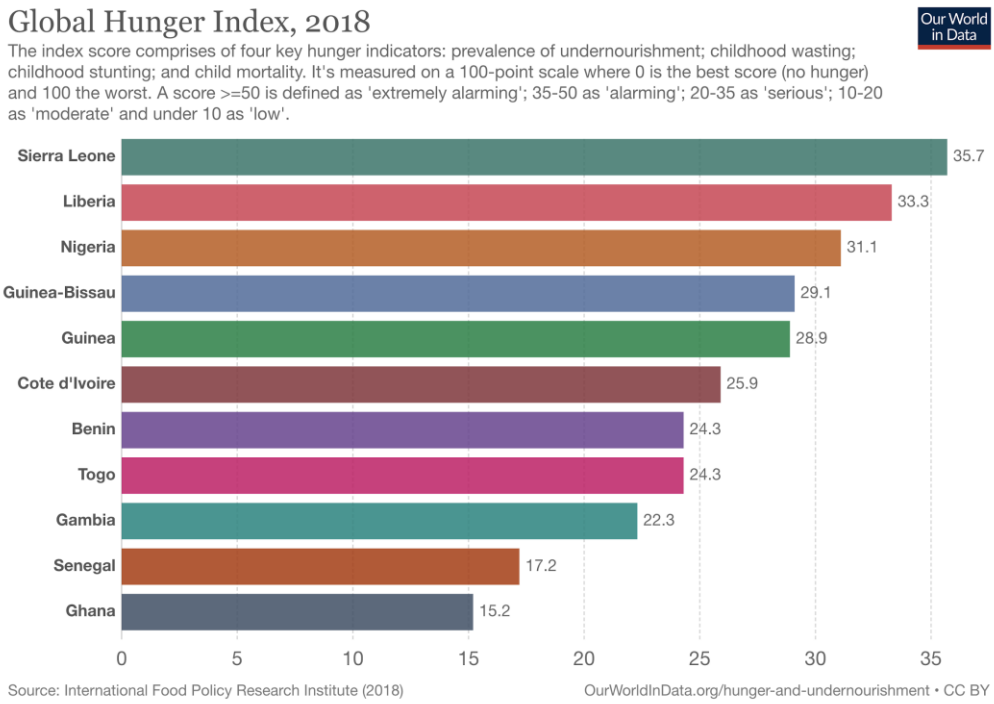

Figure 7: Global Hunger Index, 2018

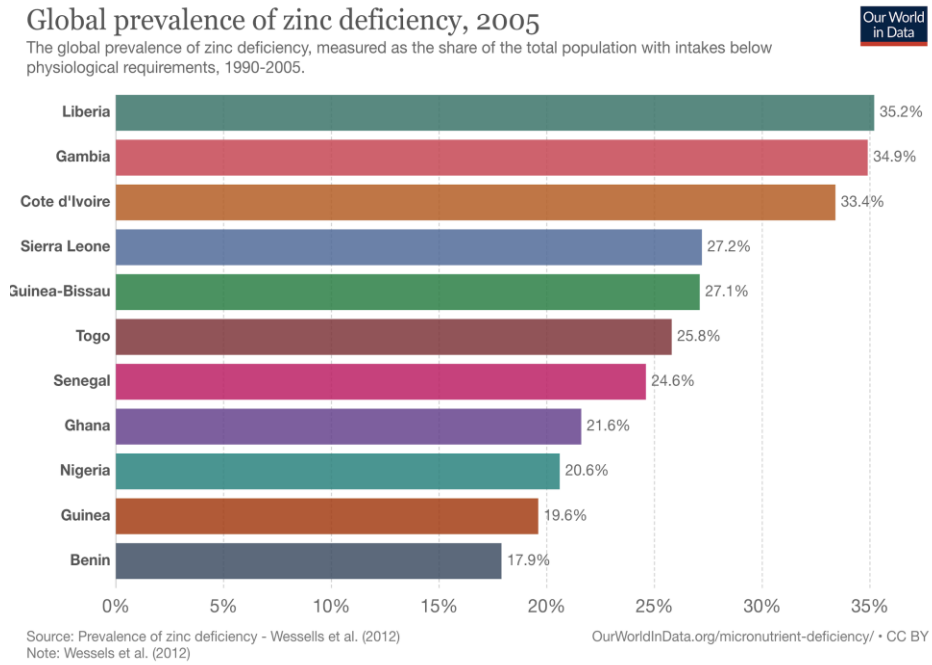

Figure 8: Global prevalence of zinc deficiency, 2005

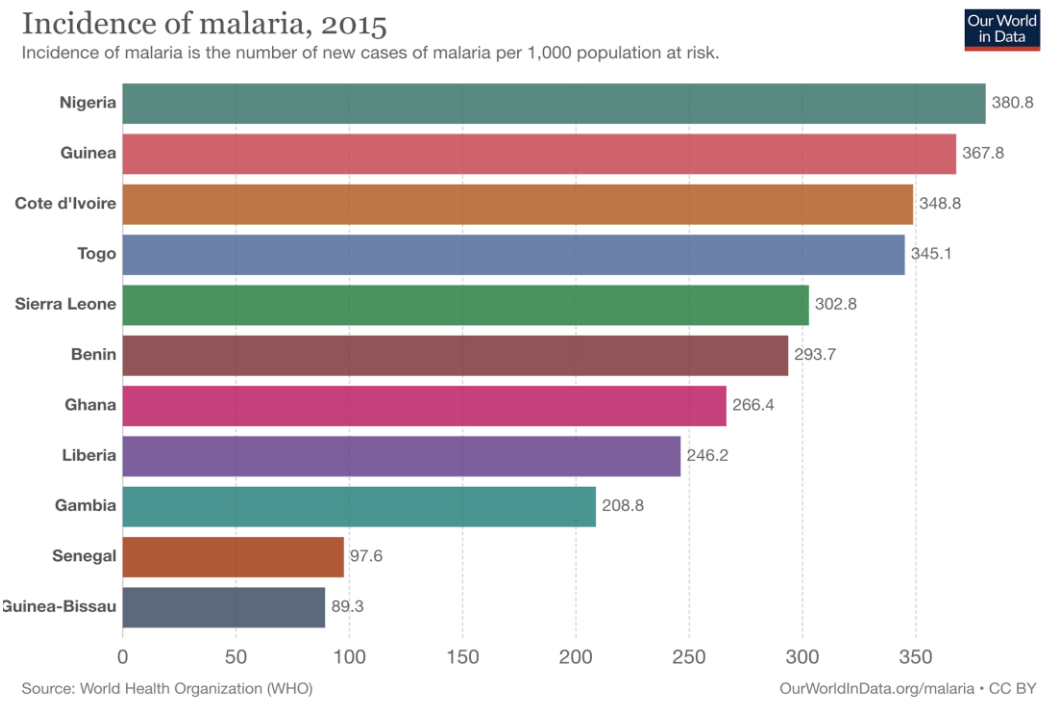

Figure 9: Incidence of malaria, 2015

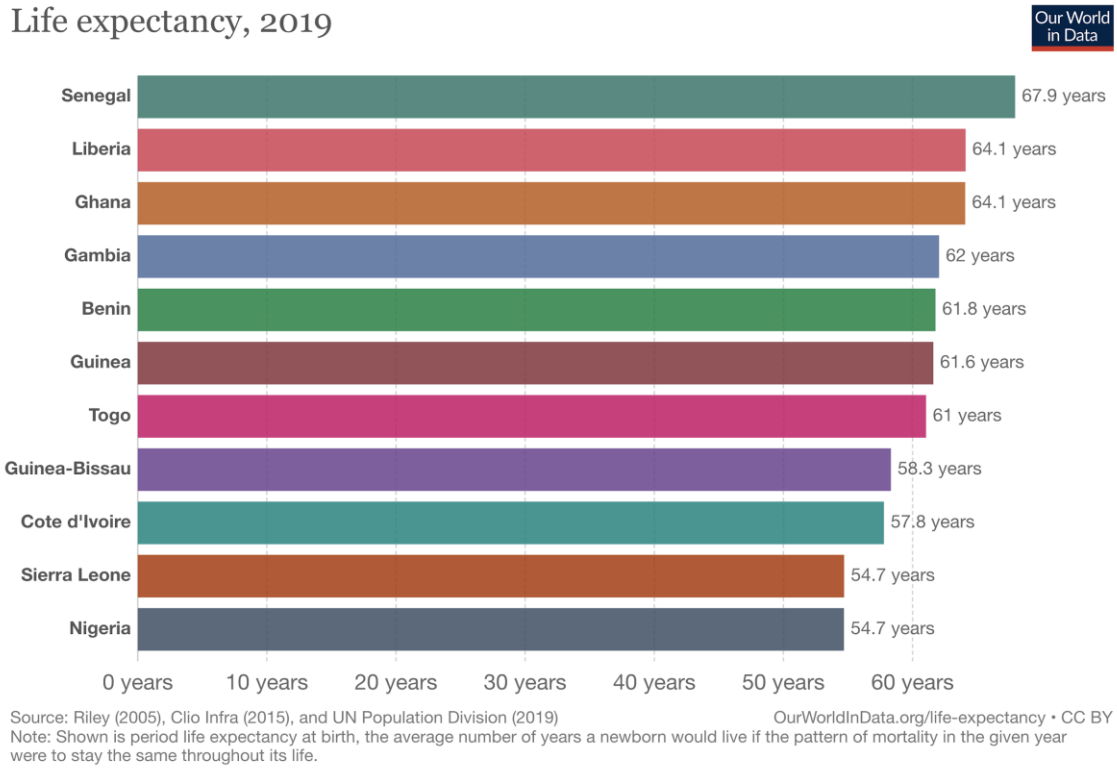

Figure 10: Life expectancy, 2019