USAID
FROM THE AMERICAN PEOPLE

Fishing for Food Security

The Importance of Wild Fisheries for Food Security and Nutrition

APRIL 2016

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Cover photo: Woman drying fish in Bangladesh. Nine out of ten people engaged in secondary activities, such as fish processing, are women. *Credit: Balaram Mahalder; Back cover photo:* A fisherman pulls up his net in Myanmar. Sharing the responsibility for resource management between user groups and the government can empower fishers to use more sustainable practices. *Credit: Balaram Mahalder*

Acronyms

DHS	Demographic and Health Survey
ECOFISH	Ecosystems Improved for Sustainable Fisheries Projects
FAO	Food and Agriculture Organization of the United Nations
FISH	Fisheries Improved for Sustainable Harvest
GDP	Gross Domestic Product
ICFG	Integrated Coastal and Fisheries Governance
MACH	Management of Aquatic Ecosystems through Community Husbandry
NOAA	National Oceanic and Atmospheric Administration
NTFP	Non-Timber Forest Product
PES	Payments for Ecosystem Services
USAID	United States Agency for International Development

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1. Preface

According to both the United Nations Food and Agriculture Organization (FAO) and the U.S. Congress, “agriculture” includes wild foods such as wild caught fish as well as farmed foods. Frequently, however, international dialogues and national action plans on food security overlook the important role that wild caught fish and other wild foods play in food security and nutrition.

Technically, the terms “fishery” and “fisheries” only refer to the production of wild fish, while “aquaculture” applies to farmed or cultured fish. Both fisheries and aquaculture are included within the agriculture sector. Here, we use the phrase “wild fisheries” as a reminder that we are referring to wild caught fish and not farmed fish, although the term is redundant.

This briefing book was produced to highlight the importance of wild caught fish to global and local food security and nutrition, local livelihoods and national revenues, especially in many Feed the Future countries. Enhancing the natural productivity of wild fisheries through improved management is not only possible, but also critical to achieving global and local food security.

II. Overview

- Fish is **one of the most traded food commodities** on the global market.
- Food and Agriculture Organization of the United Nations (FAO) policies highlight the **importance of wild fish to food security.**
- Fish is an **important staple food** in many Feed the Future countries.
- Fish is one of the most **nutritious foods.**
- **Successful management approaches** can sustainably increase wild fish productivity.
- **Women play an important role** in the fisheries value chain.
- Improved fisheries management is critical for **climate change adaptation.**

Credit: Irwandi/AFN

"People have never consumed so much fish or depended so greatly on the sector for their well-being as they do today"

– FAO, The State of World Fisheries and Aquaculture 2014

Source: FAO 2014a.

Need for Integrated Policies & Planning on Wild Fisheries, Aquaculture, Water, and Food Security

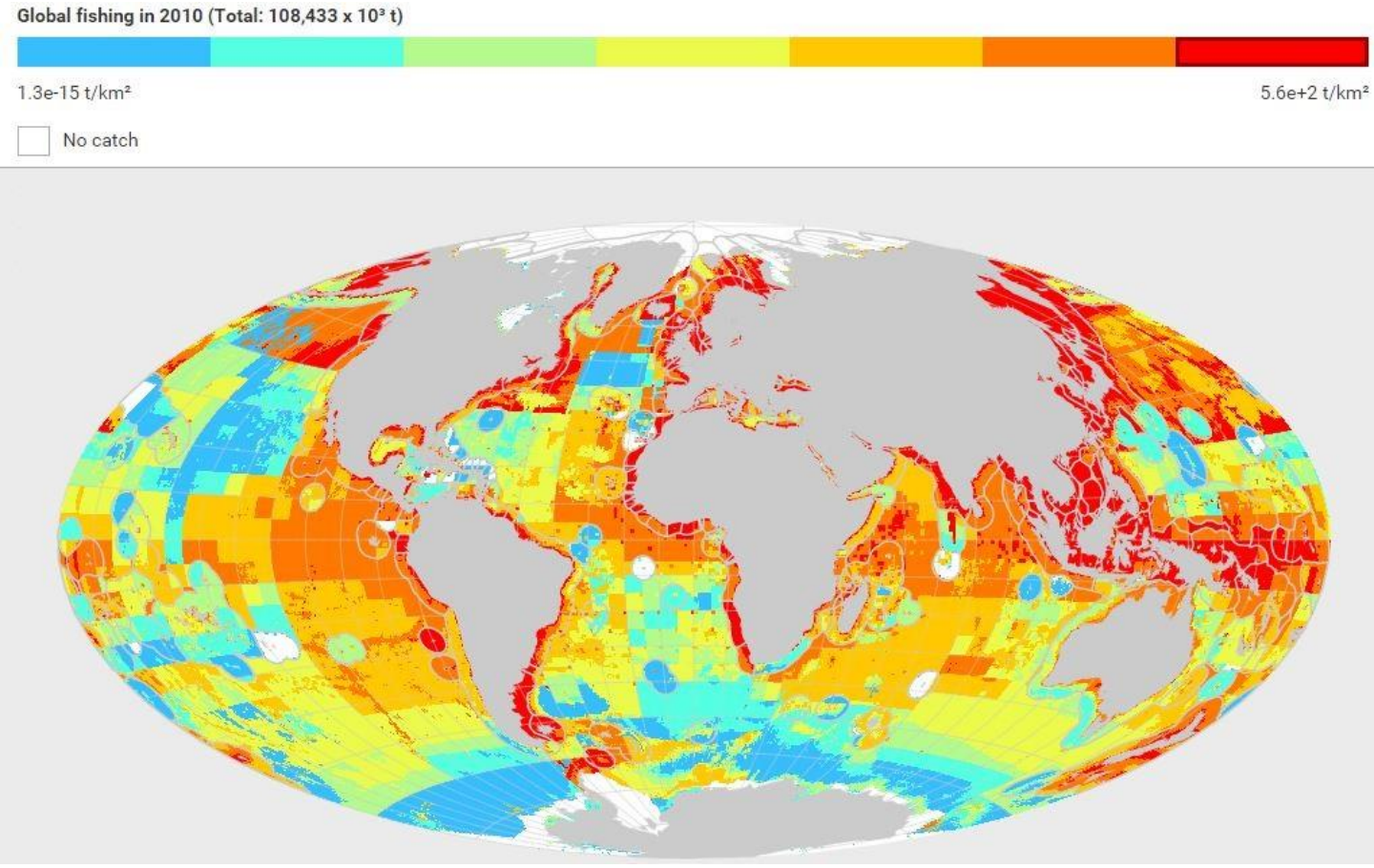
- Many national food security plans do not include wild foods such as fish.
- Over **$50 billion is lost each year** from the marine fishing sector due to poor governance and lack of secure tenure.
- About **20-30% of wild fish caught** are used as fishmeal, primarily exported for aquaculture; these small fish are important for food security and livelihoods for coastal communities and for healthy ecosystems.
- Fish exports can endanger domestic food security if an inclusive approach to economic growth is not taken.
- Improper siting of fish farms and poor land use practices can reduce water quality and the natural productivity of wild fisheries and wetlands.
- An integrated, systems approach to food security is urgently needed.

About 20-30% of wild fish caught are used as fish meal, primarily exported for aquaculture; these small fish are important for food security and livelihoods for coastal communities.

Credit: Tushar Sharma

Global Fishing in the Ocean

Figure 1. Global fishing (in tons per square kilometer) in 2010. These data combine official reported catch data and reconstructed estimates of unreported data (including major discards).



Coastal waters are some of the most naturally productive areas on earth. Yet this natural productivity is threatened by poor fisheries management, lack of managed access, and illegal fishing. Enhancing the capacity of many countries in Southeast Asia and parts of Africa and Latin America to strengthen their fisheries management could help restore and improve wild fisheries productivity.

Source: Sea Around Us (http://www.seaaroundus.org/data/#/spatial-catch)


Credit: Peg Herring

III. Fisheries and Global Development


Credit: Eric Sala WCS

Fish and Global Trade

- According to the FAO (Food and Agriculture Organization of the United Nations), fish are the most widely traded foods in the world, with about 50% coming from developing countries.
- The FAO estimates that the net value of fish exports from developing countries in 2011 was over $20 billion – greater than the net exports of rice, coffee, tea, tobacco, and meat *combined*.
- According to the FAO, wild fish and farmed fish each make up about 50% of the fish produced each year, but China alone accounts for about 68% of aquaculture products; excluding aquaculture products from China, wild fisheries account for approximately 80-90% of fish production.
- A recent analysis found that, among 220 Marine Stewardship Council certified fisheries, only 7% are in developing countries. To maintain their comparative advantage in the global seafood market, developing countries need to move towards improved fisheries management.

Credit: Joan Drinkwin

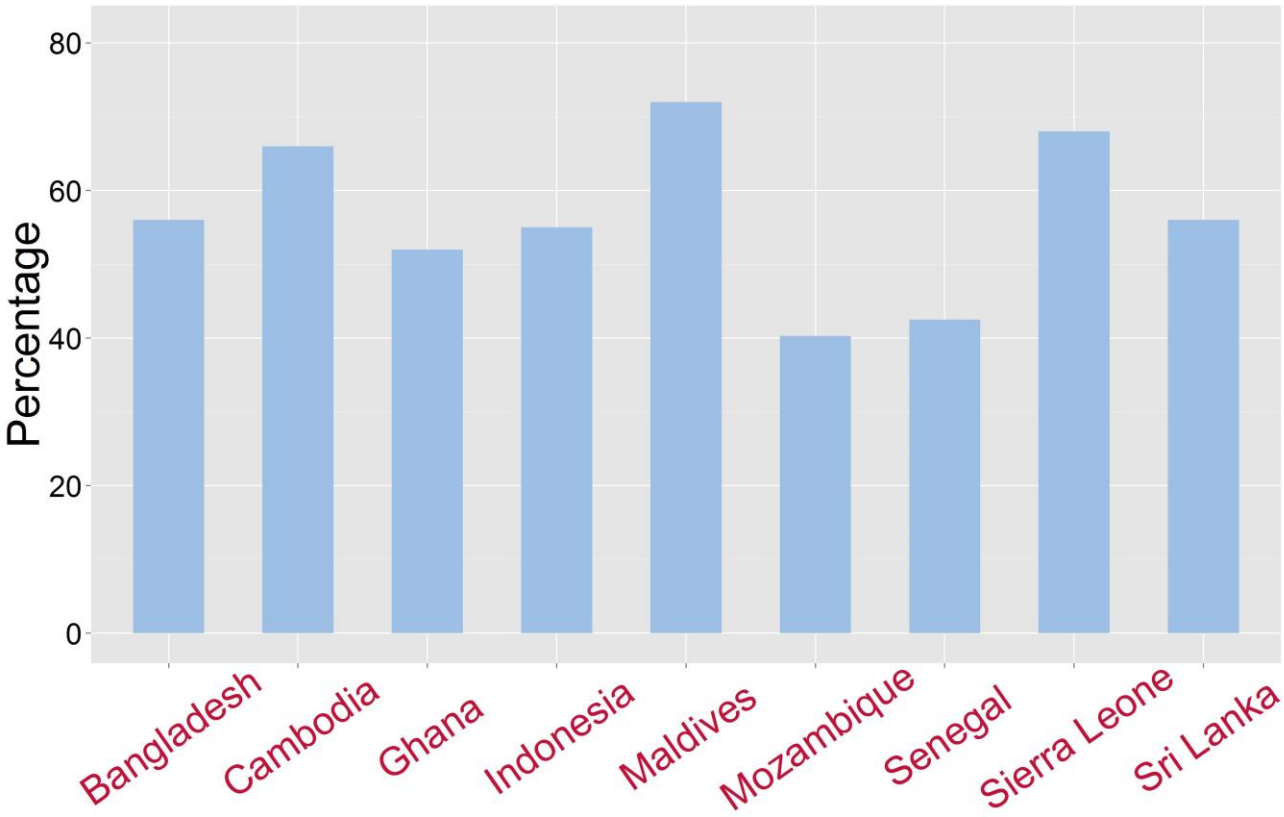
Research on catch reconstructions from the Sea Around Us program indicates that the quantity of wild fish from developing countries may actually be much higher that previously reported.

Sources: Dyck and Sumaila 2010, Bonini et al. 2011, Sampson et al. 2015, FAO 2014a, Pauly and Zeller 2016.

Fish and Food Security

- FAO estimates that 2.9 billion people rely on fish for a substantial part (greater than 20%) of their animal protein.
- In several African and Asian countries, fish provide more that half of the animal protein supply and are a food staple.
- New research suggests that the contribution of wild fish to food security may be even higher than previously thought in many developing countries.

Figure 2. Fish Contribution to Animal Protein Supply.

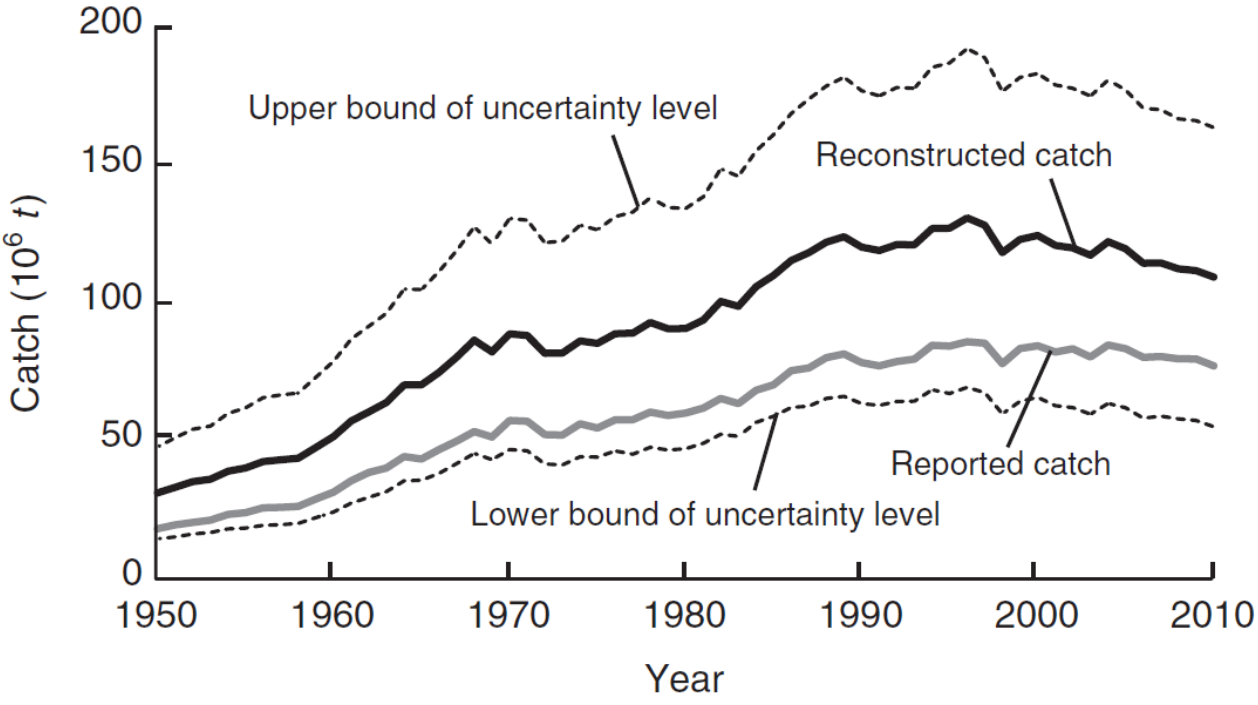


Sources: FAO Fisheries and Aquaculture Department 2011, FAO 2014a, Pauly and Zeller 2014.

Wild Fish and Food Security

- Global catches of wild marine fisheries are higher than previously reported, contributing more to local and global food security.
- A 10-year study involving over 50 institutions and 400 researchers estimates that global marine fish catches were 50% higher than reported and are declining due to poor management.

Figure 3. Voluntary submissions of marine fisheries catch data by FAO member countries ("Reported catch," solid gray line) and estimations including all fisheries known to exist ("Reconstructed catch," solid black line).



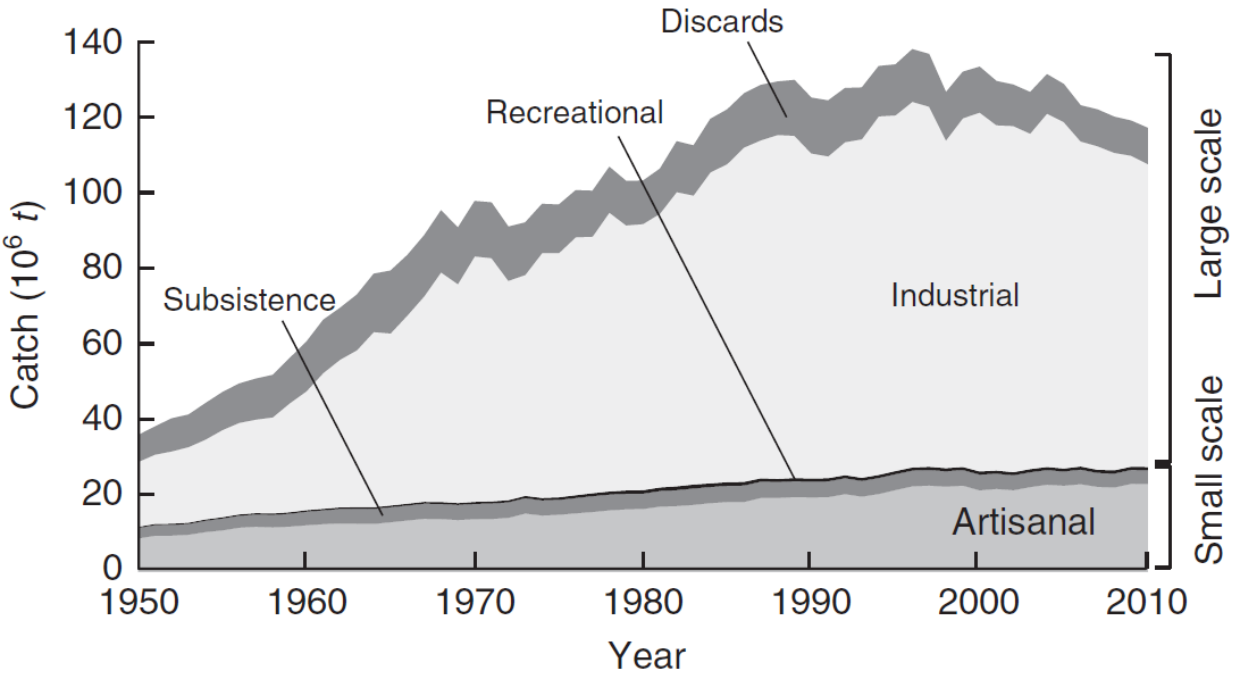
Wild fish catches are significantly higher than previously reported in many developing countries, including several Feed the Future priority countries.

Source: Pauly and Zeller 2016.

Wild Fish and Food Security

- Industrial fishing vessels are largely responsible for most of the global catch, discards (bycatch), and reported decline in fisheries.
- Catches from artisanal and subsistence fisheries are often not reported in official country reports to FAO, skewing their contribution to food security.
- At the global scale, artisanal sector catches continue to show gradual growth.
- Non-commercial subsistence catches, particularly gleaning by women in coastal areas, are usually neglected.

Figure 4. Reconstructed global catch by fisheries sectors.



Industrial fisheries are the source of the overwhelming majority of the discards.

Source: Pauly and Zeller 2016.

Fish and Nutrition

- Fish are rich in omega-3 fatty acids, which play an important role in children's brain development.
- When eaten whole, fish are rich in essential micronutrients including vitamin A, calcium, iron, and zinc.

Credit: USAID Feed the Future

In Ghana, researchers found that the addition of fish powder to traditional maize porridge during weaning improved infant growth.

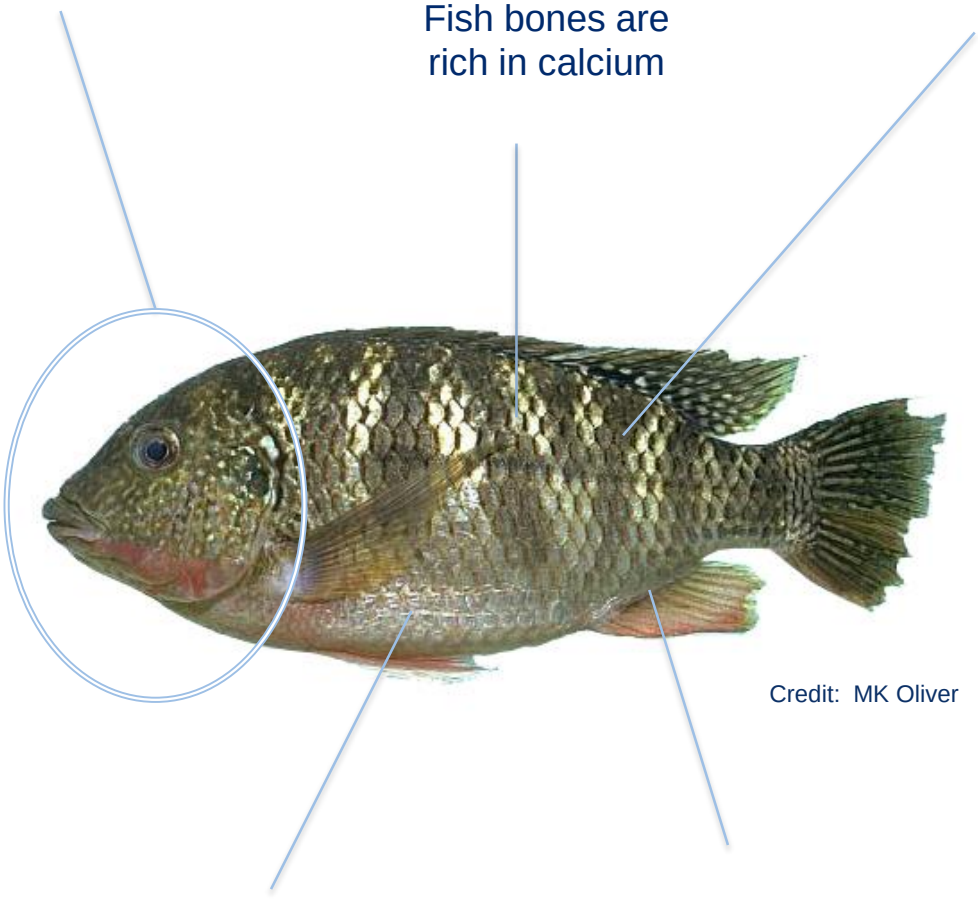
Sources: Lartey et al. 1999, FAO 2014a.

Fish and Nutrition

Fish heads are rich in micronutrients such as iron, vitamin A, and zinc

Fish flesh is rich in protein and omega-3 fatty acids

Fish bones are rich in calcium



Credit: MK Oliver

Protein from fish has all of the essential amino acids and is more digestible that protein from plants

Fish viscera are rich in micronutrients such as iron and vitamin A

Sources: Roos et al. 2007, Kawarazuka 2010, Kawarazuka and Bene 2011, Tacon and Metian 2013.

Fish and Nutrition

- A recent analysis on the role of fish in food and nutrition security found that "farmed fish is an excellent source of animal protein but because of species, size, and method of rearing, it is often inferior to small wild fish as a source of essential fatty acids and micronutrients."
- In a study of fish consumption patterns in Bangladesh, researchers concluded that "increased availability of fish from aquaculture may not have fully compensated for the loss of fish from capture fisheries in terms of dietary diversity, micronutrient intakes, and food and nutrition security, particularly for the poorest consumers."

Credit: Christopher Walker

Several pounds of wild fish are required to produce one pound of some species of carnivorous farmed fish.

Sources: Beveridge et al. 2013, Belton et al. 2014, Waite et al. 2014, Bene et al. 2015.

Women in Fisheries

- Women's roles in the fisheries sector include:
  - Fishers/gleaners
  - Sellers
  - Boat owners
  - Processors
  - Marketers
  - Investors
  - Consumers
- A recent study of wild fisheries in nine fish producing countries found that 46% of those engaged in pre- and post-harvesting activities were women.
- Nine out of ten people engaged in secondary activities such as fish processing are women.

Credit: WorldFish

About 20% of inland fishers are women.

Credit: Jessica Torres-Spence

Sources: The World Bank, FAO, and WorldFish Center 2010, WorldFish Center 2010, FAO 2014a.

Women in Fisheries

Women employed in the fisheries sector face a number of challenges, including:

- Restricted participation in fisheries management organizations due to cultural barriers
- Limited access to credit and microfinance
- Lower incomes than men

Credit: Tushar Sharma

Because of their heavy involvement in post-harvest activities, women can be disproportionately impacted by harmful fishing practices, such as the use of explosives and chemicals that yield fish that appear normal but fall apart during processing. FAO reports that these practices can reduce the incomes of women fish processors.

Sources: WorldFish Center 2010, Matthews et al. 2012, FAO 2014a.

Fisheries and Climate Change

Credit: Somenath Mukhopadhyay

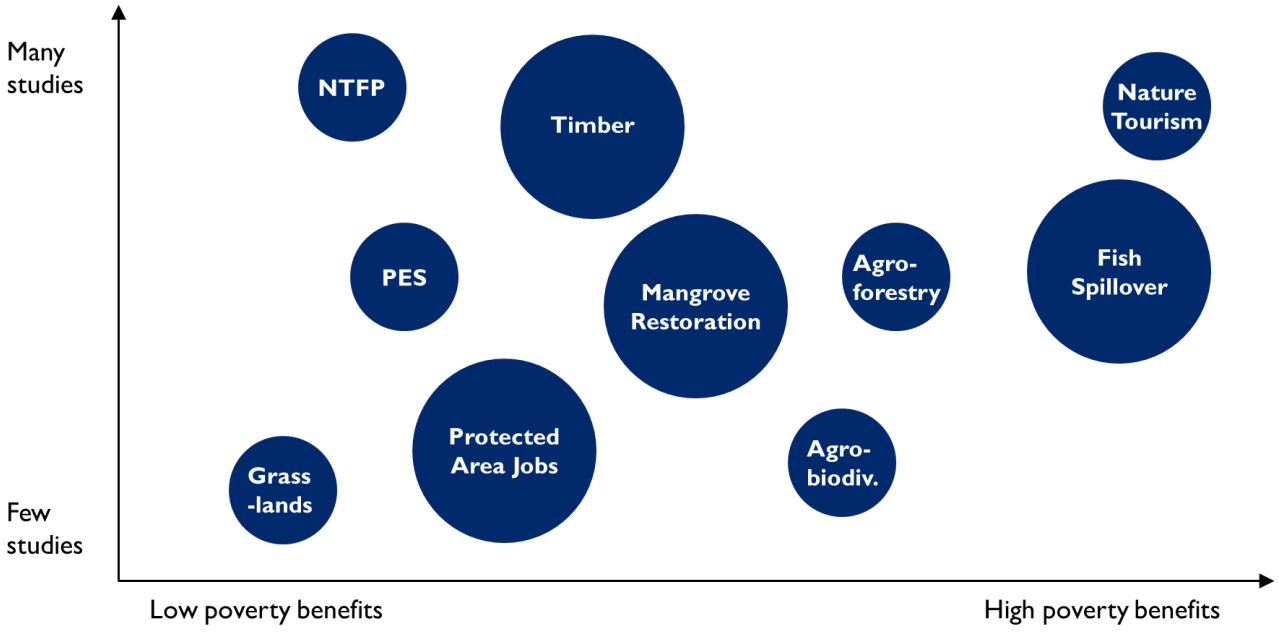
Drought, changes in rainfall patterns, increased water temperatures, coral bleaching, and ocean acidification pose significant threats to terrestrial crops and fisheries

- An estimated 850 million people benefit from ecosystem services provided by coral reefs, including fisheries. Climate change is increasing the frequency and severity of coral reef bleaching episodes, with negative impacts on millions of people in developing countries who rely on coral reef fisheries for food security and livelihoods.
- The National Oceanic and Atmospheric Administration (NOAA) announced in October 2015 that rising ocean temperatures are causing a global coral bleaching event, threatening coral reef ecosystems and the important services they provide.
- Improved fisheries management and conservation of critical fish habitat such as reefs and mangrove forests can enhance the resilience of coral reef ecosystems to climate change impacts and are effective adaptation strategies.

Sources: Hoegh-Guldberg et al. 2007, WRI 2011, FAO 2014a, Anthony et al. 2015, NOAA 2015.

Fisheries and Poverty Reduction

Figure 5. Evidence base, poverty reduction benefits, and importance to biodiversity for specific conservation mechanisms.



NTFP: Non-timber forest products
PES: Payments for ecosystem services

A 2013 study found evidence to support the hypothesis that at least 10 conservation mechanisms had positive effects on poverty alleviation.

- Some of the strongest evidence in support of poverty reduction benefits came from fish spillover (the movement of fish from areas of high population density) from marine reserves with no-take zones.
- Fish spillover was more likely to benefit local communities if they actively participated in management of the resource, and if the benefits from spillover offset losses from the no-take zone.

Source: Leisher et al. 2013.

Wild Fisheries and Livelihoods

- Wild fisheries and related activities such as boat building and fish processing support livelihoods for more than 500 million people worldwide.
- Of those employed in the fisheries sector, 95% live in developing countries.
- Small-scale fisheries in developing countries provide employment for about 90% of those working in the sector.
- Estimated number of fishers by region:
  - Asia: 30.8 million
  - Africa: 5.6 million
  - Latin America and Caribbean: 1.9 million
  - Europe: 544,000
  - North America: 314,000
  - Oceania: 121,000

Credit: USAID

Wild fisheries support a variety of livelihood activities throughout the developing world.

Sources: Bene et al. 2010, Garcia and Rosenberg 2010, WorldFish Center 2011, FAO 2014a.

Successful Approaches to Increase Wild Fisheries Productivity

Credit: WAWASH

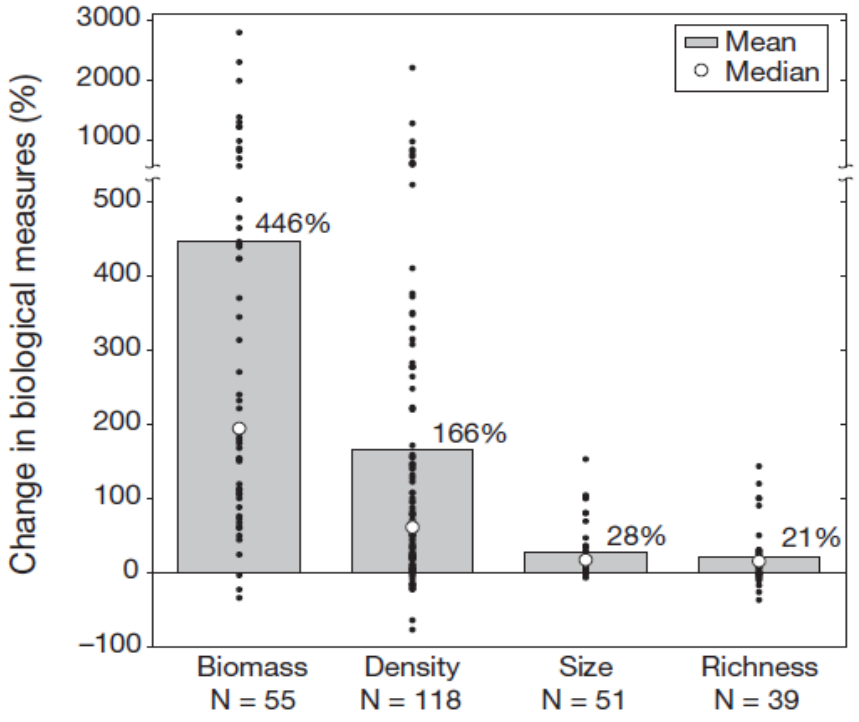
Co-management, where fishers have a say in management decisions, is a successful approach to increasing the productivity of wild fisheries.

- **Co-management:** Sharing the responsibility for resource management between user groups and the government can empower fishers to use more sustainable practices.
- **Securing tenure rights:** Secure tenure rights of fisheries resources is important for improving their governance and sustaining livelihoods.
- **Ecosystem-based management:** Conserving ecosystems through measures such as identifying and protecting critical fish habitats and using appropriate gear can increase their productivity.

Sources: FAO 2013, USAID 2013.

Successful Approaches to Increase Wild Fisheries Productivity

Figure 6. The biological effects of fully protected, no-take marine reserves. Average and median percent change in biomass, density, organism size, and species richness. All the increases are statistically significant.



N = number of reserves

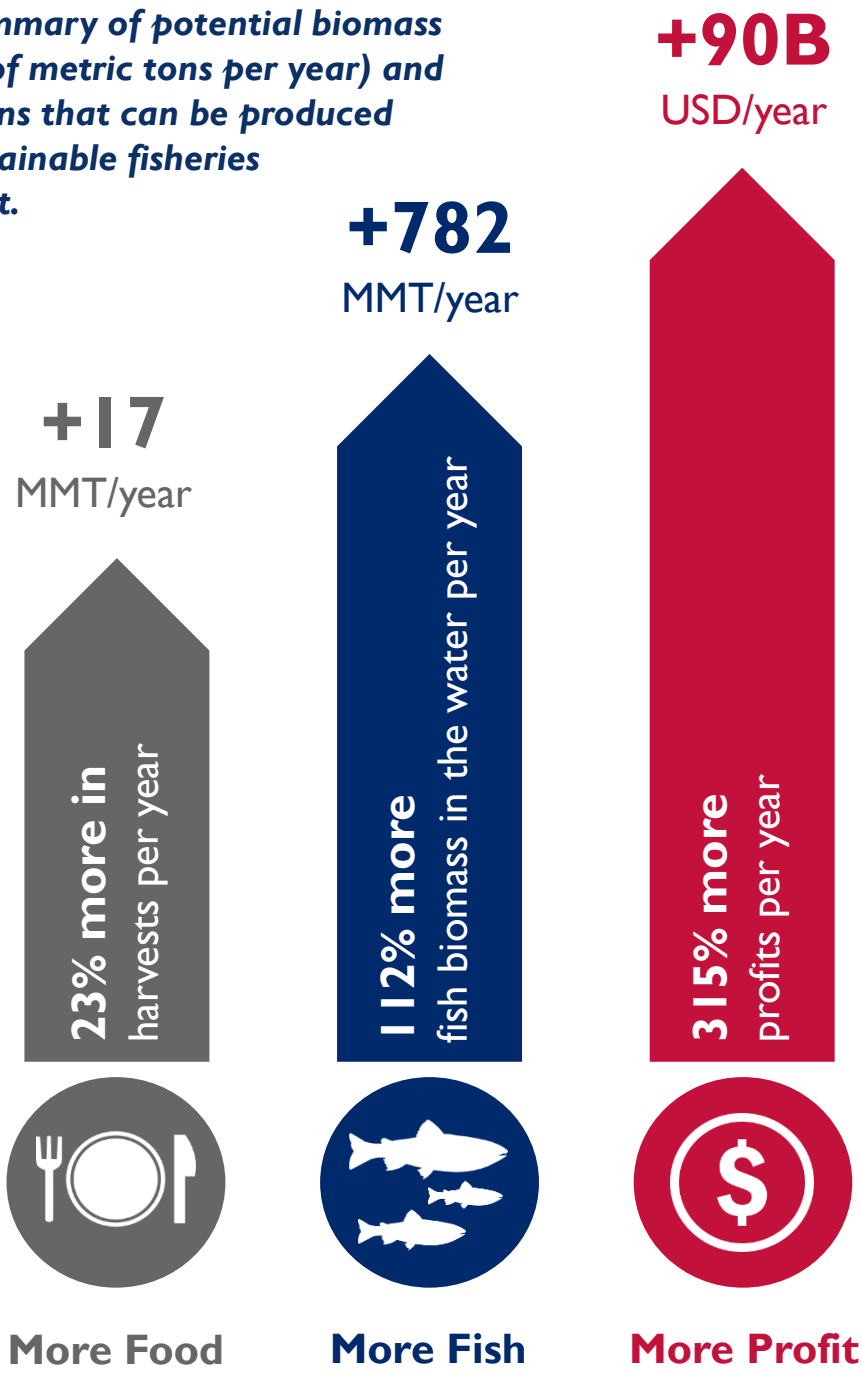
A 2009 review on the biological effects of fully protected, no-take marine reserves found positive impacts on fish biomass, density, size, and species richness.

- Fully protected marine reserves that are well-managed and enforced can increase the abundance, size, and diversity of fish within the reserve.
- Fisheries can benefit from marine reserves through spillover.
- Marine reserves have been shown to foster coral reef recovery and increase the resilience of populations of commonly harvested fish species.
- A study analyzing the effects of 28 marine protected areas on catch per unit effort of marketable fish found a 2-4% increase per year for at least 30 years.

Sources: Lester et al. 2009, Vandeperre et al. 2011, Barner et al. 2015, da Silva et al. 2015.

Potential for Global Fish Recovery and Productivity

Figure 7. Summary of potential biomass (in millions of metric tons per year) and financial gains that can be produced through sustainable fisheries management.



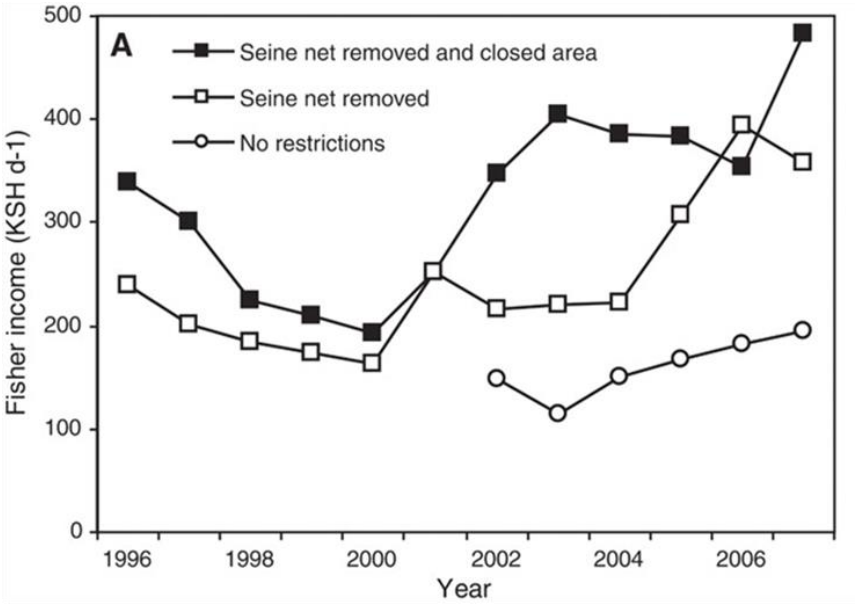
Recent analyses highlight the tremendous potential to recover ocean productivity through improved fisheries management.

Source: California Environmental Associates et al. 2015.

Improved Management Can Rebuild Wild Fisheries

- Evidence from the United States:
  - Of 44 wild fisheries populations reviewed in the U.S., 28 stocks, or 64%, were rebuilt or showed significant rebuilding progress.
  - The estimated annual gross commercial revenue of those 28 U.S. fish populations increased 92% from the start of rebuilding.
- Rebuilding has also occurred in developed countries through improved management, including the adoption of co-management, closed areas as fish reserves, and restrictions on destructive fishing gear (e.g., beach seines, bottom trawls).

Figure 8. Rebuilding of Kenyan small-scale fisheries through gear restrictions and closed area management.



In Kenya, local communities adopted cooperative management approaches that included closed areas and gear restrictions on beach seines, leading to the recovery of fish biomass, increases in fish size, and significant increases in fisher's incomes

Sources: McClanahan et al. 2008, Worm et al. 2009, Sewell et al. 2013.

Credit: Toby Jorrin

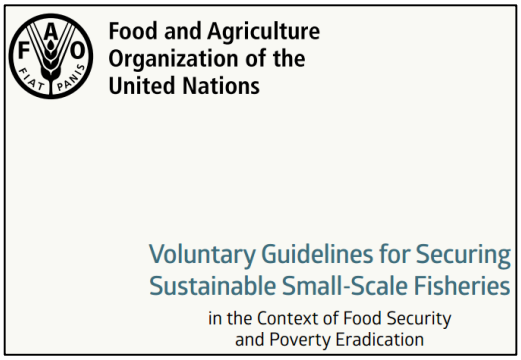
IV. Key Opportunities for Action

Credit: Jarret Cassanti

Key Opportunities for Action: Secure Tenure

Globally, there is increasing awareness of the importance of wild fisheries to global and local food security and the need for improved management, secure tenure, and innovative financing to sustain them. Secure tenure in fisheries could be as transformative as land tenure in terrestrial agriculture.

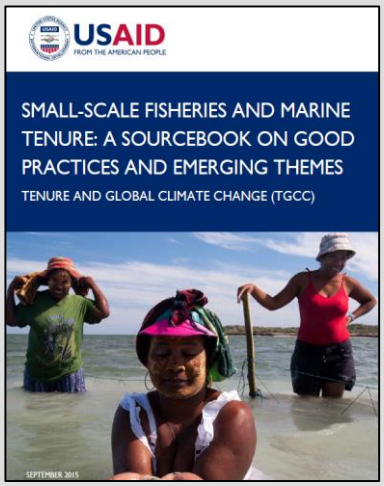
FAO has published a set of internationally agreed upon voluntary guidelines that promote a human-rights based approach to sustainable development of small-scale fisheries. The guidelines place particular emphasis on responsible tenure of fisheries resources as critical for achieving food security, poverty eradication, social stability, and sustainable livelihoods.



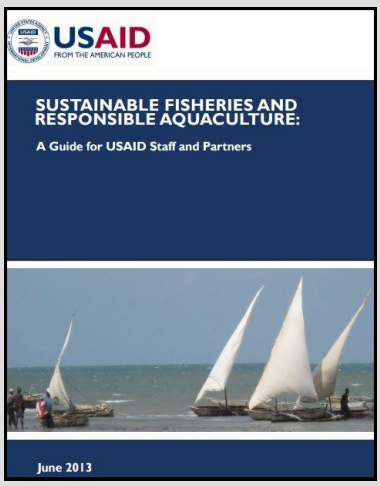
USAID's Bureau for Economic Growth, Education, and Environment Office of Land Tenure and Resource Management and Office of Forestry and Biodiversity have produced resources to aid in Agency programming around tenure.

Small-Scale Fisheries and Marine Tenure: A Sourcebook

Looking to the Sea to Support Development Objectives: A Primer

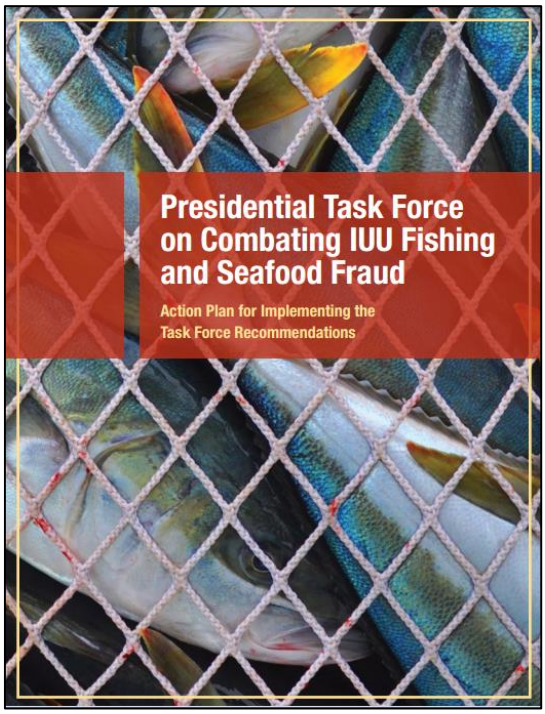


Sustainable Fisheries and Responsible Aquaculture: A Guide for USAID Staff and Partners



Sources: USAID 2013, FAO 2015**,** Courtney and Jhaveri forthcoming.

Key Opportunities for Action: Seafood Traceability



- Forthcoming catch documentation and traceability requirements by the United States, a major seafood importer, will create market incentives for improved fisheries management in source countries. Wild and farmed seafood will be required to document where it was caught or farmed, the vessel and gear used, and trace its supply chain.
- The U.S. Presidential Task Force on Combating Illegal, Unreported, and Unregulated Fishing and Seafood Fraud calls for seafood traceability as one measure to reduce illegal fishing.

- Globally, losses from illegal, unreported, and unregulated fisheries are valued at $10-23 billion annually, constituting 20-30% of the catch from key fisheries. This looting threatens the food security of 2.6 billion people who rely on fish protein in developing countries. Forced labor and other criminalities are often associated with illegal fishing.
- Research supported by USAID/Senegal found that about 60% of the fish caught in Senegal waters was taken illegally, resulting in $300 million per year in lost revenues and threatening local livelihoods and food security.

Sources: Presidential Task Force on Combating IUU Fishing and Seafood Fraud 2015.

Key Opportunities for Action: Market Demand

- There is **increasing market demand** for seafood from sustainably managed fisheries and niche fisheries. Major retailers such as Costco, Target, and Walmart have committed in recent years to offering more sustainable seafood choices. Sodexo, one of the world's largest food services corporation, has committed to stop serving at-risk seafood species.
- **Innovative financial mechanisms** are important in improving fisheries management. Bloomberg Philanthropies launched the $53 million Vibrant Oceans Initiative to improve fishing practices. The project will work with investors to create financial incentives for fishers to manage fisheries more sustainably.
- **Catalyzing market-based partnerships** is a key component of the Rockefeller Foundation's Oceans & Fisheries Initiative, which aims to increase the health and productivity of local fisheries by decreasing unsustainable fishing pressures by putting the needs of poor and vulnerable people at the center of innovative, equitable solutions.
- **Impact investment firms** for fisheries are changing the way investment capital is used to solve critical environmental and social problems.
- Fish 2.0 is an **international business competition** that connects potential investors with sustainable seafood businesses.

Sources: NPR 2012, Bloomberg Philanthropies 2015, Fish 2.0 2015.

Credit: USAID

V. Case Studies

Credit: Omar Eid

Management of Aquatic Ecosystems through Community Husbandry Program: BANGLADESH

- The Management of Aquatic Ecosystems through Community Husbandry (MACH) Program was a nine-year, $14 million project jointly developed and funded by USAID and the Government of Bangladesh targeting more than 110 rural fishing villages.
- MACH secured lease rights for local fishing communities and helped them pioneer co-management of three degraded wetlands, including the formation of Resource Management Organizations composed of fishers, local politicians, and other stakeholders.
- Fish consumption increased by 52%, fish catch went up by 140%, and average household income rose by 33% between 1999 and 2006 across targeted communities.
- Other program accomplishments include: establishment of 63 fish sanctuaries; 644,000 trees planted to replace swamp forest; and wetlands restocked with 1.2 million native species fish.

Table 1. Summary of cumulative sanctuary area, total estimated fish catch, and fish consumption outcomes at the Hail Haor wetland, one of the program's sites.

Year	Cumulative area of sanctuaries (ha)	Total estimated catch (T)	Fish consumption (g/person/day)
2000	5.65	2561	52
2001	8.87	2382	54
2002	18.11	3588	60
2003	103.79	2021	58
2004	103.79	4854	65

Sources: Thompson and Choudhury 2007, WRI 2008.

Integrated Coastal and Fisheries Governance Program: GHANA

Credit: Sean Southey

"Biribirieba," a weekly radio drama supported by the ICFG program, reached more than two million Ghanaians weekly and delivered important messages about coastal resource management.

- The Integrated Coastal and Fisheries Governance (ICFG) program was a $12.5 million initiative jointly funded by USAID and implementing partners targeting coastal communities in the Western Region of Ghana.
- ICFG worked with local and national partners to improve coastal governance and fisheries management, address overfishing, and increase socio-economic benefits for artisanal fishing communities.
- Program achievements include:
  - Adoption of Ghana's first shoreline management plan
  - Improved enforcement of fisheries laws
  - Development of a toolkit for each Western Region district that included case studies, technical information, and suggestions for integrated coastal management projects

Sources: Coastal Resources Center 2014, Coastal Resources Center 2015.

FISH and ECOFISH Projects: PHILIPPLINES

- The Fisheries Improved for Sustainable Harvest (FISH) project was a seven-year (2003-2010) initiative supported by USAID with a target of increasing fish stocks in four large economically important fishing areas by 10%.
- The FISH project built local capacity to manage coastal resources and marine fish stocks and to improve governance by:
  - Building relationships between fishers, communities, and local authorities to promote more effective enforcement and co-management of fisheries resources
  - Strengthening the ability of local governments to conduct fisheries management as a public service
  - Providing training to help local law enforcement units develop the skills to monitor marine protected areas and fishing grounds and confront violators
- The Ecosystems Improved for Sustainable Fisheries Projects (ECOFISH) project is a five-year (2012-2017) initiative building on the progress made by FISH and expands these approaches into eight marine key biodiversity areas.

Credit: USAIDFISH

FISH project accomplishments include:

- ***Over 20 new marine protected areas established***
- ***12.8% increase in fish stocks within 77,000 hectares of marine waters***
- ***31 law enforcement units put into operation or strengthened***
- ***65 new fishing effort restrictions introduced***

Sources: USAID 2010, USAID 2014a, USAID 2014b.


Credit: USAID

VI. The Importance of Fisheries in Nine Feed the Future Priority Countries


Credit: USAID

Importance of Wild Fisheries for Local Food Security: BANGLADESH

- Fish provide an estimated 60% of dietary animal protein supply.
- Fisheries provide full-time employment for about 1.4 million people.
- The fisheries sector in Bangladesh contributes 4% to the national Gross Domestic Product (GDP) and 22% to agricultural GDP.
- Small indigenous fish species are commonly cooked and eaten whole and are an important source of nutrients, especially for the rural poor.

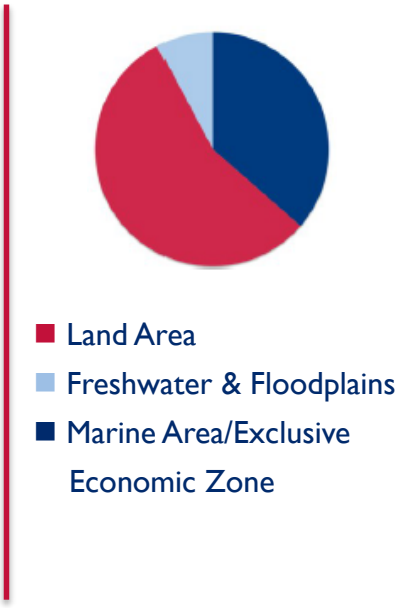
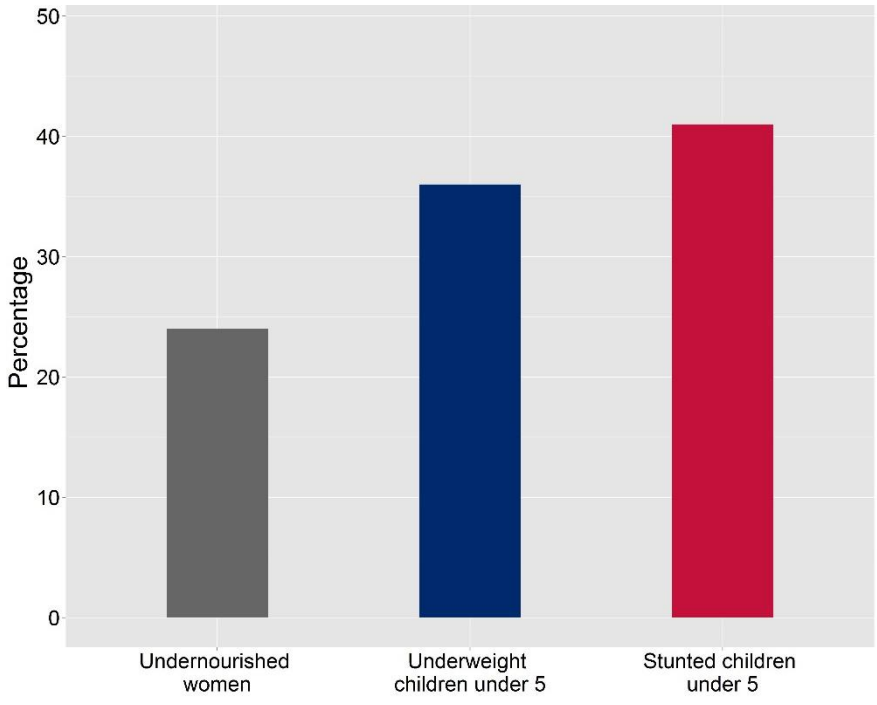


Figure 9. Nutrition and Food Security Statistics for Bangladesh.



Sources: Roos et al. 2007, Ahmed et al. 2012a, National Institute of Population Research and Training et al. 2013, Government of the People's Republic of Bangladesh 2015.

Threats to Wild Fisheries: BANGLADESH

Credit: WASHplus

Women's involvement in the fisheries sector in Bangladesh is limited by their lack of access to resources and training and by cultural barriers to participation in fisheries management organizations.

- Wild fisheries are threatened by habitat degradation, overexploitation due to poor management, and low compliance with existing fisheries management rules and laws.
- Bangladeshi fisheries are highly vulnerable to climate change and have low adaptive capacity.

Sources: Allison et al. 2009, Hussain 2010, Ahmed et al. 2012b, Government of the People's Republic of Bangladesh 2015.

Importance of Wild Fisheries for Local Food Security: CAMBODIA

- Fish provide an estimated 66% of dietary animal protein supply.
- Fisheries contribute 10% to the national GDP.
- The livelihoods of almost 30% of Cambodians directly depend on small-scale fisheries.
- Over half of people employed in the fisheries sector are women.
- Cambodia's 2014-2018 National Strategic Development Plan highlights the importance of conservation areas, community-based fisheries management, and improved governance in addressing these threats.

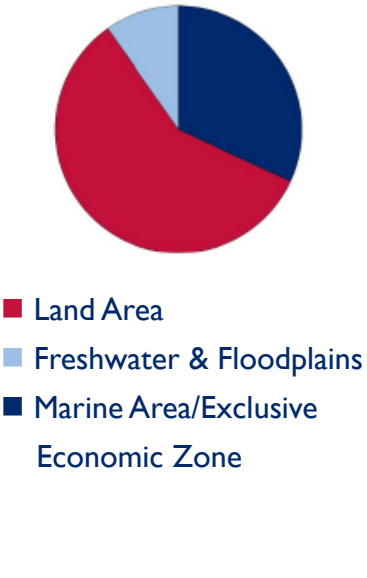
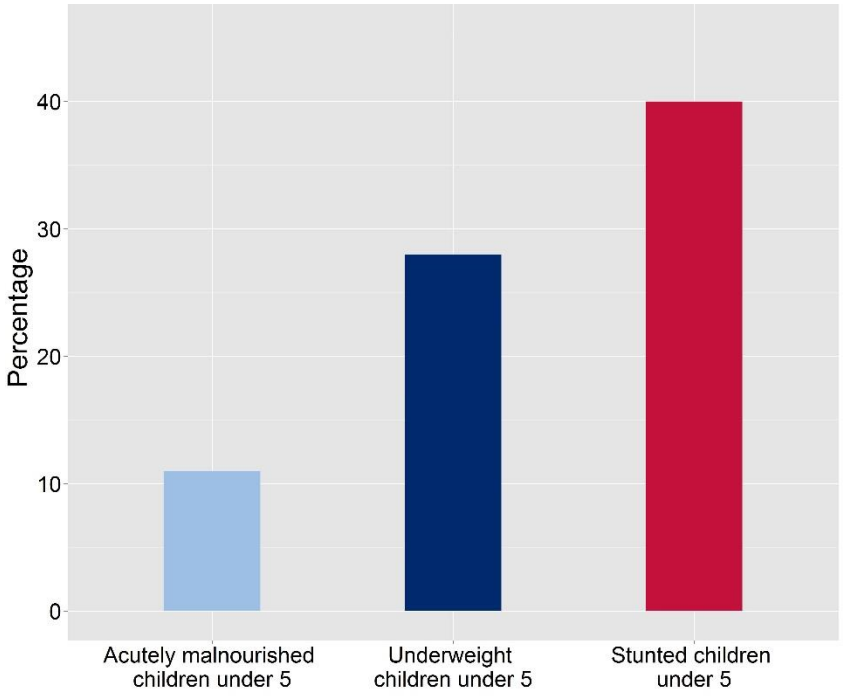


Figure 10. Nutrition and Food Security Statistics for Cambodia.



Sources: Hori et al. 2006, Navy and Bhattarai 2009, National Institute of Statistics et al. 2010, The World Bank, FAO, and WorldFIsh Center 2010, FAO Fisheries and Aquaculture Department 2011.

Threats to Wild Fisheries: CAMBODIA

- Poor management of wild fisheries in Cambodia has resulted in declining productivity and biodiversity.
- Widespread use of illegal fishing methods, as well as climate change and habitat loss, pose important threats to Cambodia's fisheries.

Credit: Eric Thompson

Given the dependence on wild fisheries for nutrition and livelihoods in Cambodia, especially among poor and marginalized communities, any decrease in their productivity could have serious repercussions.

Sources: Navy and Bhattarai 2009, Sok et al. 2012, Cambodia Ministry of Planning 2015.

Importance of Wild Fisheries for Local Food Security: GHANA

- Fish provide an estimated 60% of animal protein supply.
- The fishing sector provides employment for an estimated 2.4 million people.
- Small-scale fisheries in Ghana contribute about 3% to the national GDP.
- The government established the Ministry of Fisheries and Aquaculture Development in 2013 to promote "sustainable management of the fisheries sector."

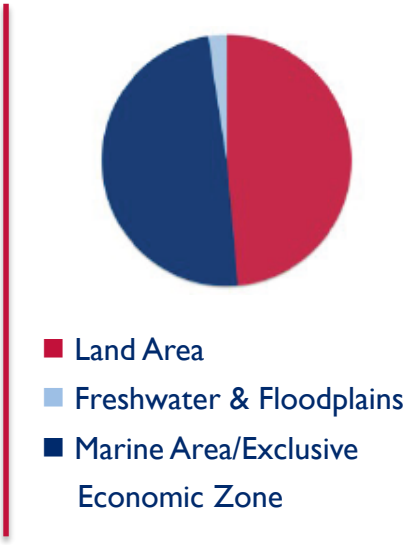
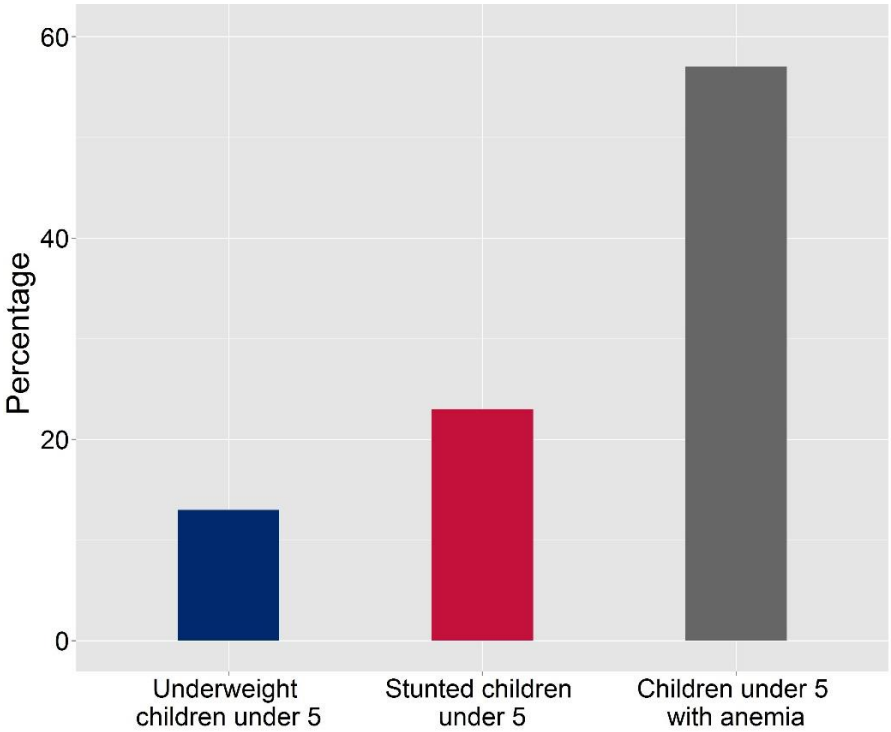


Figure 11. Nutrition and Food Security Statistics for Ghana.



Sources: West Africa Trade Hub and USAID 2008, Republic of Ghana 2014a, Republic of Ghana 2014b, Belhabib et al. 2015.

Threats to Wild Fisheries: GHANA

- Demand for fish in Ghana has outstripped supply, and fish stocks are in serious decline.
- Threats to fisheries include overfishing, poor management, and illegal, unreported, and unregulated fishing by foreign fleets.
- Recognizing the need to assess and mitigate the negative impacts of illegal fishing, the Ghanaian government worked with FAO to develop the 2014 National Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing.

Credit: Kimie Tanaka

Improved fisheries management is urgently needed to sustain the socio-economic importance of Ghanaian fisheries.

Sources: Falaye 2008, Republic of Ghana 2014b.

Importance of Wild Fisheries for Local Food Security: KENYA

- Fish provide an estimated 8% of dietary animal protein supply.
- The fisheries sector generates employment for more than two million Kenyans through fishing, boat building, fish processing, and other activities.
- Small-scale fishing is the primary source of income for communities along Kenya's lakes and coastline.
- Kenya's 2014-2017 National Nutrition Plan promotes fisheries as a sector that can contribute to the national nutrition agenda.

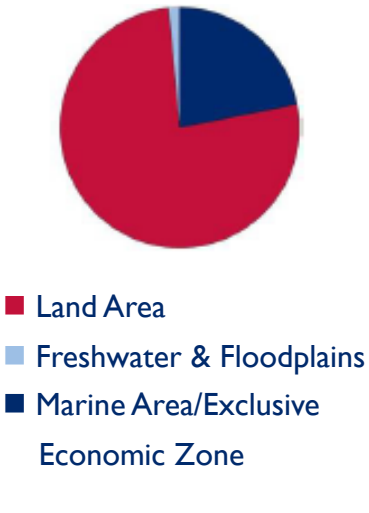
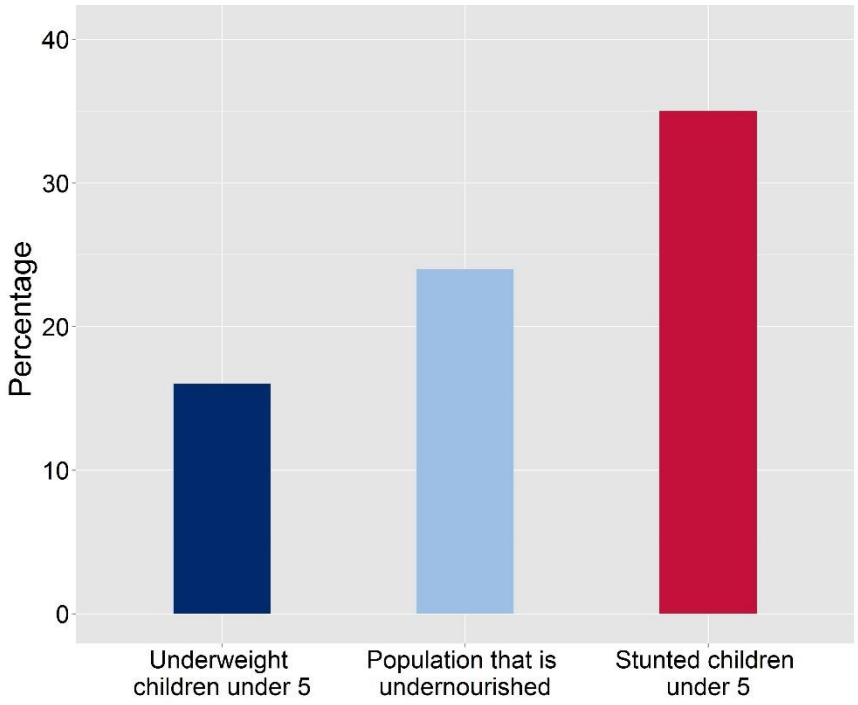


Figure 12. Nutrition and Food Security Statistics for Kenya.



Sources: FAO 2007, Kenyan National Bureau of Statistics and ICF Macro 2010, FAO Fisheries and Aquaculture Department 2011, Republic of Kenya 2012, Republic of Kenya Ministry of Fisheries Development 2013, Gavenus 2014, The World Bank 2015.

Threats to Wild Fisheries: KENYA

Credit: James Bowman

Some of the highest rates of HIV prevalence in Kenya are found in the fishing communities that live in the Nyanza region around Lake Victoria. Fishers' mobility, which makes them difficult targets for public health interventions, has been identified as a driver of this pattern.

- Kenyan wild fisheries have experienced declines in both diversity and productivity due to poor management.
- Kenya currently derives little economic benefit from its valuable marine fisheries, which are primarily exploited by foreign vessels.
- Among western Indian Ocean countries, Kenya's coral reefs are among the most vulnerable to climate change-related coral bleaching.

Sources: Kenya National AIDS Control Council 2009, Cinner et al. 2012, Republic of Kenya Ministry of Fisheries Development 2013.

Importance of Wild Fisheries For Local Food Security: LIBERIA

- Fish provide an estimated 15% of dietary animal protein supply.
- Small-scale fisheries provide employment for 33,000 people, 60% of them women.
- A recent analysis found that, if adequately managed, fisheries can significantly contribute to sustainably providing the country's needs for animal protein.
- During the recent Ebola outbreak in Liberia and subsequent bans on bushmeat consumption, sellers switched to the sale of fish as an alternative source of income.

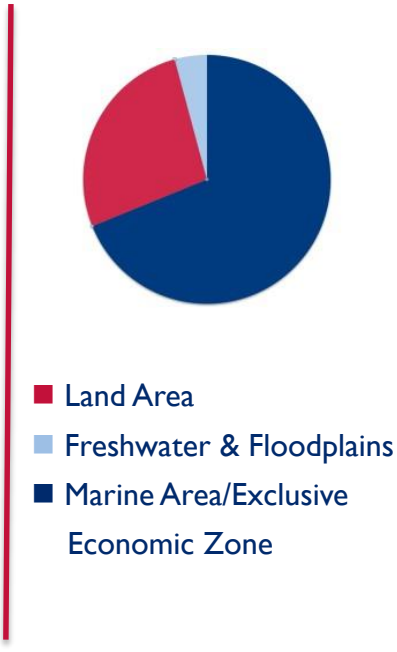
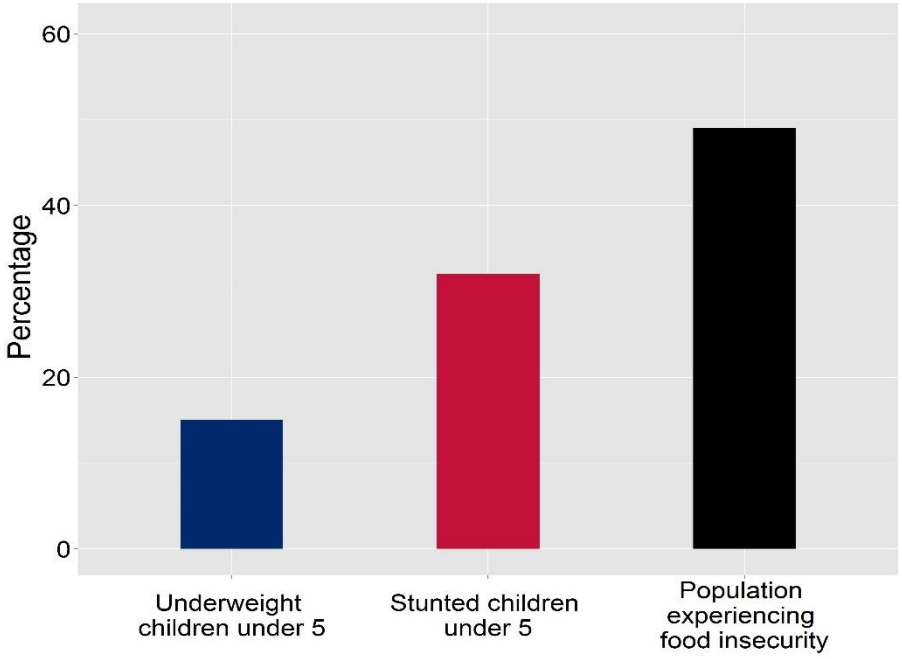


Figure 13. Nutrition and Food Security Statistics for Liberia.



Sources: FAO Fisheries and Aquaculture Department 2011, Belhabib et al. 2013, World Food Programme 2013, Government of Liberia and FAO 2012, Malayea 2014, Liberia Institute of Statistics and Geo-Information Service et al. 2014.

Threats to Wild Fisheries:
LIBERIA

Average per capita annual fish and shellfish intake in Liberia is estimated to be 5.0 kg, significantly lower than in neighboring countries like Sierra Leone (25 kg) and Guinea (10.5 kg).

Credit: Wasif Hasan

- Illegal, unreported, and unregulated catches in Liberia are draining about $75 million per year from the national economy.
- The Liberian Bureau of National Fisheries has low enforcement capacity and lacks resources to properly survey fisheries.
- Liberia is very vulnerable to catastrophic wild fisheries declines due to its high dependence on fish for food security.

Sources: Kebe et al. 2009, National Marine Fisheries Service 2011, Belhabib et al. 2013, Hughes et al. 2012.

Importance of Wild Fisheries for Local Food Security: MALAWI

- Fish provide an estimated 28% of dietary animal protein supply.
- Fisheries contribute 4% to the national GDP.
- Capture fisheries in Malawi employ almost 60,000 fishers and indirectly employ more than half a million people.
- A key strategy in Malawi's 2011-2016 Growth and Development Strategy is to increase the productivity of the country's fisheries.

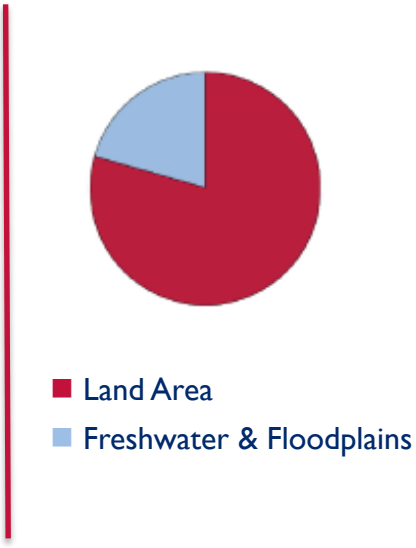
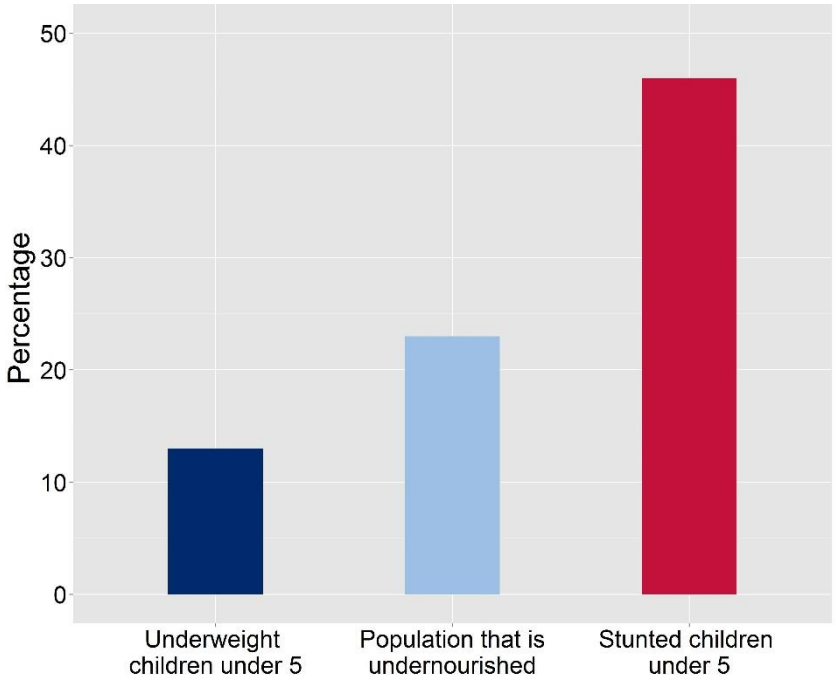


Figure 14. Nutrition and Food Security Statistics for Malawi.



Sources: Government of Malawi 2010, National Institute of Statistics and ICF Macro 2010, FAO Fisheries and Aquaculture Department 2011, Njaya 2011, IFPRI 2012, Donda and Mafaniso 2014.

Threats to Wild Fisheries:
MALAWI

- Poor management of Malawi's fisheries is resulting in rising prices, declining catches, and decreased food security.
- Climate change is expected to decrease the productivity of Malawi's fisheries.
- In the wake of declining catches, rural fishing communities are turning to environmentally destructive fishing gear in an effort to increase their catch.

Credit: Asafu Chijere

Yields from Malawi's lakes are declining significantly. Lake Chilwa's total catch has dropped by more than a third since the 1990s.

Sources: Government of Malawi 2010, Government of Malawi 2012, Tweddle et al. 2015.

The Importance of Wild Fisheries For Local Food Security: MOZAMBIQUE

- Fish provide an estimated 40% of dietary animal protein supply.
- About 330,000 people rely on small-scale fisheries for their livelihoods.
- Fisheries contribute almost 7% to the country's agricultural GDP.
- Mozambique's Fisheries Master Plan 2010-2019 focuses on increasing the contribution of fisheries to food security and economic development.

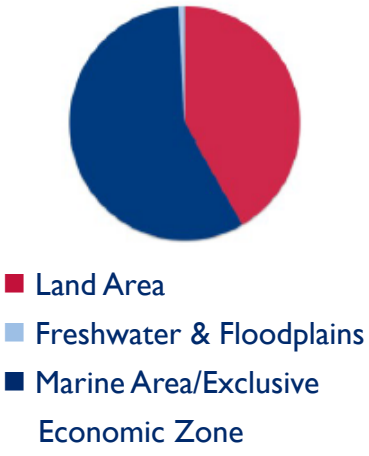
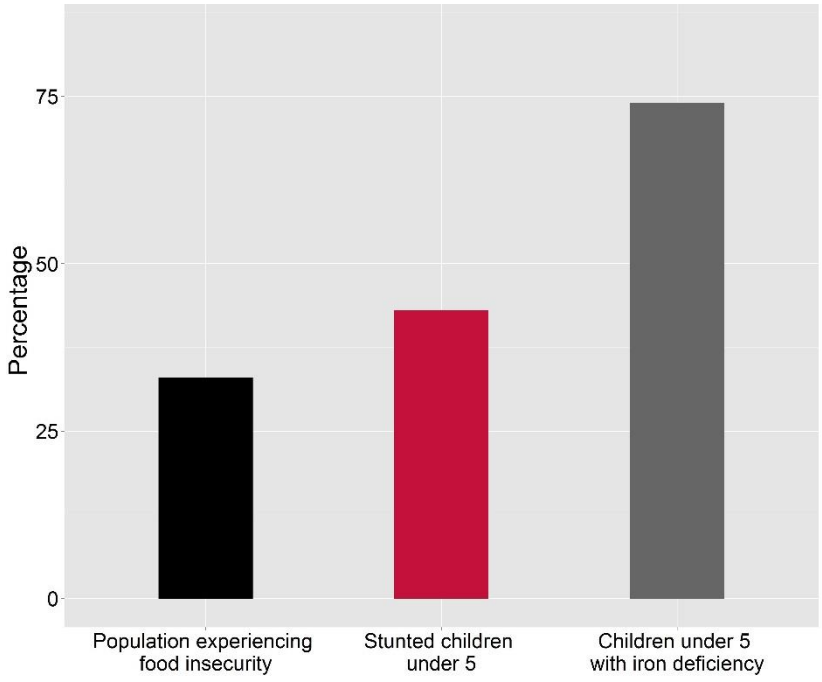


Figure 15. Nutrition and Food Security Statistics for Mozambique.



Sources: World Health Organization 2010, FAO 2011, FAO Fisheries and Aquaculture Department 2011, Benkenstein 2013, Benson et al. 2014, Oceanic Development 2014, World Food Programme 2015.

Threats to Wild Fisheries:
MOZAMBIQUE

- Stocks of many small-scale fisheries are decreasing due to poor management.
- Illegal fishing practices, pollution from extractive industries, and climate change also pose important threats to Mozambique's fisheries.
- Coastal communities in Mozambique identified fisheries degradation and climate variability as the two main stressors impacting their livelihoods.

Credit: Rodrigo Mueche

Average per capita annual fish and shellfish consumption in Mozambique is estimated to be 5.7 kg – among the lowest in the region.

Sources: Bunce et al. 2010, National Marine Fisheries Service 2011, Benkenstein 2013.

Importance of Wild Fisheries for Local Food Security: SENEGAL

- Fish provide an estimated 43% of dietary animal protein supply.
- The fisheries sector employs an estimated 600,000 people, 30% of them women.
- Small-scale fisheries in Senegal contribute 3% to the national GDP.
- Strategic objectives under Senegal's National Strategy for Economic and Social Development include sustainable management and improved productivity of fisheries.

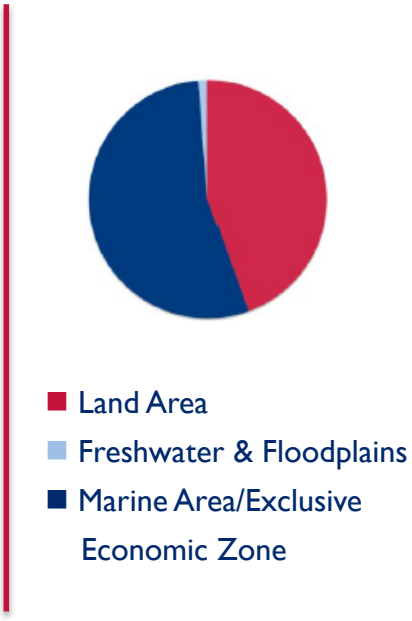
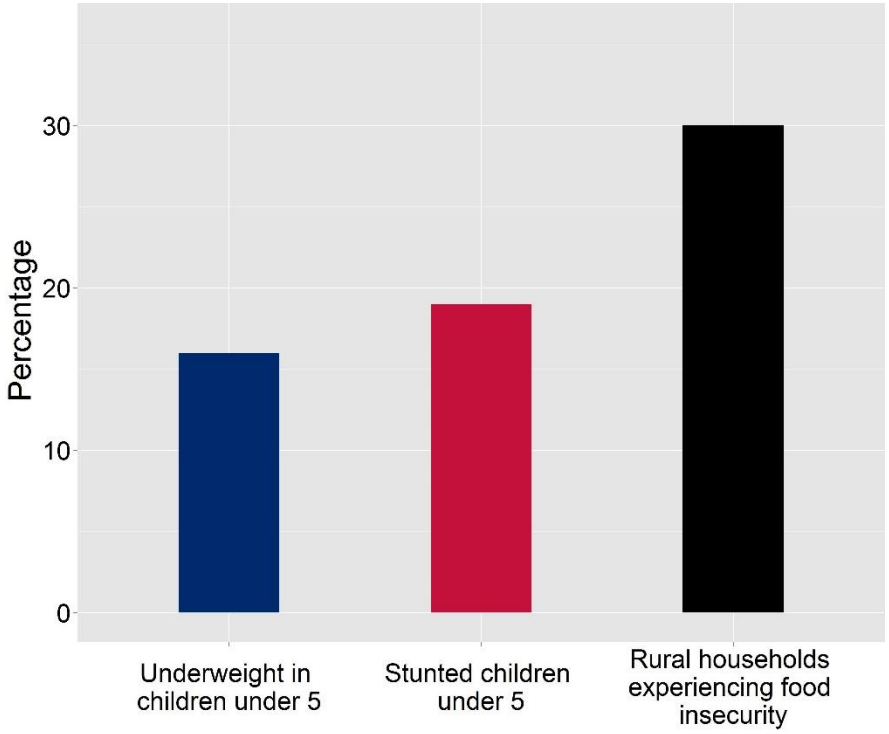


Figure 16. Nutrition and Food Security Statistics for Senegal.



Sources: FAO 2008, FAO Fisheries and Aquaculture Department 2011, Republic of Senegal 2012, Belhabib et al. 2014, Belhabib et al. 2015.

Threats to Wild Fisheries: SENEGAL

- Wild fisheries in Senegal are threatened by poor management and overexploitation.
- About 60% of the fish taken from Senegal waters are taken illegally, negatively affecting fish populations, local food security and fishers' livelihoods, and resulting in $300 million in lost revenues annually.
- Overexploitation of some high value species has led to their collapse.

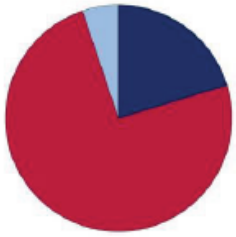
Credit: HK Arun

Industrial fleets operating in Senegal are estimated to have discarded an estimated 40% of their total catch between 1950 and 2010.

Sources: Thiao et al. 2012, Belhabib et al. 2014.

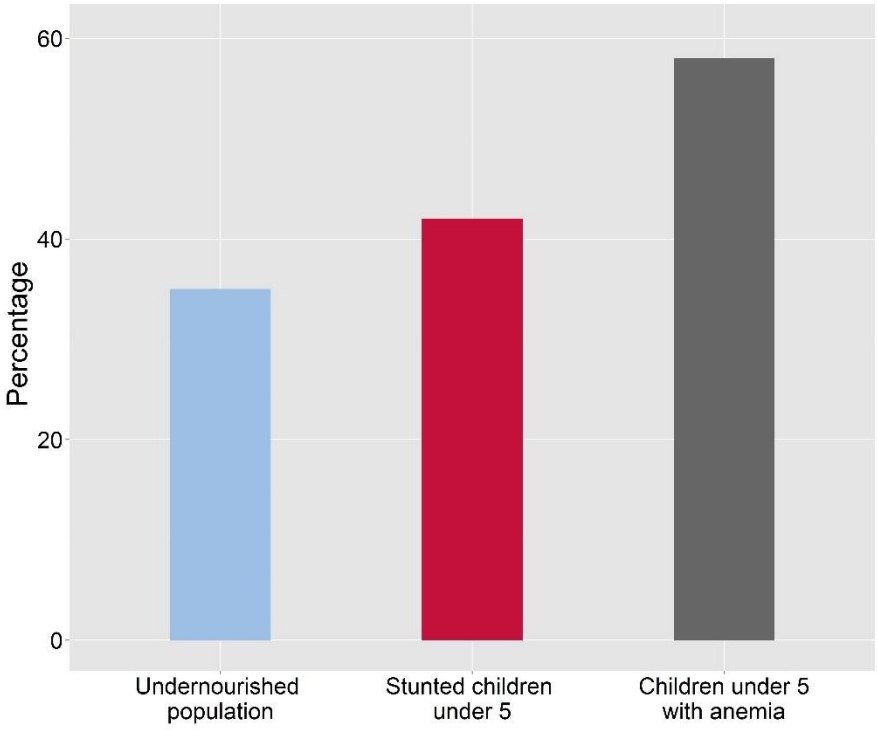
Importance of Wild Fisheries for Local Food Security: TANZANIA

- Fish provide an estimated 22% of dietary animal protein supply.
- The fisheries sector employs more than 4 million people.
- Due in part to harmful fishing practices, the growth of the fisheries sector has declined in recent years.
- Tanzania's National Strategy for Growth and Poverty Reduction recognizes the potential of sustainably managed fisheries to contribute to livelihoods and nutrition.



Land Area
Freshwater & Floodplains
Marine Area/Exclusive Economic Zone

Figure 17. Nutrition and Food Security Statistics for Tanzania.



Sources: United Republic of Tanzania Ministry of Finance and Economic Affairs 2010, United Republic of Tanzania Ministry of Livestock and Fisheries Development 2010, FAO Fisheries and Aquaculture Department 2011, National Bureau of Statistics (Tanzania) and ICF Macro 2011, The World Bank 2015.

Threats to Wild Fisheries:
TANZANIA

- Tanzania's fisheries face a number of challenges including over-exploitation, destruction of fish habitats through blast fishing and other harmful practices, and climate change.
- Coastal fishing communities in Tanzania are particularly sensitive to climate change due to their high dependence on fisheries for food security and livelihoods.
- Illegal fishing and trafficking of fish and fisheries products across Tanzania's borders divert valuable resources that could be utilized for national economic growth and poverty reduction strategies.

Credit: Philippe Guillaume

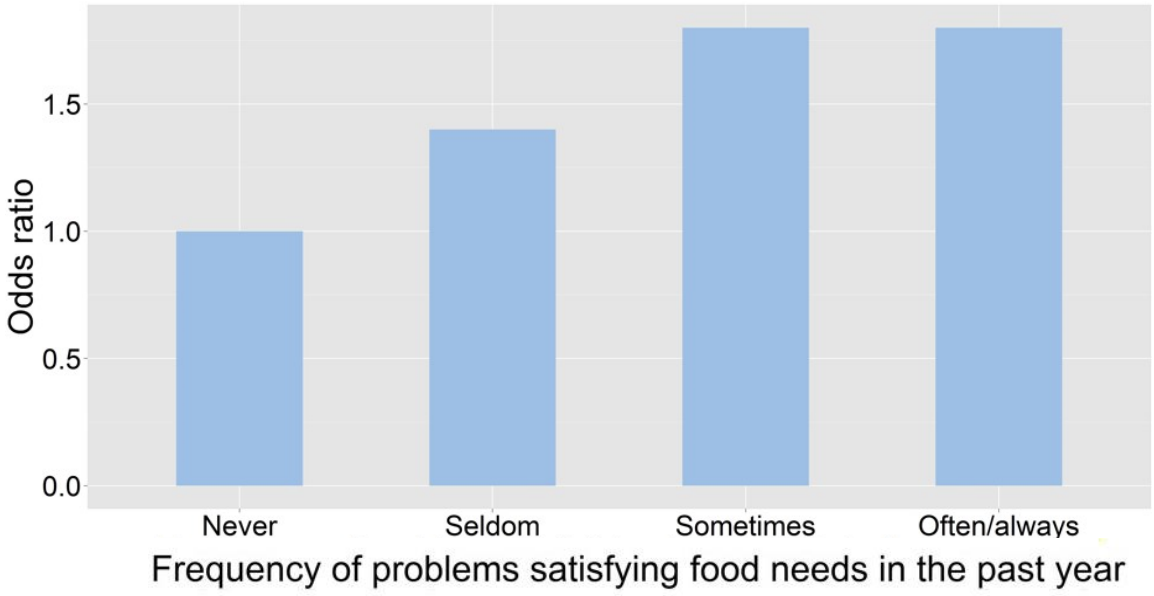
A 2012 study on the effectiveness of marine protected areas in three ecological zones in Tanzania found that they led to an increase in fish catch and income and a reduction in harmful fishing practices.

Sources: United Republic of Tanzania Ministry of Livestock and Fisheries Development 2010, Cinner et al. 2012, Machumu and Yakupitiyage 2013.

Demographic and Health Survey Analysis: TANZANIA

- Data from the 2010 Tanzania Demographic and Health Survey (DHS) were analyzed to better understand associations between fish consumption and select nutritional outcomes, as well as differences in fish and meat consumption based on geography, household wealth, and degree of food insecurity.
- Rural households within the poorest wealth quintile consumed fish on average almost three times more frequently than meat during the week before the survey.
- Rural households that experienced food insecurity in the previous year were more dependent on fish than meat.
- These findings suggest that poorer and more food insecure populations depend more strongly on fish as a protein source.

Figure 18. Odds of having eaten fish rather than meat by degree of food insecurity* during the previous year.



**Controlling for relevant socio-economic, environmental, and WASH variables.*

Sources: National Bureau of Statistics (Tanzania) and ICF Macro 2011, Jacob and Assaf unpublished data.

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