Distant Water Fishing

Overview of Research Efforts and Current Knowledge

October 2018

CEA | California Environmental Associates

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Introduction and Scope

Early in 2018 CEA was commissioned by the Packard Foundation to explore the topic of Distant Water Fishing (DWF) and its impacts on the ocean. The goal of the engagement was two-fold:

1) **Review leading academic research on DWF**
   Our goal was to understand current research agendas on DWF, and to solicit expert perspectives on the topic.

2) **Assess the current state of knowledge on DWF**
   Our goal was to aggregate the known body of knowledge on DWF, specifically attempting to answer the following research questions:
   - What are the known **impacts on the health of global fisheries** from DWF? What are the known intersections between DWF and **overfishing**?
   - What is known about **current trends** in the growth, size, distribution, and affiliation of DWFs?
   - Where have investments and supporting **subsidies** been most significant?
   - How are distant water fishing nations **investing in fisheries development** in the Global South?
   - What are the links between these investments and **fishing access agreements**?
   - What are the known intersections between DWF and **IUU fishing**?
   - What are the known intersections between DWF and **worker exploitation**?

The end product is this **Synthesis Report** aggregating the material CEA has uncovered, based on research undertaken between January and June of 2018.

Methods

Approach

Interviews & Outreach

CEA conducted outreach to 20 leading experts and academics, conducted nine interviews (an additional four responded with their thoughts over email), and also participated in a workshop hosted by Global Fishing Watch where many leading academics presented their work on DWF. In our interviews and outreach we described the nature of the project, shared our research questions, and encouraged sharing of ideas for work to advance the field. Our interviews were biased toward our existing connections and recommendations from interviewers. As such, a gap in this assessment is limited perspectives from the Global South.

Desk Research

In addition to interviews, CEA collected and reviewed 90 sources (academic papers, white papers, news articles, and grey literature) related to the research questions.

Note: CEA's research approach did not attempt to follow systematic review or meta-evaluation methods.

Contributors

Academics

- Simon Bush (Wageningen University)
- Chris Costello (University of Santa Barbra)
- Gordon Munro (UBC)
- Daniel Pauly (UBC)
- Rashid Sumaila (UBC)
- Reg Watson (University of Tasmania)
- Boris Worm (Dalhousie University)

Leading Experts

- Aurora Alifano (FishWise)
- Valerie Farabee (Liberty Asia)
- Tony Long & David Kroodsma (Global Fishing Watch)
- Amanda Shaver & Sally Yozell (Stimson Center)
- Andy Shen (International Labor Rights Forum)
- Steve Trent (Environmental Justice Foundation)

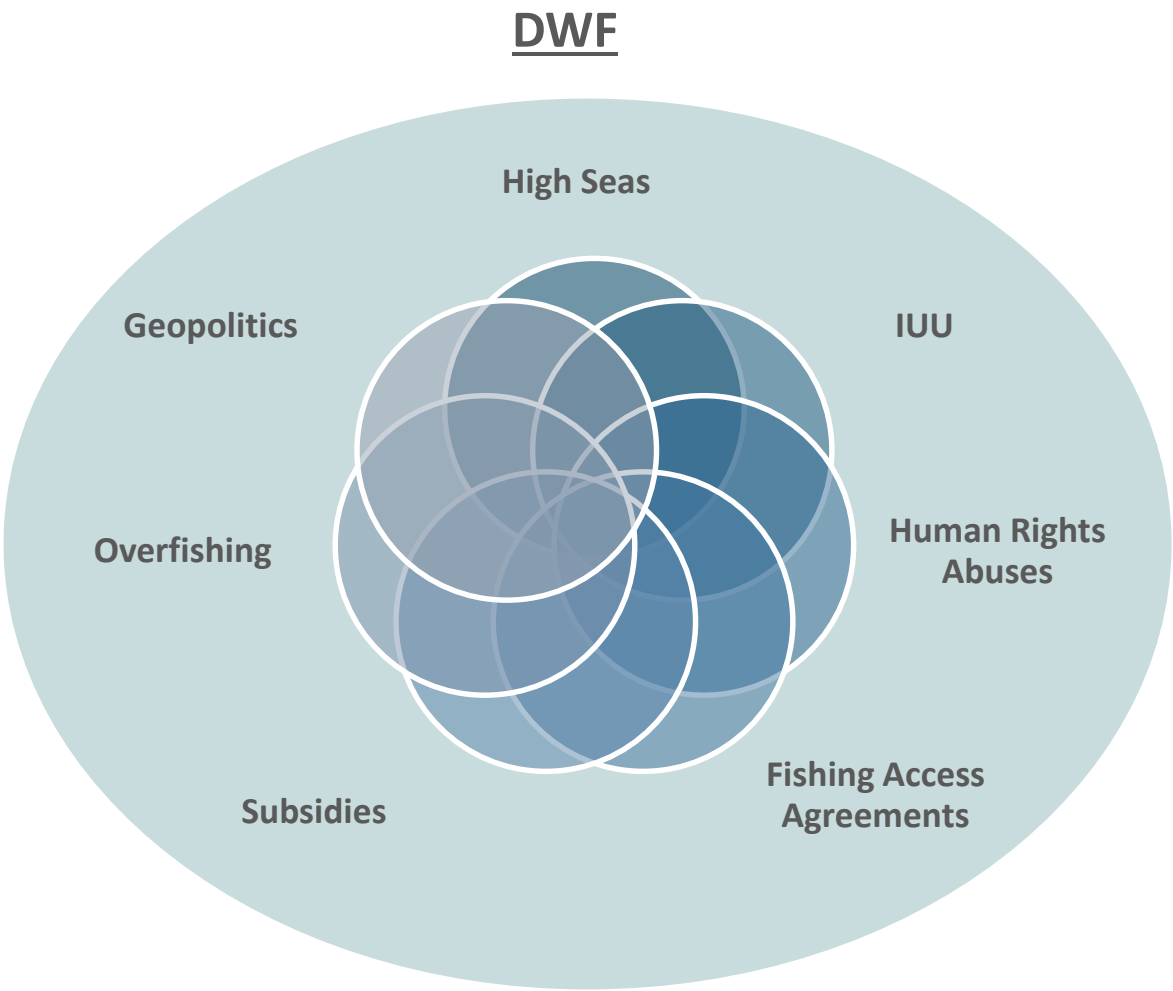
Executive Summary
Key Issues

DWF overlaps with many of the pressing issues and threats concerning the world's oceans today, without being synonymous with any one of them.

- Distant water fleets touch on issues of international and domestic law, economic development, conservation science and policy, geopolitics and diplomacy, and outright fraud, theft, human trafficking, and crime.

Despite these connections, distant water fleets as a topic unto themselves have been comparatively lightly studied.

- As an entire economic sector that operates outside traditional economic and political systems, distant water fleets have benefitted from a lack of concerted study.
- The most recent comprehensive overview of the extent of these fleets and their impacts on the economics and ecology of marine systems, was in 1998.



Source: Bonfil, Ramón, Gordon Munro, Ussif Rashid Sumaila, Hreidar Valtysson, Miriam Wright, Tony Pitcher, David Preikshot, Nigel Haggan, and Daniel Pauly. "Distant Water Fleets: An Ecological, Economic and Social Assessment," Fisheries Centre Research Reports, University of British Columbia. Vol. 6, No. 6. 1998.

Executive Summary
Key Issues

Distant water fishing is an opaque topic that is difficult to study due to data limitations, yet these fleets are likely having a significant impact on marine fishery resources.

- Fishing access agreements that create formal relationships between distant water fishing nations and host countries are rarely public, and it is only recently that automatic information system (AIS) tracking data has enabled any kind of verification of self-reported activities.
- The most recent global study is from 1998, which relied on data from the Food and Agriculture Organization (FAO) and used country and fishery case studies to demonstrate both positive and negative impacts. China and other emerging fishing powers are mostly absent from this analysis. The study documented historical catches of more than 230 million metric tons between 1950-1994 by DWFs.
- Case studies do exist, but are largely insufficient to capture the overall impact of DWF on host nations globally. For example, an ecological and economic assessment of distant water fishing in Namibia showed a 16% reduction in standing biomass in that ecosystem due to decades of effectively unchecked fishing activity prior to that country's independence in 1990.

Distant water fleets are justified by international law under the the idea of comparative advantage. In reality, these fleets seem to do little more than contribute to overexploitation, illegality, and human rights abuses. But those connections are hard to prove.

- In its official documentation of its access agreements, the EU pays approximately 25% of the value of the catch, China up to 40%. Accounting for unreported catches, this figure drops to 4% and 8% respectively.
- If not synonymous with IUU, there is significant (but as of yet unquantified) overlap in the Venn diagram between DWF, overfishing, IUU, human rights abuses, and fisheries subsidies. Teasing out these relationships is critical to understand how to change bad practices.

China, South Korea, and Taiwan are the distant water fishing powers of today, taking over from the EU, the former USSR, and Japan.[1]

- All three fish the waters of over 50 exclusive economic zones (EEZs). China alone has anywhere from 600 – 3,400 distant water fishing vessels.
- These nations have made incredible advances in technology, logistics, and business that enable these massive global networks of seafood production. For China, growth of its distant water fleet is a geopolitical and economic imperative, as it is often combined with billions of dollars in infrastructure development to lower income countries (US$20 billion in port infrastructure investments in 2017 alone).
- All three have been engaged in documented cases of illegal activity and egregious human rights abuses, resulting in a yellow card for Taiwan from the EU. The nature and extent of abuses, lack of action, and tepid response of the seafood industry at large are appalling, and point to the culture of illegality and lawlessness that seems to pervade the seafood industry.

More research that accurately characterizes the DWF industry and that does not rely on self-reported measures is needed, as this is an industry that thrives in the shadow cast by misperception, lack of public information, and outright criminal activity, even if good actors are among the bad. Distant water fleets do not deserve the benefit of the doubt that allows their activities under international and national laws.

[1]FAO categorizes China and Taiwan's catches together, but various data sources have different approaches to categorizing this information. Unless otherwise stated, data that refers to 'China' refers only to China (and not Taiwan), and the same for Taiwan.

Executive Summary
Research Areas

DWF remains a lightly studied topic, although it touches on many widely studied topics in ocean science and economics. Given its potential for significant adverse ecological, economic, and social impacts and the lack of recent studies examining its impacts, and in light of modern trends, all of the interviewees felt that additional research was needed to advance our understanding and inform policy action.

Research Area	Research Coverage	Possible Future Research Questions
Impacts on global fisheries & overfishing	**MODERATE**. Mostly case studies on countries or gear types, no global review.	• What is the global impact on fisheries attributable to DWF alone? • What is the actual catch level of DWF? • What have been the economic and social impacts of DWF on host nations?
Trends (growth, size, distribution, affiliation)	**LIMITED**. Existing reporting structures underestimate effort. Activities are notoriously secret and guarded.	• What proportion of DWF catch is caught on the high seas vs. in EEZs? • How have the activities of DWFs changed in the last 20 years, since the most recent comprehensive study?
Subsidies	**MODERATE**. Subsidies data is opaque, but academics seem to be converging on estimates to global fisheries.	• What proportion of DWF returns come from subsidies? • Are DWFs as a whole operating uneconomically? • What are the benefits of reducing or eliminating subsidies to DWFs?
Aid from distant water fishing nations	**LIMITED**. China's emergence has dwarfed historical investments and made traditional aid monitoring databases inaccurate and obsolete.	• What kinds of agreements is China negotiating with host countries? Are they trading development packages for fishing access? If so, to what extent?
Fishing Access Agreements (FAAs)	**LIMITED**. Most agreements are not made public and academic study has relied on incomplete databases.	• Under what conditions can FAAs be successful? Under which should they not be used? • What would be the ecological, economic, and social benefits of banning foreign fishing fleets from EEZs?
Illegal, unregulated, and unreported fishing (IUU)	**MODERATE**. Significant grey literature and increasing peer-reviewed literature on IUU, but DWF connections are hard to pinpoint with certainty.	• Which DWFs are most responsible for IUU fishing, and to what extent? • Is banning DWF from EEZs a sufficient proxy for taking action on IUU, especially in regions where IUU activity is high?
Worker exploitation & human rights	**LIMITED**. Most evidence is based in the grey literature, and data collection is methodologically and ethically difficult.	• What is the global extent of human rights abuses in fisheries, and specifically DWF? • Are there more effective (comprehensive, accurate, secret, less costly) ways to monitor for human rights abuses?

Key Issues

- Impact on fisheries
- Trends
- Subsidies
- Aid from distant water fishing nations
- Fishing access agreements
- Illegal, unregulated, and unreported fishing
- Worker exploitation

Key Issues - Overview

This section attempts to provide an overview of the current state of knowledge on a diverse range of topics related to distant water fishing. This is not an exhaustive, academic review but rather a broad scan of the literature for salient points. Pursuant to the research questions outlined at the outset of the project, we attempted to provide a high-level understanding of the following questions:

- **IMPACTS** – What are the known impacts on the health of global fisheries from distant water fleets? What are the known intersections between DWF and overfishing?
- **TRENDS** – What is known about the current trends in the growth, size, distribution, and affiliation (flag state) of distant water fleets?
- **SUBSIDIES** – Where have investments and supporting subsidies been most significant?
- **DISTANT WATER FISHING NATION AID** – How are major distant water fishing nations investing in fisheries development in the Global South?
- **FISHING ACCESS AGREEMENTS** – What are the connections between DWFN investments and fishing access agreements?
- **IUU** – What are the known intersections between DWF and IUU fishing?
- **HUMAN RIGHTS & WORKER EXPLOITATION** – What are the known intersections between DWF and worker exploitation?

For each issue area we provide an overview that covers:

- **LEVEL OF RESEARCH COVERAGE** – Is this a field with significant peer-reviewed literature or is it a field of emerging interest, but little academic study?
- **KEY FINDINGS** – What are the salient messages from a review of the main bodies of work on the topic?
- **TOP EXPERTS** – Who are the leading academics and NGOs working on these issues?
- **KEY RESOURCES** – What are the seminal papers, articles, and/or studies?
- **FUTURE QUESTIONS** – What gaps in knowledge exist, and where could future research efforts be directed?

Impacts on Fisheries

Level of Research Coverage	• MODERATE. Several in-depth case studies. One broad review. No global estimate of ecological or economic impact, and limited recent studies of direct impacts of DWF. Greater evidence referring to impacts of specific fleet types (e.g., longline vessels, trawlers) and in specific regions.
Key Findings	• In 2016 nearly 73% of the ocean's area was fished. Distant water fleets play an important, but as of yet unquantified role in this expansion. Estimates suggest 6-8% of fish are caught in the high seas, and ~20% caught illegally. • From 1950-1994, distant water fleets caught at least a cumulative 230 million metric tons, primarily tuna, mackerels, sardines, cods, hake, and cephalopods. • Pelagic longline fishing, which occurs primarily in the high seas, caused the decline of pelagic fish populations by 87-99% in the Atlantic and Gulf of Mexico since the 1950s. • Although positive benefits can accrue in the form of economic benefits to host nations, the impacts of distant water fleets are almost universally negative. In Namibia, the presence of DWF resulted in reduced standing biomass of 16%.
Experts	• **Ramón Bonfil**, Executive Director, Oceanos Vivientes • **Rashid Sumaila**, Professor, Fisheries Centre, University of British Columbia • **David Kroodsma**, Research Program Director, Global Fishing Watch
Key Resources	• Kroodsma, David A. et al. Tracking the global footprint of fisheries. *Science*. Vol 359, 904-908. Feb, 2018. • Bonfil, Ramón, et al. Distant Water Fleets: An Ecological, Economic and Social Assessment. *Fisheries Centre Research Reports, University of British Columbia*. Vol. 6, No. 6. 1998. • Sumaila, U. Rashid and Marcelo Vasconcellos. Simulation of ecological and economic impacts of distant water fleets on Namibian fisheries. *Ecological Economics.* Vol 32. 457-464. Aug, 1999.
Future Questions	• What is the global impact on fisheries attributable to distant water fleets alone? • What is the actual catch level of distant water fleets, not just numbers reported to FAO? • What have been the resulting economic and social impacts of distant water fleets on host nations?

Impacts on Fisheries

Globally, the exploitation of the seas via fishing is one of the most geographically extensive impacts humans have on our environment.

- According to a recent paper tracking the extent of fishing efforts globally, fishing occurs in >55% of ocean area and has a spatial extent more than four times that of agriculture. Approximately 73% of the ocean was fished in 2016 by 2.9 million fishing vessels, covering an area of more than 200 million km.[2]
- Effort is concentrated in the Northeast Atlantic, Northwest Pacific, and upwelling regions off of South America and West Africa.
- Longline fishing is the most widespread (45%) followed by purse seining (17%) and trawling (9.4%). Longline vessels display transoceanic, circumglobal movements whereas purse seiners and trawlers are active more regionally.
- These efforts contribute to overfishing, with nearly 90% of fish stocks fully fished or overfished, and annual economic losses of US$83 billion.

Distant water fleets cover the entire globe. The contributions of distant water fleets to the deterioration of the oceans and fishery resources are estimated to be significant, but are not well understood as a whole outside of certain countries and gear types.

- Historically, distant water fleets have been defined as collectives of fishing vessels operating outside the waters of their own territories. With the advent of EEZs in the 1970s, the definition now refers to those vessels fishing outside their own EEZs.
- These fleets have hotspots of activity in western Africa, the Indian Ocean, and the western and central Pacific.
- Sorting out exactly how much these fleets are catching is challenging, as frequently catches outside of EEZs go underreported or unreported (it is estimated that both China and Thailand report <10% of their distant water catch to the FAO).
- Although no estimate of global impact on fisheries exists, impacts have been documented in countries including Gambia, Iceland, Indonesia, Mauritania, Namibia, Norway, and Senegal. In Namibia, rampant distant water fishing by the USSR was deemed to be responsible for the collapse of the hake stock, and for a nearly 50% reduction in the ecosystem's productive capacity.

Although distant water fishing is justified under international law as a means of optimally utilizing fishing resources in cases where countries are unable to take advantage of them, in reality these fleets seem to be the result of overcapacity among powerful fishing nations, and are likely contributing significantly to the depletion of global fishery resources.

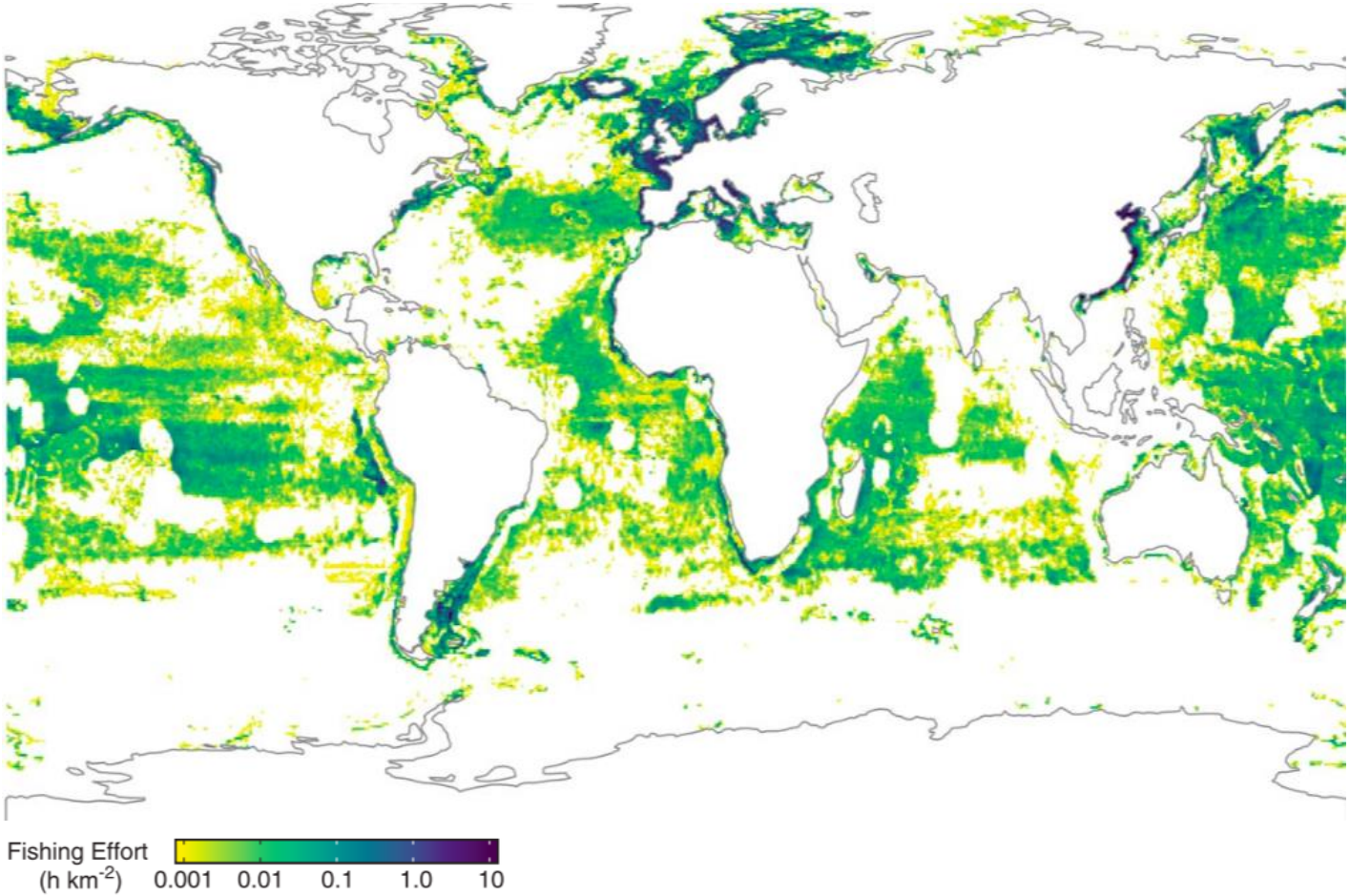
- There are some unique situations under which DWF may be beneficial to the host nation such as where a host nation has the capacity to administer the fishery and monitor and enforce compliance, and the DWFN is seeking an equitable deal.
- Most DWF relationships seem to be thinly veiled attempts to over exploit a country and its fishery resources.

Sources: Kroodsma et al. 2018.; SOFIA 2016. FAO.; Sunken Billions Revisited. 2016.; Sea Around Us Project.; Bonfil et al. 1998.

Impacts on Fisheries

The ability to use AIS (automatic identification system) tracking data has vastly improved our understanding of the footprint of global fisheries. While covering only a fraction (70,000) of the world's 2.9 million fishing vessels, the authors believe **this map represents 50-70% of total fishing effort expended while fishing more than 100 nautical miles from land.**

The spatial footprint of fishing effort, 2016*



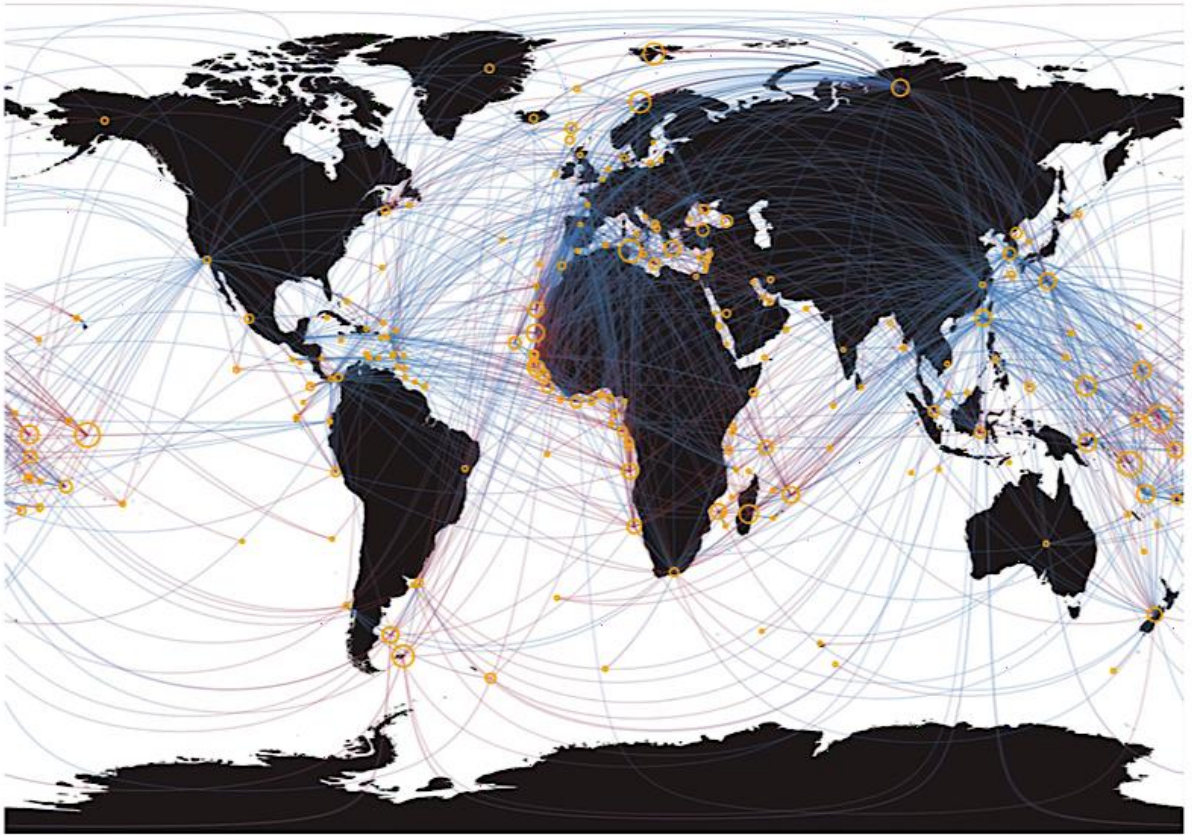
*Total fishing effort (defined as hours fished per square kilometer) in 2016 by ~70,000 vessels >6m in length with AIS tracking systems.
Source: Kroodsma et al. 2018.

Impacts on Fisheries

Produced using Global Fishing Watch automatic identification system (GFW AIS) data, this map shows the connections between distant water fishing nations and the EEZs of the countries they fish. Lines connect flag states (blue) fishing in foreign EEZs (red). Line thickness represents total fishing hours, and the circle size represents the number of distinct foreign vessels.

Hotspots can be observed in western Africa, the Indian Ocean, and the western and central Pacific.

Global network of distant water fishing, 2003-2016



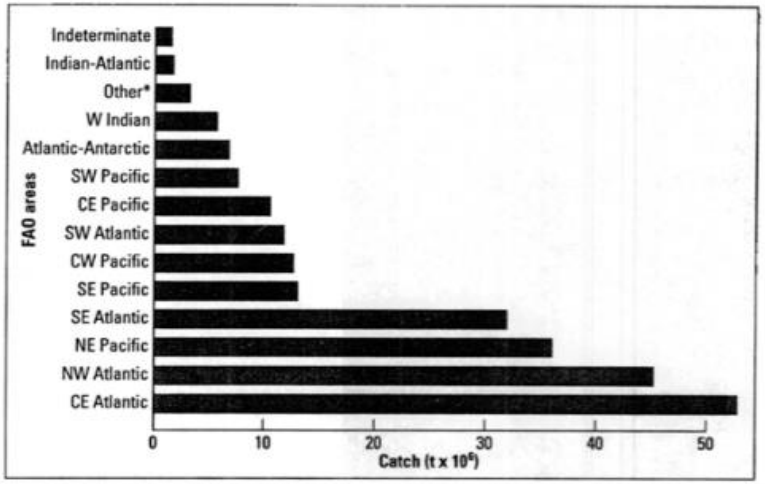
Source: Cabral et al. 2018.

Impacts on Fisheries

The most comprehensive assessment of the extent and impacts of distant water fleets was produced by the University of British Columbia in 1998. "Distant Water Fleets: An Ecological, Economic, and Social Assessment."

- This paper describes the evolution and extent of DWF, primarily through analysis of FAO data and case studies of countries where DWF was known to occur.
- While no global impact estimate was produced, the paper did quantify historical catches between 1950-1994, showing that **more than 230 million metric tons of seafood was harvested primarily from four main regions**: the Southeast Atlantic, Northeast Pacific, Northwest Atlantic, and Central Eastern Atlantic (corresponding to the relevant FAO Statistical Area).
- **Tunas and horse mackerels were the largest category of species fished**, followed by sardines, cods, hakes, pollock, and cephalopods.
- The case studies covered examples spanning impacts both positive and negative, including: Mauritania and Senegal, Galapagos Islands, Bering Sea, Iceland, Norwegian spring-spawning herring, northern cod in eastern Canada, Namibia.

Cumulative catches (1950-1994) of distant water fishing nations by FAO Statistical Area



Other (*) includes Mediterranean-Black Seas, Pacific-Antarctic, Antarctic intermediate, E Indian, and NE Atlantic areas.

Based on FAO Fishery Statistics

Source: Bonfil et al. 1998

Main fishery resources pursued by distant water fishing nations (cumulative catch 1950-1994)

Species	Catch 1950-94 (t x10⁶)	Notes
Tunas	32,096	38% Skipjack, 29% yellowfin
Horse mackerels	31,779	65% Chilean and Cape horse mackerels
Sardines etc.	23,502	77% Sardines (59% European pilchard), 18% herrings (74% Atlantic herring)
Cods	23,152	91% Atlantic cod
Hakes	21,290	53% Cape hakes, 19% silver hake, 13% North Pacific hake
Walleye pollock	20,620	-
Cephalopods	14,997	77% Squids (22% Argentine shortfin squid), 14% octopi
True mackerels	7,962	92% Atlantic and chub mackerels
Flatfishes	3,825	26% Yellowfin sole, 19% Greenland halibut
Grenadiers	2,777	59% Blue grenadier
Billfishes	2,187	34% Indo-Pacific blue marlin, 23% swordfish
Crabs	443	95% Snow and king crabs

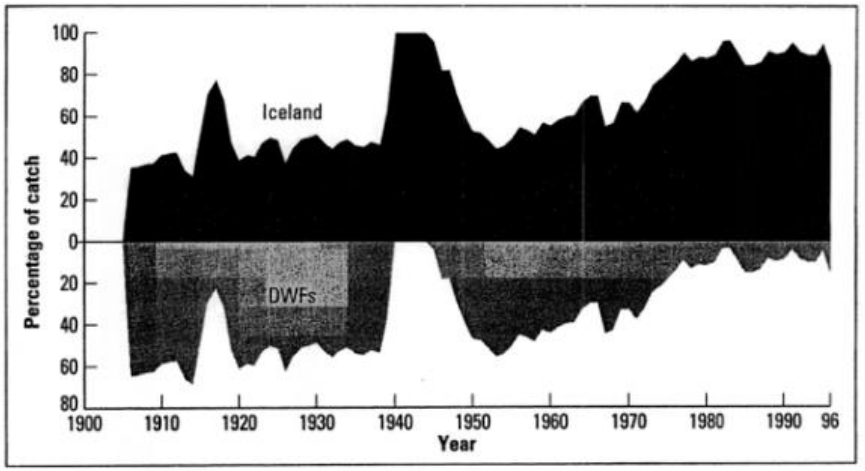
Source: FAO fishery statistics

Impacts on Fisheries

CASE STUDY: Beneficial Impacts – Iceland

Context: Iceland has a 5,000 km coastline and an EEZ of 758,000 km.[2] It sits at the intersection of three major currents (Irminger, East Greenland, East Iceland). Its most important fishery resources are demersal species like the Atlantic Cod, and the pelagic capelin fish. Iceland has a long history of distant water fleets from Europe fishing its waters. After WWII Iceland aggressively extended their EEZ, and all foreign fleets were expelled from Icelandic waters in 1975. Iceland also implemented management measures fairly early on – individual transferable quotas (ITQs) established for herring in 1979, capelin and ground fish, including cod, in 1984 and then all fisheries in 1990. Quotas can only be owned by Icelandic citizens. Foreigners are only allowed to own up to 25% of Icelandic fishing companies.

Iceland regained control of its fishery resources in the 1970s



Impacts

Positive

- **Economic development**. Fisheries are a main reason for Iceland's transition from agriculture. A successful ITQ system has allowed Icelandic companies to become highly profitable and expand globally. Fisheries were responsible for 75% of export earnings in 1996. Approach to foreign fleets has allowed Iceland to capture much of the value of its fisheries.
- **Fisheries management**. Almost all fisheries have a total allowable catch (TAC), and most considered in good condition.
- **Fishery recovery**. After an earlier collapse due to excessive foreign effort, the herring fishery has fully recovered. Stock recovery and growth has resulted in domestic quota increases, decreasing the incentive for Iceland to act as a DWF.

Negative

- **Bycatch**. Ongoing issues related to Atlantic halibut and skate.
- **Overcapacity**. Iceland's large and technologically advanced domestic fleet has gone global, becoming a major DWF presence.
- **Social inequity**. Inequitable initial quota distribution and ongoing consolidation.
- **Conflict over high seas fisheries**. For stocks that straddle or sit outside the EEZ, Iceland is in perpetual conflict with its European neighbors.

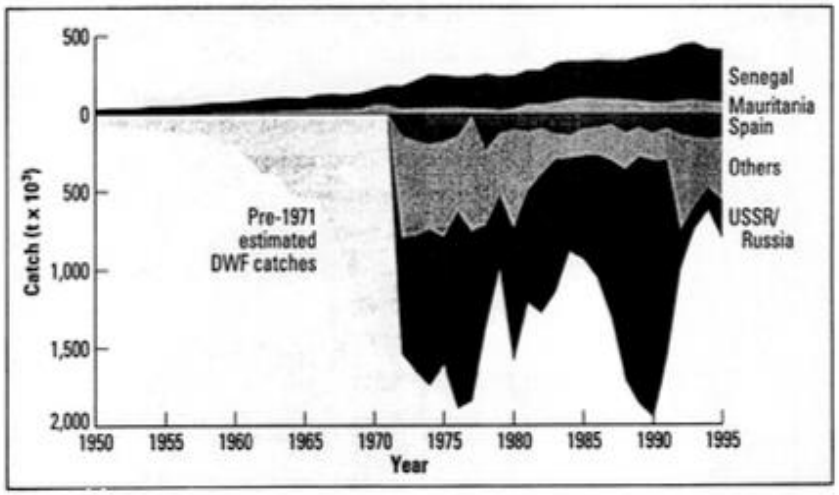
Source: Bonfil et al. 1998

Impacts on Fisheries

CASE STUDY: Mixed Impacts – Mauritania & Senegal

Context: Senegal and Mauritania have nearly 1,200 km of coastline in the highly productive Canary Current upwelling system off West Africa. Fishery resources are dominated by pelagic species (sardines, horse mackerels, and jacks). In the 1970s, governments poor in foreign exchange looked to fisheries as a source of foreign currency and income. Mauritania initially established requirements that foreign companies create joint ventures, land their catches in Mauritania, and employ Mauritanians. Senegal's fisheries have become highly developed but primarily artisanal, limiting DWF presence. Fishing by distant water fleets was effectively unchecked before 1977 by the USSR, Spain, Korea, Japan, Norway, Greece, Poland, Romania, Portugal, and Bulgaria.

Foreign fleets took a peak of 2 million tons of seafood off the coast of Senegal and Mauritania in 1990



Impacts

Positive

- **Economic benefits**. Mauritania at its peak received US$308 million in fisheries rents, constituting 68% of its foreign income (1988).
- **Foreign aid**. Mauritania has received millions in aid from countries seeking to exploit its resources.
- **Monitoring and enforcement**. The United States and Canada have assisted the Senegalese navy in improving its surveillance and monitoring capabilities.

Negative

- **Disproportionate catch.** DWFs take an estimated 80% of the catch, compared to 20% for national fleets.
- **Deteriorating fisheries**. Cephalopods and sardines are "overexploited" and the remainder "possibly fully exploited."
- **Illegal fishing**. Responsible for ~50% of total catch. Ability to monitor or enforce remains limited.
- **Outright theft**. It is estimated that only 33-50% of the fees required by access agreements are actually paid to the government.

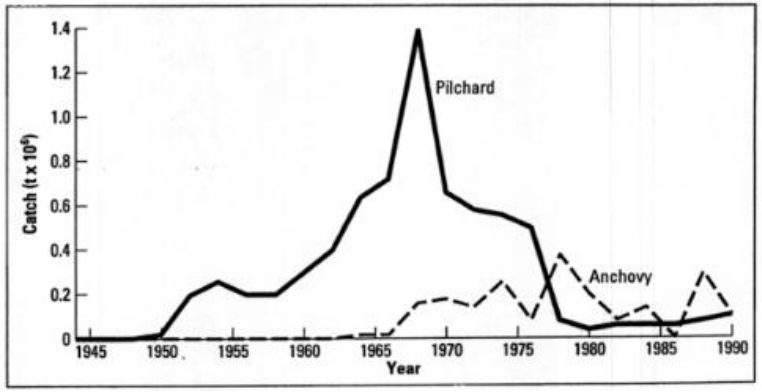
Source: Bonfil et al. 1998

Impacts on Fisheries

CASE STUDY: Negative Impacts – Namibia

Context: With a coastline of 1,500 km along the highly productive Benguela current system, Namibia has significant fishery resources. The economy is highly dependent on extraction and processing of minerals for export (diamonds, copper, uranium, gold, lead, tin, lithium, cadmium, zinc, salt, vanadium, and natural gas), and half of the country depends on subsistence agriculture. Prior to its independence in 1990 Namibia did not effectively have an EEZ, resulting in overfishing. The new government took steps to recover fish stocks and severely limited the number of licenses to foreign trawlers and encouraged joint ventures, resulting in foreign fishing declining by 90% post-independence. The main species are pilchard, horse mackerel, hake, and anchovy.

After heavy exploitation by DWFs in the 1960s, the pilchard fishery declined and was partially replaced by anchovy



Impacts

Positive

- **Economic benefits**. Fisheries form a significant part of the Namibian economy, responsible for 7.6% of GDP, the largest sector after mining (1994).

Negative

- **Fisheries declines and collapse**. Hake, horse mackerel, and sardine stocks were reduced by 32-49% of the biomass potential due to DWF. The USSR caused the collapse of hake stocks in the late 1970s.
- **Altered ecosystem**. The effect of DWF activities was to reduce standing biomass by 16% and resulted in a species shift from sardine to anchovy. Textbook example of excess effort, shift in species dominance, and overexploitation.
- **Lost economic rent**. Presence of DWF led to a loss of ~50% of what Namibia would have earned in their absence. Namibia inherited an ecosystem well below its productive capacity because of DWF.

Source: Sumaila, U. Rashid and Marcelo Vasconcellos. Simulation of ecological and economic impacts of distant water fleets on Namibian fisheries. *Ecological Economics.* Vol 32. 457-464. Aug, 1999.

Trends

Level of Research Coverage	• **LIMITED**. DWFs have operated on the margins of the law and human understanding for centuries, and as such their activities over time are not well documented. Existing data sources (FAO, public fishing access agreements) are woefully inadequate or not synthesized for the public (Sea Around Us Project), and AIS tracking technology is only just beginning to give us a better understanding of this notoriously secretive sector.
Key Findings	• Historically, the USSR, Japan, and the EU were the dominant distant water fishing nations for most of the 20th century. The USSR and EU have dropped off significantly in recent years. • The greatest historical fishing pressures have been in West and Southern Africa, the Central Pacific, and both coasts of Canada (NW Atlantic and NE Pacific). • China, Taiwan, and South Korea have filled that gap and then some. China has anywhere from 600–3,400 boats in its distant water fleet, and all three nations fish the waters of more than 50 EEZs. • A wide variety of species are targeted by DWFs, with a range of gear types (trawlers, purse seiners, longliners, squid jiggers). • Very little is known about where DWF catch is landed, and it is likely underreported.
Experts	• **Boris Worm,** Professor, Dalhousie University • **David Kroodsma,** Research Program Director, Global Fishing Watch • **Daniel Pauly,** Fisheries Centre, University of British Columbia • **Sally Yozell and Amanda Shaver,** Stimson Center
Key Resources	• Bonfil, Ramón, et al. Distant Water Fleets: An Ecological, Economic and Social Assessment. *Fisheries Centre Research Reports, University of British Columbia*. Vol. 6, No. 6. 1998. • Pauly, Daniel et al. China's Distant Water Fisheries in the 21st Century. *Fish and Fisheries*. 2014. • Boerder, Kristina et al. Global Hotspots of Transshipment of Fish Catch at Sea. In review. 2018. • Global Fishing Watch/Stimson Center Research (in progress).
Future Questions	• What proportion of DWF catch is caught on the high seas vs. in EEZs? • How accurate are AIS studies of DWFs? Should these data be supplemented? • How have the activities of DWFs changed in the last 20 years (the most recent comprehensive study)?

Trends

Analysis of DWF is constrained by limited data, but this is changing with the advent of AIS tracking technology and sophisticated methods for analyzing these data. However, there are some clear historical trends.

- Historically, the USSR was the largest distant water fishing nation. The EU and Japan also had significant presences, up until the late 1980s, operating effectively unchecked until the formation of EEZs in the mid-1970s. Effort from those regions has declined, but has been offset by the rise of China, South Korea, and Taiwan as the most prominent distant water fishing nations.
- For most of the 20th century, effort (~75% of historical catches) was concentrated in four main areas: Central Eastern Atlantic, Northwest Atlantic, Northeast Pacific, and Southeast Atlantic.
- Studies coming out in the next year are likely to drastically reshape our thinking about distant water fleets, based on AIS data analysis. For example, recent estimates showed that five flag states (China, Spain, Taiwan, Japan, and South Korea) accounted for more than 85% of the observed effort on the high seas.

FAO catch data is likely an inaccurate representation of current effort, especially given the massive expansion of East and Southeast Asian fleets.

- China is estimated to under report its catch to the FAO by a factor of 10, and has an estimated DWF of 3,400 boats, according to Sea Around Us Project catch reconstructions (which excludes Taiwan).
- A wide variety of species are targeted by these fleets: tuna, mackerels, Atlantic Cod, walleye pollock, sardines, hakes, cephalopods, true mackerels, flatfishes, grenadiers, billfishes, crabs.

China is the largest DWFN, with anywhere from 600–3,400 boats, fishing in over 50 EEZs. They are followed closely by Taiwan.

- China's maritime presence in foreign countries is part of a strategic growth imperative that involves not just seafood production but significant investments in infrastructure (US$20 billion in foreign port infrastructure last year alone). Their aims and practices remain largely opaque.

Technological, logistical, and business advances have enabled the growth of distant water fleets. It's not clear that monitoring and enforcement capabilities are able to keep up.

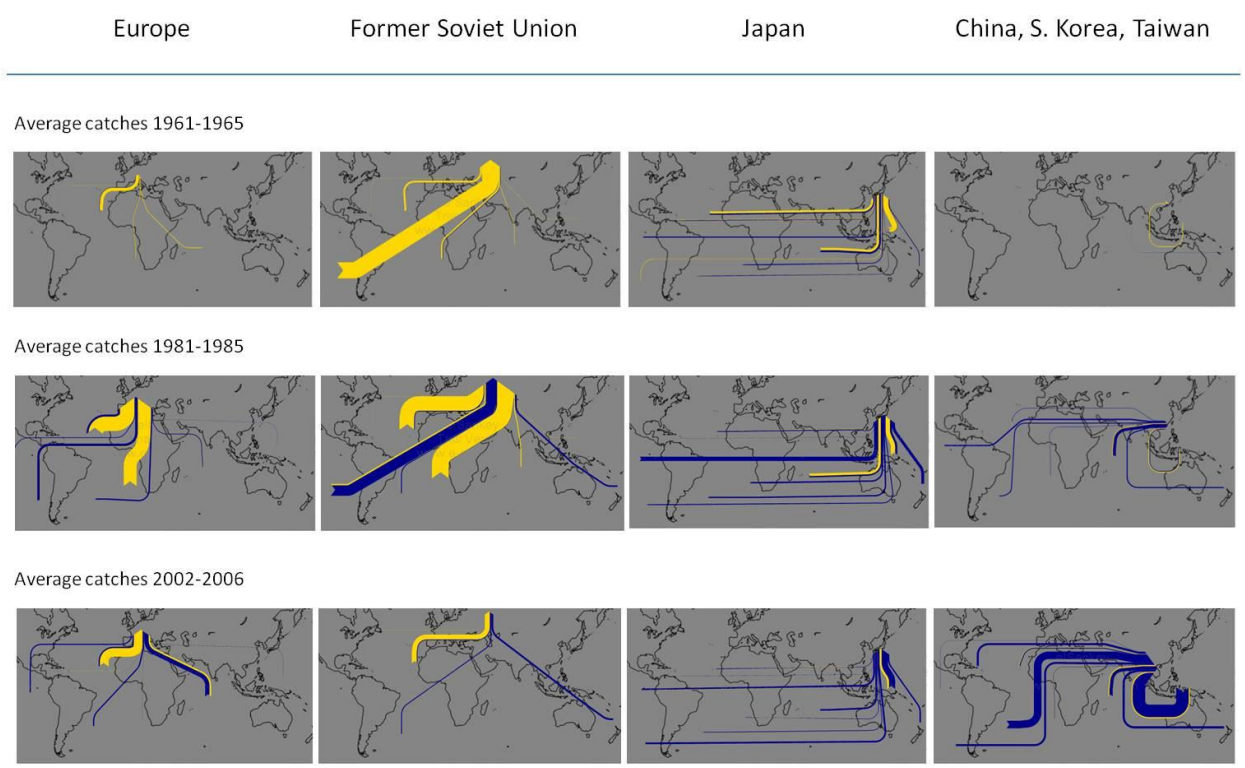
- While AIS tracking data are improving our understanding of these fleets, they only capture a portion of total effort and AIS data can be manipulated. Additionally, practices on board these vessels remain almost entirely unknown.

Sources: Bonfil et al. 1998; Gagern, Antonius and Jeroen van den Bergh. A critical review of fishing agreements with tropical developing countries. *Marine Policy*. Vol. 38. Jul. 2012.; Kroodsma et al.2018; Stimson Center/Global Fishing Watch data.; Pauly et al. 2014.

Trends

Growth and composition of DWF over time (1961-2006)

Historically, the USSR was the dominant DWFN, especially prior to the EEZ regime which came into effect in the mid-1970s. Along with the EU and Japan, these historical entities have been replaced by China, South Korea, and Taiwan.



Yellow fluxes are fish caught in national EEZs and blue fluxes indicate open ocean fisheries. Catch data comes from the Sea Around Us Project.
Source: Gagern A. et al. (2013) A critical review of fishing agreements with tropical developing countries. Marine Policy

Some notable trends:

- Fishing grounds have expanded and catches increased for all DWFNs between 1961-1985.
- Distant water landings have declined, along with the number of areas fished for Japan, EU, and former Soviet countries.
- Chinese, Taiwanese, and S. Korean catches and fishing areas increased up until 2006 (the last year for which data was included).
- China, South Korea, and Taiwan should show up as more significant presences than they do, which likely reflects the data source's limited access to data from fishing agreements.
- Low- and middle-income countries (LMICs) and emerging economies in Asia and Africa are increasing their presence as DWFNs, offsetting reductions from the EU, former Soviet Union, and Japan.

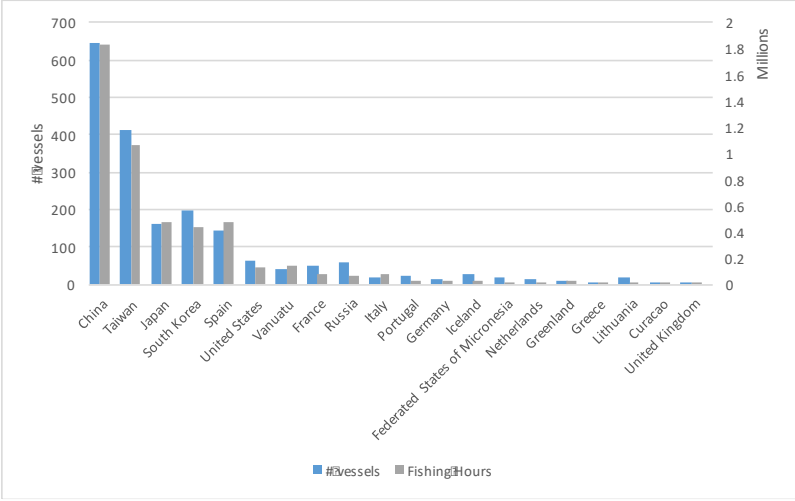
Trends

Top distant water fishing nations (DWFNs) and EEZs fished by DWFNs

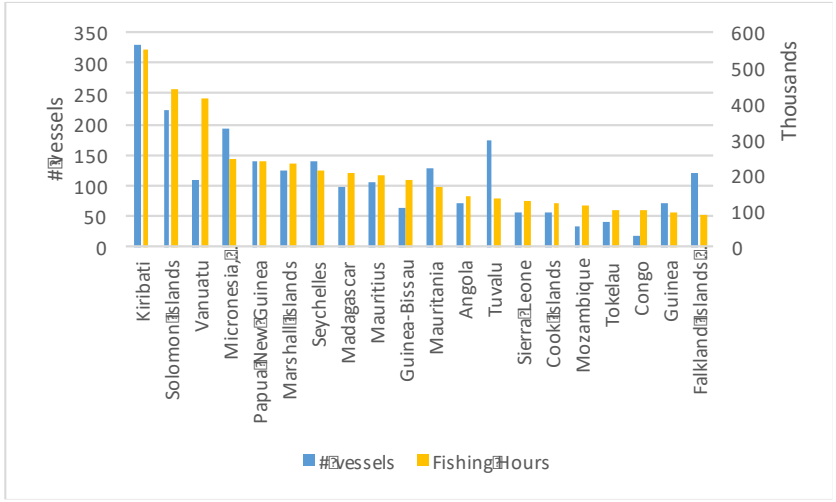
The Stimson Center has a major year-long project exploring a wide variety of topics related to DWF (practically all the topics CEA attempted to cover in this review). They are collaborating with Global Fishing Watch to provide updated estimates of the top distant water fleets and the EEZs that are most fished by them using their automatic information system (AIS) tracking data. They define distant water fleets as groups of fishing vessels from the same country that conduct fishing activities in Exclusive Economic Zones of foreign nations, except countries whose EEZ is adjacent to the country in question (which may exclude some Southeast Asian and Scandinavian nations).

GFW's preliminary analysis echoes existing research that identifies **China, Taiwan, Japan, South Korea, and Spain as the countries with the largest distant water fleets.** Thailand, Vietnam, Indonesia, and the Philippines were excluded due to low AIS data. And while their research echoes historical trends around DWF pressure in the Eastern Central Pacific, some of their findings have been surprising, such as the importance of Eastern Africa, and the intensity of fishing pressure in the Central Pacific.

Top distant water fishing nations (DWFNs)



Which EEZs are Most Fished by DWF?



Source: Stimson Center/Global Fishing Watch data. Years analyzed are 2016-2017.
Note on limitations: Low AIS fleets: Thailand, Vietnam, Philippines, Indonesia. Did not include date from EU fleets fishing in other EU country EEZs. Should be considered a rough cut subject to refinement over the course of the Stimpson Center's research.

Trends
China

China is truly the elephant in the room when it comes to distant water fisheries.

- A study by Daniel Pauly and colleagues at UBC argued that China's actual catch was nearly 10 times greater than that reported to the FAO (4.6 million metric tons /year from 2000-2011, compared to an average of 368,000 metric tons /year reported to the FAO). This corresponds to a value of €8.6 billion, 14% of the ex-vessel landed value of the world's reported catch.
- China has developed significant advances in technology, logistics, and business that enables them to coordinate this incredible global effort.

China fishes in the EEZs of over 50 nations, but their agreements with host nations remain opaque.

- Pauly et al. estimated China's fleet at 3,400 vessels catch the most in African water (3.1 million metric tons/year), followed by Asia (1.0 million metric tons/year), Oceania (198,000 metric tons/year), and Central and South America (182,000 metric tons/year) and Antarctica (48,000 metric tons /year).
- China operates with specialized catcher vessels (bottom trawlers, purse seiners, squid jiggers, and longliners) that are linked to mother ships that deliver catch to strategically located freezing and processing facilities that supply local, international, and Chinese domestic markets.
- It is estimated that approximately 1/3 of the catch was landed locally, 1/3 went to high-value markets (invertebrates, high-value species), and 1/3 went to the Chinese domestic market (medium and large demersal fish, shark fins).

China seems to have no intention to constrain its distant water fleet. To the contrary, the One Belt, One Road initiative (described later in this review) as well as broader geopolitical aims suggest that fisheries expansion is part of a strategic growth effort.

- **China's 13th Five Year Plan (2016-2020)** states that it will simultaneously develop high seas fishing capacity and strictly control the intensity of fishing. In early 2017, the Chinese Ministry of Agriculture sought to address overfishing by announcing reductions of medium- and large-sized vessels by 8,300 and total fishing vessels by 20,000. However, these represent reductions of only 13% of the distant water fleet and less than 3% of the total fleet, and subsidies that led to significant expansion of the fleet from 2008 to 2012 have remained in place.

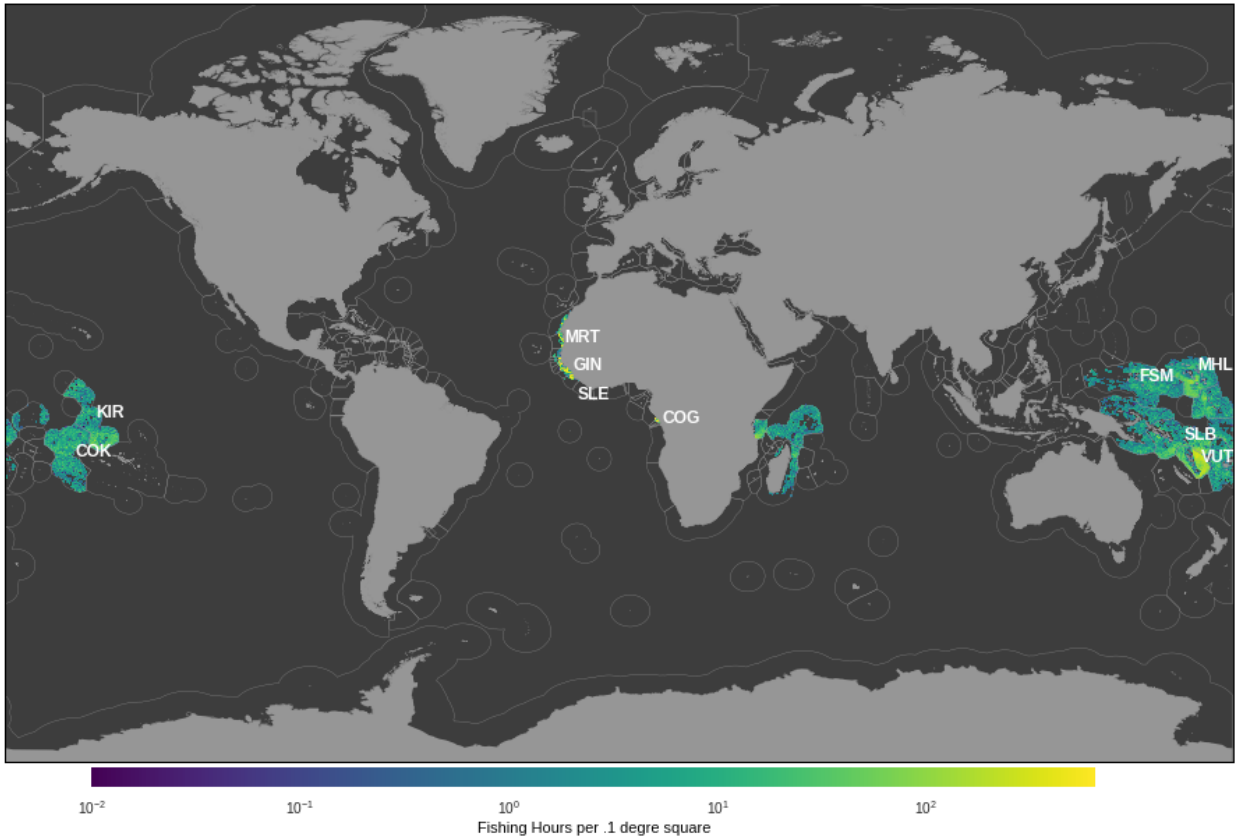
Sources: The 13th Five-Year Plan for the Social and Economic Development of China: 2016-2020 https://tinyurl.com/k6ha7u5 ; "China pledges to shrink its fishing fleet by 20,000 vessels." Undercurrent News. 2017."https://tinyurl.com/md6qjzn ; Pauly et al., "China's distant-water fisheries in the 21st century," 2013.

Trends
China

The Stimson Center/GFW research is creating profiles of the major DWFNs to provide updated information on their level of effort and the countries where that fishing effort is expended.

- Preliminary results for China show intense effort in the Central Pacific and the coasts of West and East Africa.
- These estimates will need to be compared against other efforts to quantify Chinese catch (e.g., Sea Around Us Project).

Top 20 EEZs fished by China's distant water fleet, by fishing hours (2016-2017)*



	Country	# of vessels	Accumulated fishing hours
1	Vanuatu (VUT)	104	401,900
2	Kiribati (KIR)	92	231,658
3	Solomon Islands (SLB)	74	180,042
4	Marshall Islands (MHL)	34	172,153
5	Cook Islands (COK)	35	108,101
6	Micronesia, Federated States of (FSM)	42	86,463
7	Guinea (GIN)	37	78,331
8	Mauritania (MRT)	32	68,830
9	Sierra Leone (SLE)	18	60,448
10	Congo (COG)	10	54,277

Source: Global Fishing Watch/Stimson Center. *Represents >95% of China's DWF total fishing hours, excluding neighboring EEZs

Trends
Transshipment

With the advent of advanced fishing technology, distant water fishing nations are able to engage in ever more sophisticated logistical efforts in pursuit of fish. One interviewee made the analogy to offshore oil and gas development.

- Transshipment refers to the practice of transferring fish from catching vessels to refrigerated cargo vessels, known as "reefers" that can resupply boats with food, water, bait, and crew.
- Most of these activities are thought to occur outside national waters, as they are often banned in national waters given their association with illegal activity.

A study by Boerder, Miller, and Worm is the first global effort to quantify the extent of this practice. In short, excluding Russia, the majority (57%) of transshipment events occurred on the high seas, half of which involved longline vessels. **It's therefore likely that much of the transshipped catch is high-grade tuna and other line-caught species like sharks and billfishes (swordfish, marlins)**. Trawlers in territorial waters and longliners on the high seas contribute to a large majority (74%) of likely transshipment events.

Summary of "Global Hotspots of Transshipment of Fish Catch at Sea" (Kristina Boerder, Nathan A. Miller, Boris Worm, 2018)

- **Extent:** Between 2012-2017, 501 reefers met up with 1,856 fishing vessels in 10,510 likely transshipment events. These events occurred in all oceans and across 42 EEZs.
- **Location**: Spatial hotspots off Russia, West Africa, South Indian Ocean, and the equatorial Pacific Ocean. Reefers travelled to meet fishing vessels at fishing grounds.
- **High Seas/EEZs**: 35% of likely encounters occurred on the high seas, while 65% took place in EEZs. 39% took place in the Russian EEZ with the remaining 61% spread across 41 other nations. Excluding Russia, 57% of likely encounters took place on the high seas. The majority of the hours vessels spent fishing before meeting a reefer were located in EEZs.
- **Vessel types**: Trawlers (53%), longliners (21%), squid jiggers (13%), pots and traps (7%), purse seiners (1.2%). Transshipment from trawlers was most common in northern hemisphere EEZs, whereas majority of transshipments from longliners, purse seiners, and squid jiggers occurred on the high seas.
- **Timing**: Average duration of 11.6 hours. Fishing vessels transshipped ~1x/month.
- **DWFNs**:
  - *Reefers*: 33 flag states operate reefers, 41% of which were flagged as "Flags of Convenience," 60% excluding Russia. Russia operated 32% of the reefers, Panama 20% - flag of convenience, and Liberia 7% - flag of convenience. Encounters between fishing vessels and reefers flying FoCs were more common on the high seas for all gear types.
  - *Fishing vessels*: Vessels from 47 nations were found to encounter those reefers and engage in likely transshipment (Russia – 26%, China – 20%, Taiwan – 15%).
- **Species involved**: Tuna, sharks, billfishes, groundfish, salmon, crustaceans.
- **Limitations**: Some areas not 100% covered by AIS data, which it is also possible to manipulate. A case study trying to recreate documented transshipment events was only successful in reconstructing ~50%, meaning overall estimate is likely conservative.

Subsidies

Level of Research Coverage	• MODERATE. Subsidies data is notoriously opaque. The OECD and UBC both attempt to maintain databases cataloguing fisheries subsidies. Rashid Sumaila at UBC is the recognized leader in understanding fisheries subsidies – Sumaila is an author in nearly all studies on the topic.
Key Findings	• Subsidies can generally be classified into three types: beneficial (i.e., for fisheries management), capacity-enhancing (i.e., fuel), and ambiguous (i.e., rural community development initiatives). • Fisheries subsidies are estimated at US$ 35 billion annually. The EU, China, and Japan provide the greatest amount of capacity-enhancing subsidies to their fleets, whereas the US provides the greatest amount of beneficial subsidies in the form of aid to fisheries management. • Fuel subsidies make up the largest fraction of subsidies, accounting for ~US$8 billion annually. Fisheries consumed ~50 billion liters of fuel annually. • Many distant water fisheries would be uneconomical without fisheries subsidies, especially fuel subsidies (Sala et al., 2018).
Experts	• **Rashid Sumaila**, Professor, Fisheries Centre, University of British Columbia • **Sarika Cullis-Suzuki**, Visiting Scientist, Ocean Networks Canada • **Peter Tyedmers**, Professor, School for Resource and Environmental Studies, Dalhousie University
Key Resources	• Sumaila, U. Rashid et al. Subsidies to high seas bottom trawl fleets and the sustainability of deep-sea demersal fish stocks. *Marine Policy*. Vol. 34, 495-497. May, 2010. • Sumaila, U. Rashid et al. Global fisheries subsidies: an updated estimate. *Marine Policy*. Vol. 69, 189-193. Jan, 2016. • Sala, Enric, et al. "The Economics of Fishing the High Seas." *Science Advances.* 4, no. 6 (June 1, 2018).
Future Questions	• What proportion of DWF returns come from subsidies? • Are distant water fleets as a whole operating uneconomically? • What are the benefits of reducing or eliminating subsidies to the distant water fleet?

Subsidies

Fisheries receive a wide variety of payments from government entities, generally referred to as subsidies (also, support programs, financial support, economic assistance, and government financial transfers). As such, **there is no universally agreed definition of subsidies, but generally they can be classified into three types**:

- **Beneficial subsidies** – programs that improve conservation and social outcomes in the fishery, generally in the form of support to fisheries management.
- **Capacity-enhancing subsidies** – programs that involve capital inputs and infrastructure investments that reduce costs or enhance revenues, such as subsidies for boat construction or fuel subsidies.
- **Ambiguous subsidies** – programs that can lead to a beneficial or negative outcome for the fishery resource, such as fisher assistance programs, vessel buybacks, and rural fisher community development programs.

There is wide variation in estimates of fisheries subsidies. According to what CEA believes is the best available data, **fisheries subsidies are estimated at US$35 billion in 2009**.

It is widely thought that DWF exists in large part as a result of or directly due to subsidies. Removing these subsidies would likely make catch uneconomical.

- A paper (Sumaila et al. 2010) studying subsidies to high seas bottom trawl fleets found that subsidies amounted to US$ 152 million annually, 25% of the landed value of the fleet. They also estimated that profits for this vessel group were not greater than 10% of total landed value, meaning high seas bottom trawl fisheries likely operate uneconomically.
- Fuel costs are estimated to make up ~24% of the costs of fishing. Yet fishing fleets do not seem to respond to significant changes in fuel prices (>50% drop), a price elasticity of -0.061 (highly inelastic). One interpretation is that fuel subsidies decouple fisheries production from the cost of energy, meaning fisheries are not subject to these market forces and likely are operating uneconomically.
- A paper looking at the high seas specifically (Sala et al. 2018) found that more than half (54%) of fleets fishing the high seas would be unprofitable without subsidies (an estimated US$4.2 billion) and low labor compensation, at current exploitation rates – which varies significantly by country and gear type. Consistent with previous studies, this paper found that “deep-sea bottom trawling on the high seas showed a broad pattern of unprofitability worldwide.”

Sources: Sumaila et al. 2015.; Sumaila et al. 2010.; Kroodsma et al. 2018.; Sala et al. 2018.

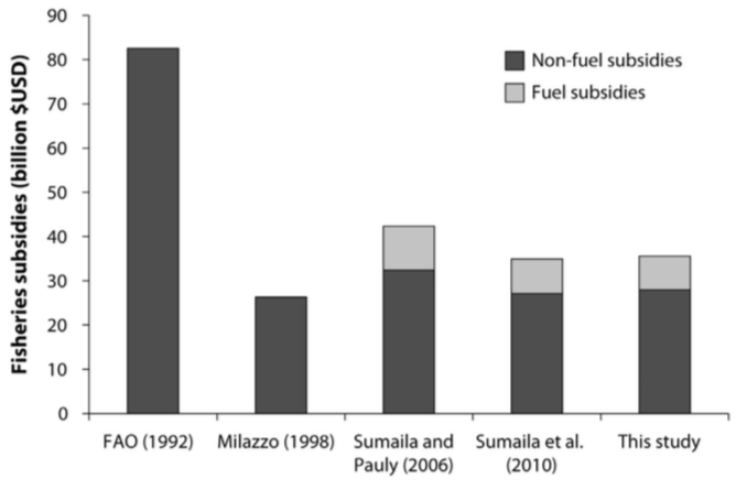
Subsidies

No global public database of fisheries subsidies exists, and countries face various incentives and disincentives for accurately reporting these subsidies. The most comprehensive estimates are believed to come from Rashid Sumaila at UBC, who has built up a subsidies database and refined an estimation methodology over decades.

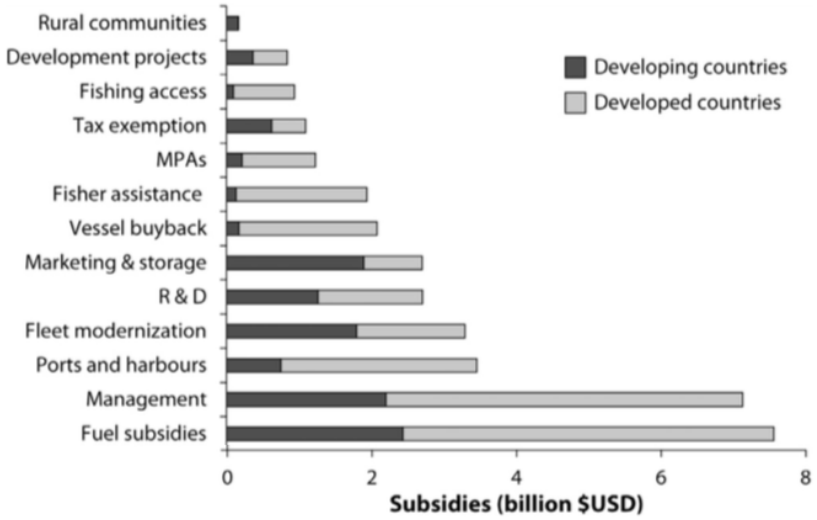
Fuel subsidies represent the largest category of subsidies, at 22% of the total and nearly US$8 billion annually. These are followed by management subsidies (20%) and ports and harbors (10%). Capacity enhancing subsidies still outweigh beneficial and ambiguous subsidies (~US$20 billion vs. ~US$15 billion).

Developed countries provide more subsidies to their fishing fleets than do developing countries, at 65% and 35% of all subsidies, respectively. Asia as a region provides the greatest amount of subsidies, at more than US$15 billion, followed by Europe at ~US$9 billion, and North America at ~US$7 billion (the majority of which are beneficial).

Comparison of global fishery subsidy estimates



Composition of the subsidy estimates by type and development status, 2009



Source: Sumaila et al 2015.

Subsidies

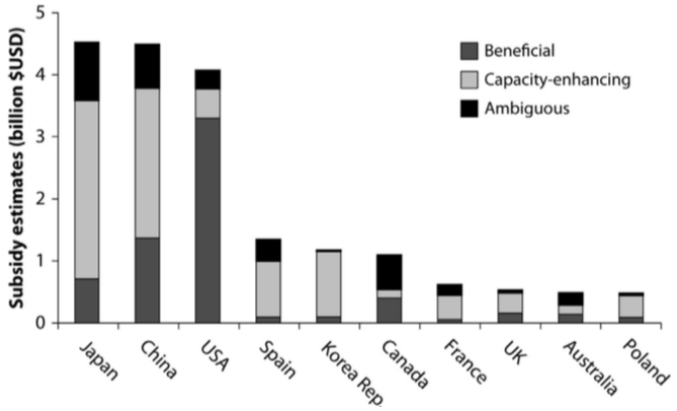
The EU, Japan, and China are heavily subsidizing their fleets. As all of these countries are also prominent distant water fishing nations, it is likely that their distant water fleets are likely also benefitting from these subsidies.

- These subsidies are likely the primary reason for the immense growth in fishing capacity and effort, and subsequent declines in catch per unit effort.

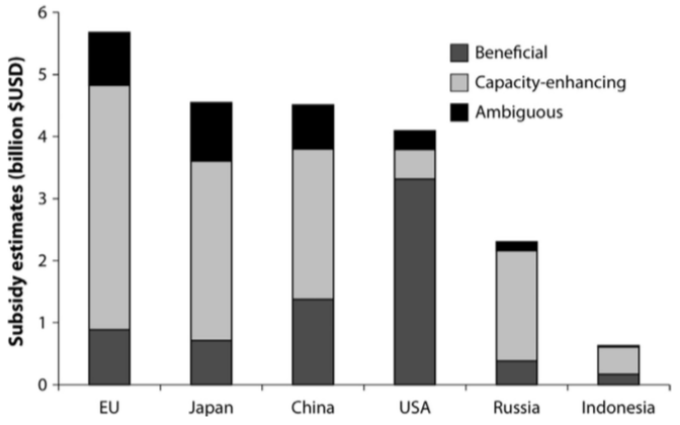
The US is a leader in providing beneficial subsidies to its fisheries, primarily in the form of assistance to fisheries management. Canada and Australia have a greater share of ambiguous subsidies.

- Estimated annual subsidies to marine protected areas are ~US$870 million, less than 3% of the total subsidies to fisheries.

Subsidy estimates for the ten largest subsidizing developed fishing countries, 2009



Subsidy estimates by major fishing political entities, 2009



Sources: Sumaila et al 2015. ; Cullis-Suzuki, Sarika et al. "Marine Protected Area Costs as "Beneficial" Fisheries Subsidies: A Global Evaluation. *Coastal Management*. 2010.

Subsidies

Fleets fishing the high seas are clearly dependent on subsidies and low labor costs to ensure profitability.

- 54% of current high seas fishing grounds would be unprofitable without subsidies and low labor costs.
- High seas catch accounts for ~6% of total catch, according to the Sea Around Us Project.

Profitability varies by nation and gear type.

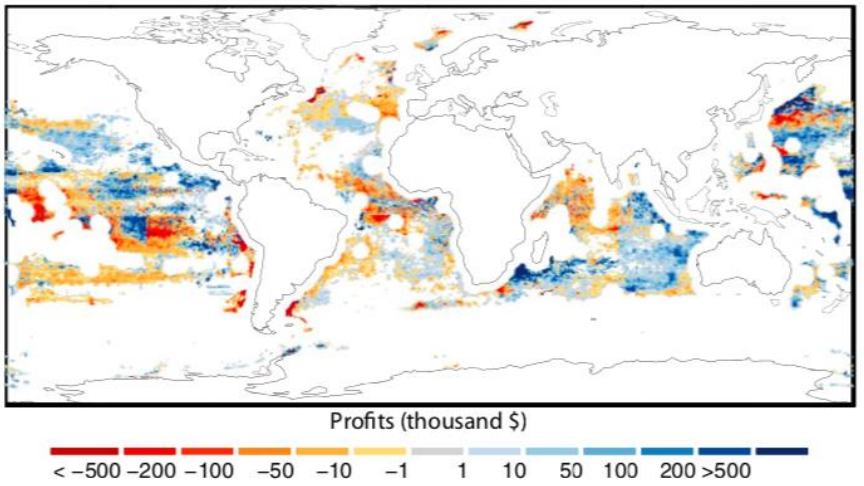
- Negative returns accrue primarily to three nations: China, Russia, and Taiwan.
- In Japan, subsidies represent more than 4x the estimate of high seas profits.
- Drifting longliners and purse seiners that target mobile, high-value species (tuna, sharks) are the most profitable.
- All other fisheries and gear types are barely profitable or unprofitable (especially deep-sea bottom trawling and squid jiggers).

How can countries continue to fish while accruing economic losses? Sala et al. suggest the following reasons:

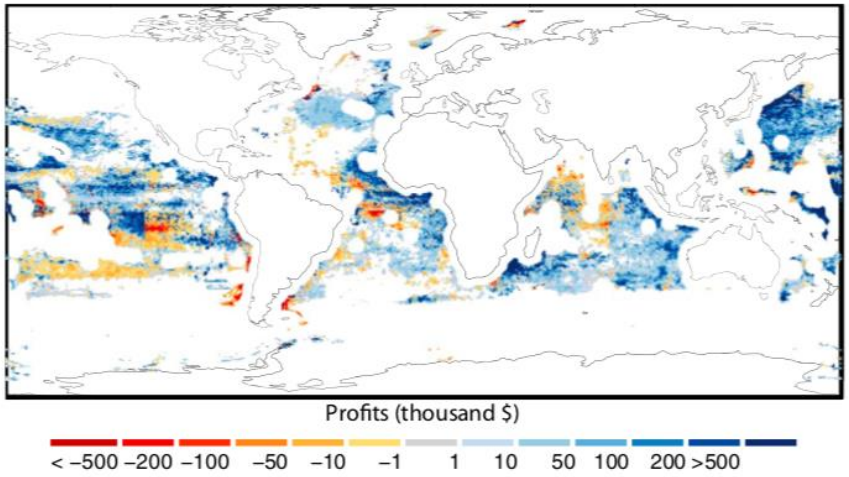
- Underreporting of catch, which underestimates catch, revenue, and profits.
- High seas vessels could fish mostly in EEZs rather than the high seas.
- Additional government subsidies not considered
- Reduced costs because of forced labor, unfair wages, and transshipment.
- Market reasons (e.g., timing catch to price spikes)
- Geostrategic reasons.
- Illegal activity (smuggling of drugs, weapons and wildlife, human trafficking).

Source: Sala et al. 2018.

High seas fishing profits WITHOUT subsidies



High seas fishing profits WITH subsidies



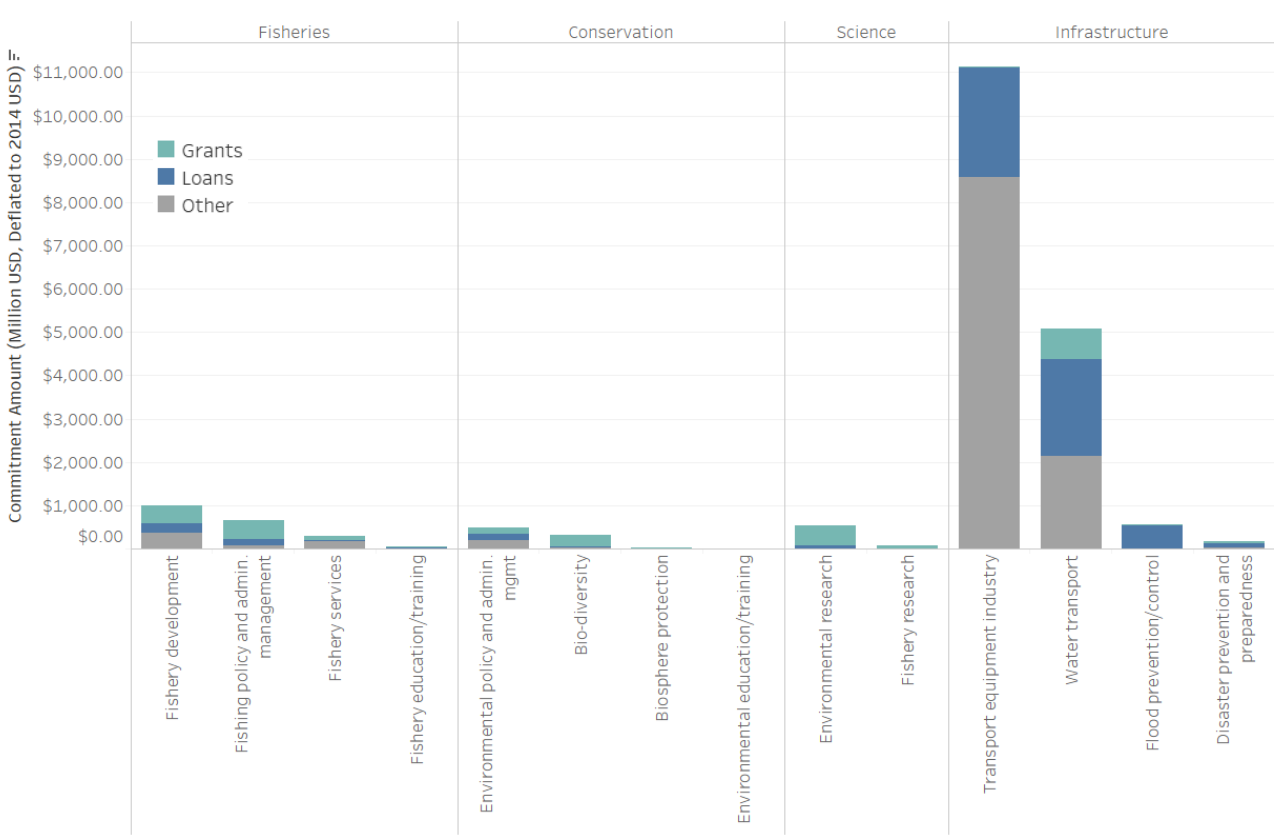
Aid from Distant Water Fishing Nations (DWFNs)

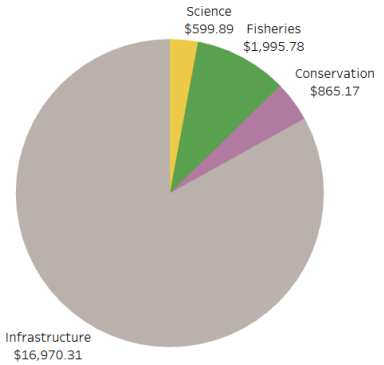
Level of Research Coverage	• **LIMITED**. While traditional channels of development aid are relatively well tracked, China's recent expansion has dwarfed historical investments and data are closely guarded by the Chinese government, effectively making existing systems obsolete. Intensive research efforts are focused on accurately quantifying Chinese development aid across sectors.
Key Findings	• From 2010-2014, the largest amount of marine development aid went towards infrastructure development, primarily from China and to countries in Latin America, West and Southern Africa, and Southeast Asia. • Total marine development aid is increasing significantly, driven by China. • The World Bank, Japan, and France are leaders in non-infrastructure-based aid. • Southeast Asia, West Africa, and Latin America are the primary recipients of marine development aid. • The U.S. is nearly the only country whose aid focuses explicitly on conservation, and remains by far the largest country supporting these issues (~US$90 million in 2014).
Experts	• **Brad Parks**, Executive Director, AidData • **Daniel Pauly**, Professor, University of British Columbia • **Reg Watson**, Professor, University of Tasmania
Key Resources	• Dreher, Axel, et al. "Aid, China, and Growth: Evidence from a New Global Development Finance Dataset." *SSRN Electronic Journal*, 2017
Future Questions	• What kinds of agreements is China negotiating with host countries? • Are they trading development packages for access? If so, to what extent?

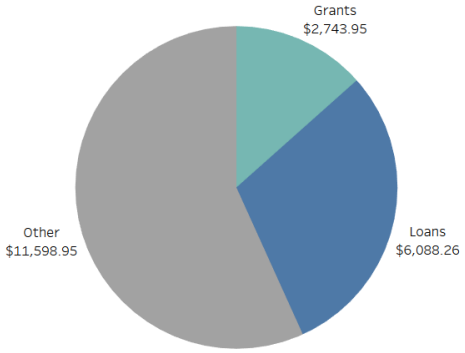
Aid from DWFNs

The largest share of global marine development aid funds infrastructure development, including ports.

- There were approximately US$17 billion in aid commitments from 2010-2014 for marine infrastructure development.
- Marine conservation work is generally funded through grants, and represents a very small part of development aid.
- The "Other" category includes things like export credits and debt forgiveness.



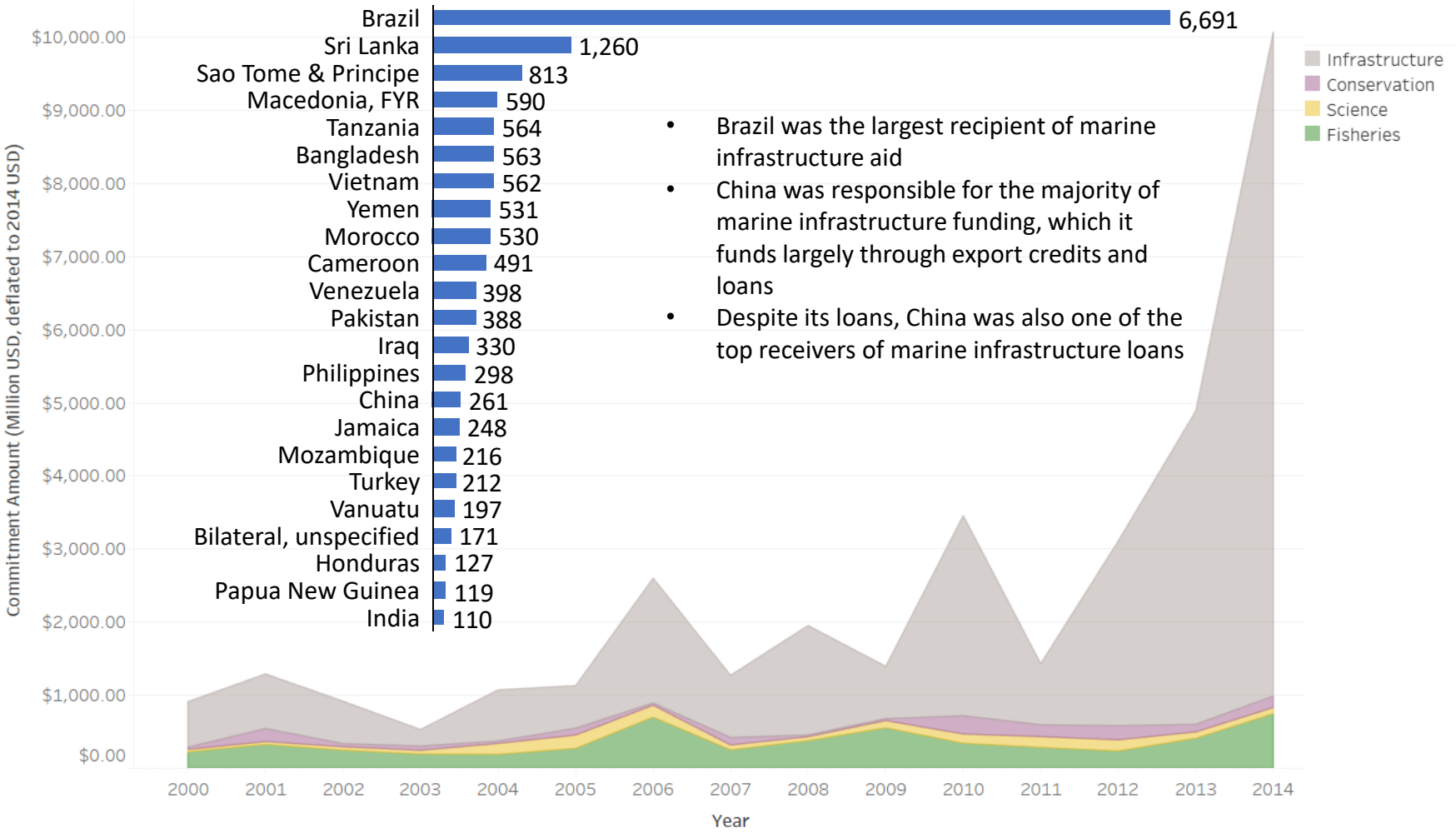




Data included are from the OECD's CRS Database and AidData. Data are for 2010-2014 globally. Years beyond 2014 were excluded because China data were incomplete.

Aid from DWFNs

The total amount of global marine aid is increasing, accentuated by several large investments in port development, especially from China.

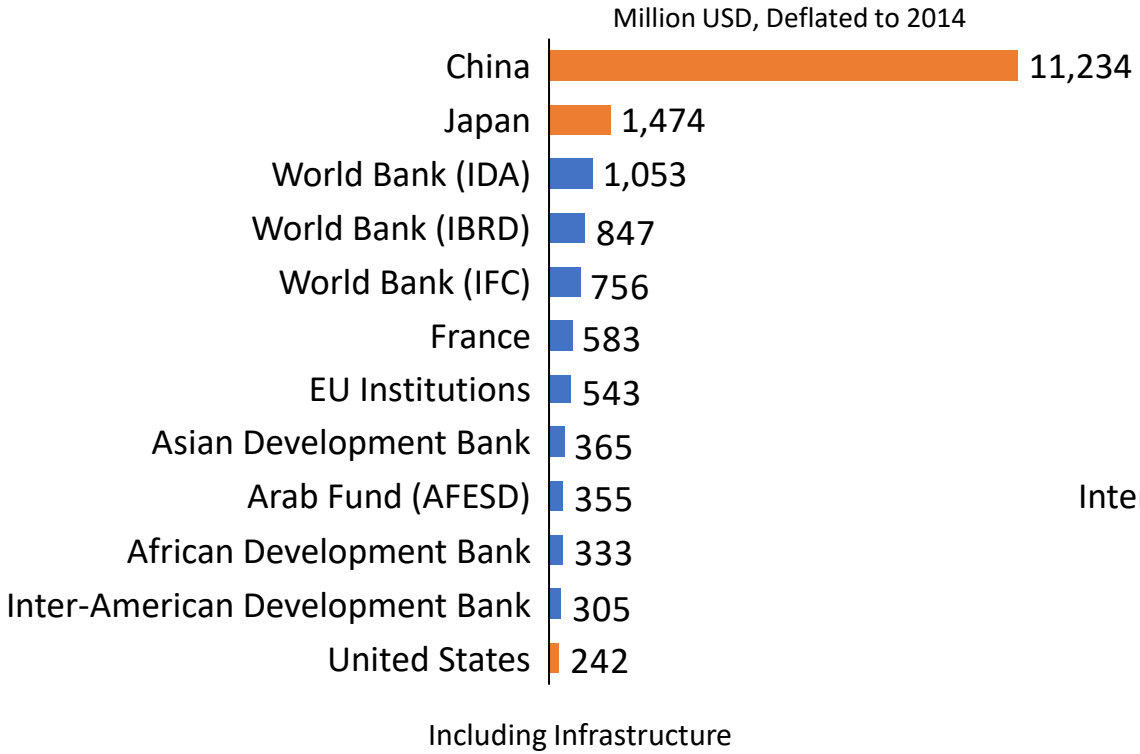


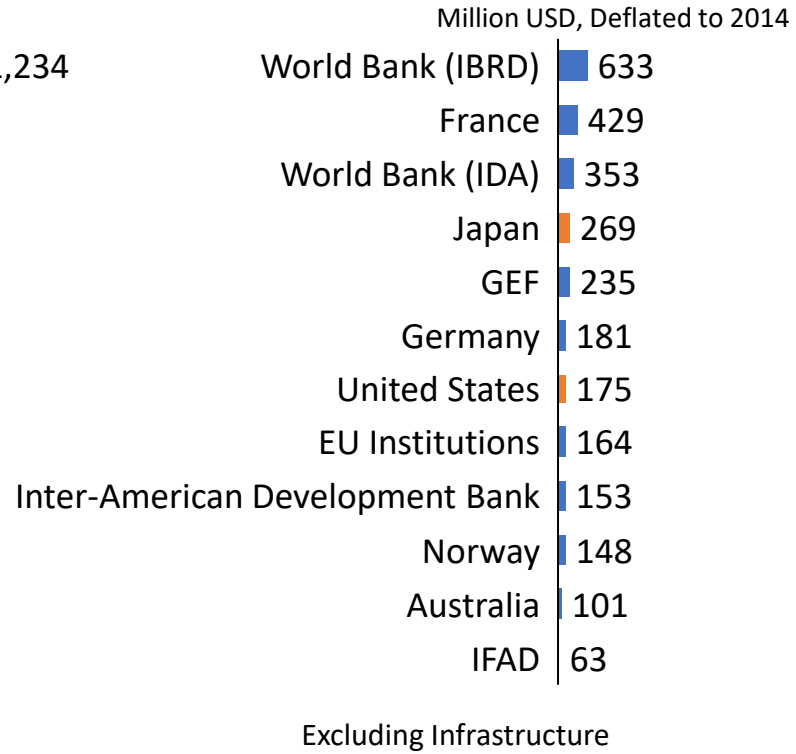
Data included are from the OECD's CRS Database and AidData. Data are for 2010-2014 globally. Years beyond 2014 were excluded because China data were incomplete.

Aid from DWFNs

Including infrastructure investments, China is by far the largest funder. Without infrastructure, the largest funders are the World Bank and Japan.

- China and Japan were the largest sources of marine development aid when considering funds earmarked for infrastructure development.
- Beyond infrastructure, the World Bank and France become the largest marine funders.



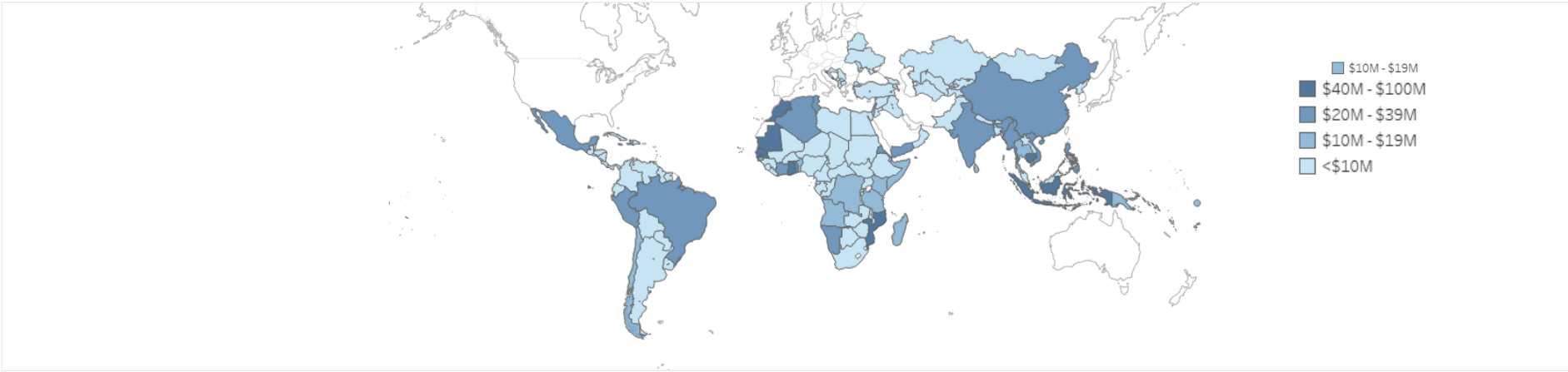


Data included are from the OECD's CRS Database and AidData (for China, does not include Taiwan). Data are for 2010-2014 globally. Years beyond 2014 were excluded because China data were incomplete. Data in **orange** refer to countries that are major distant water fishing nations..

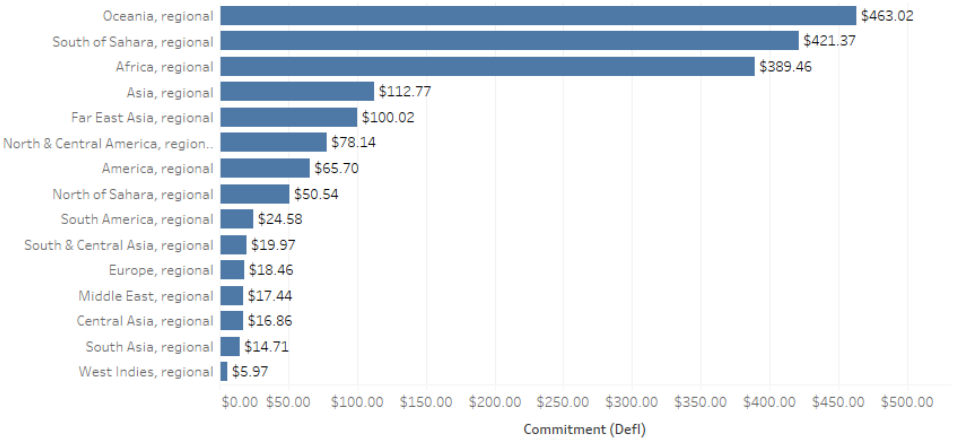
Aid from DWFNs

Globally, the largest recipients of marine Overseas Development Assistance (ODA) are concentrated in West Africa, Southeast Asia, and South America. This was mirrored in regional grants, which are given to support multiple countries in a specific area

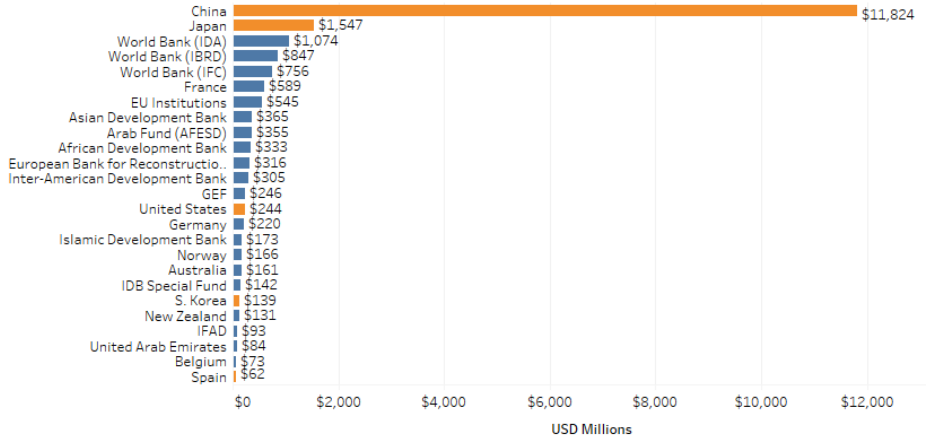
Recipient Countries



Recipients (Regions)



Top Donors

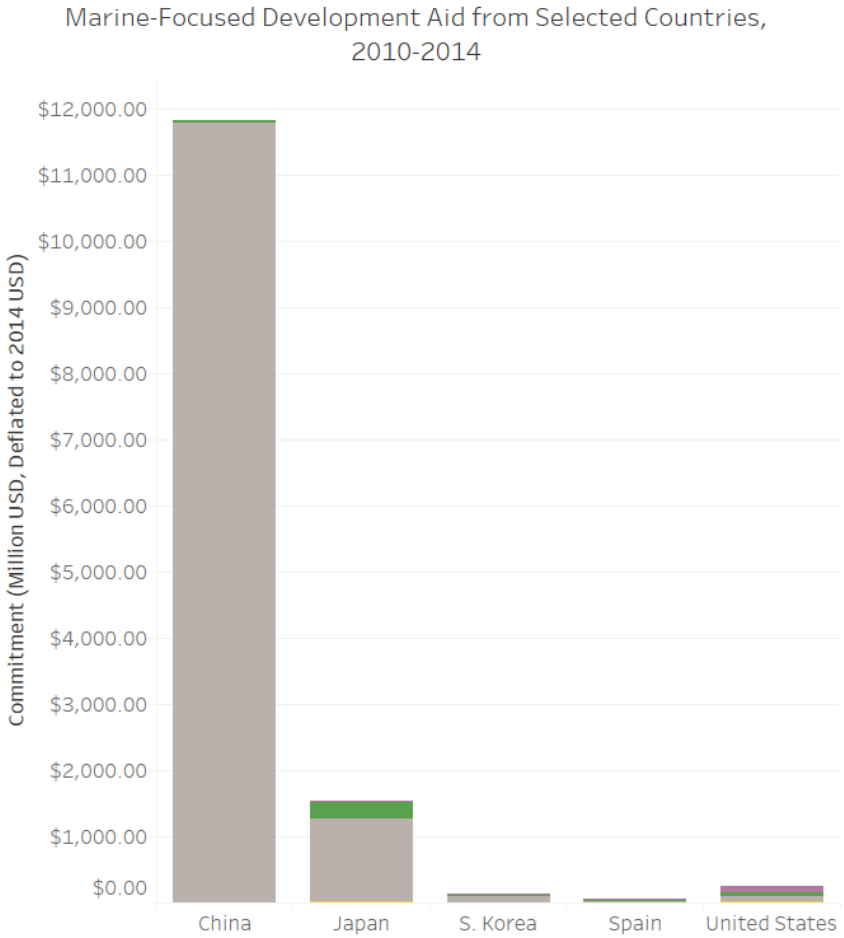


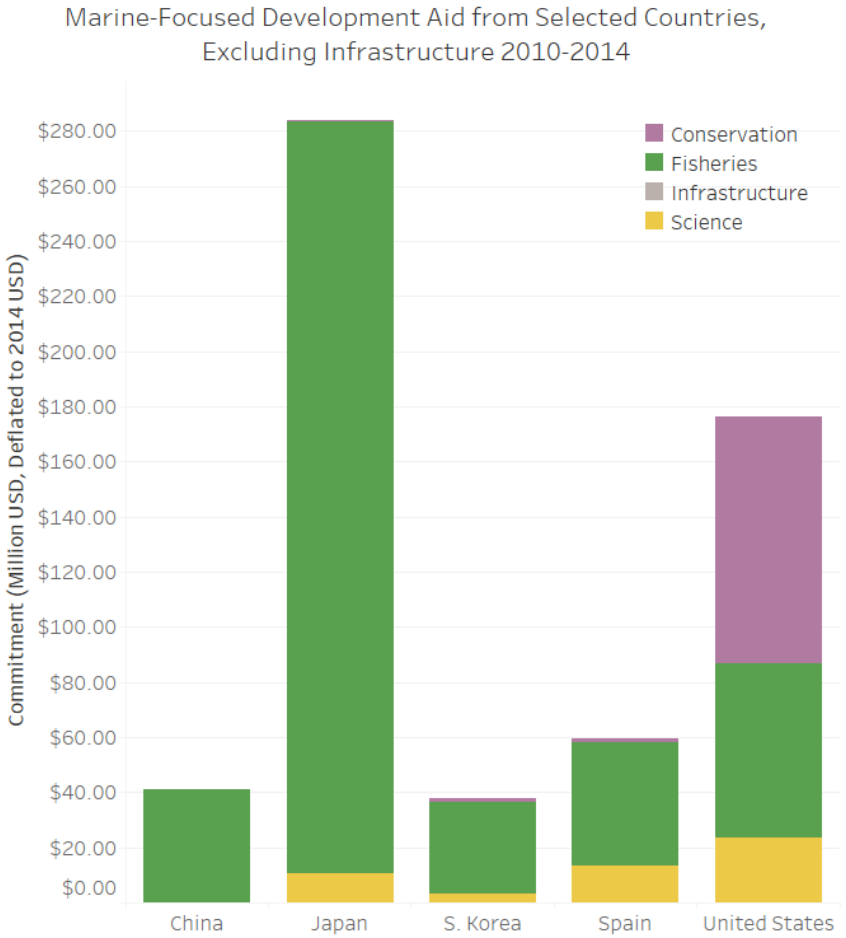
Data included are from the OECD's CRS Database and AidData (for China, does not include Taiwan). Data are for 2010-2014 globally. Years beyond 2014 were excluded because China data were incomplete. Data in **orange** refer to countries that are major distant water fishing nations

Aid from DWFNs

At the national level, China is the largest single country funder, but Japan is the largest non-infrastructure funder.

- After infrastructure funding, fisheries funding makes up the largest share.
- The U.S. provides by far the most funding specifically targeted for conservation.



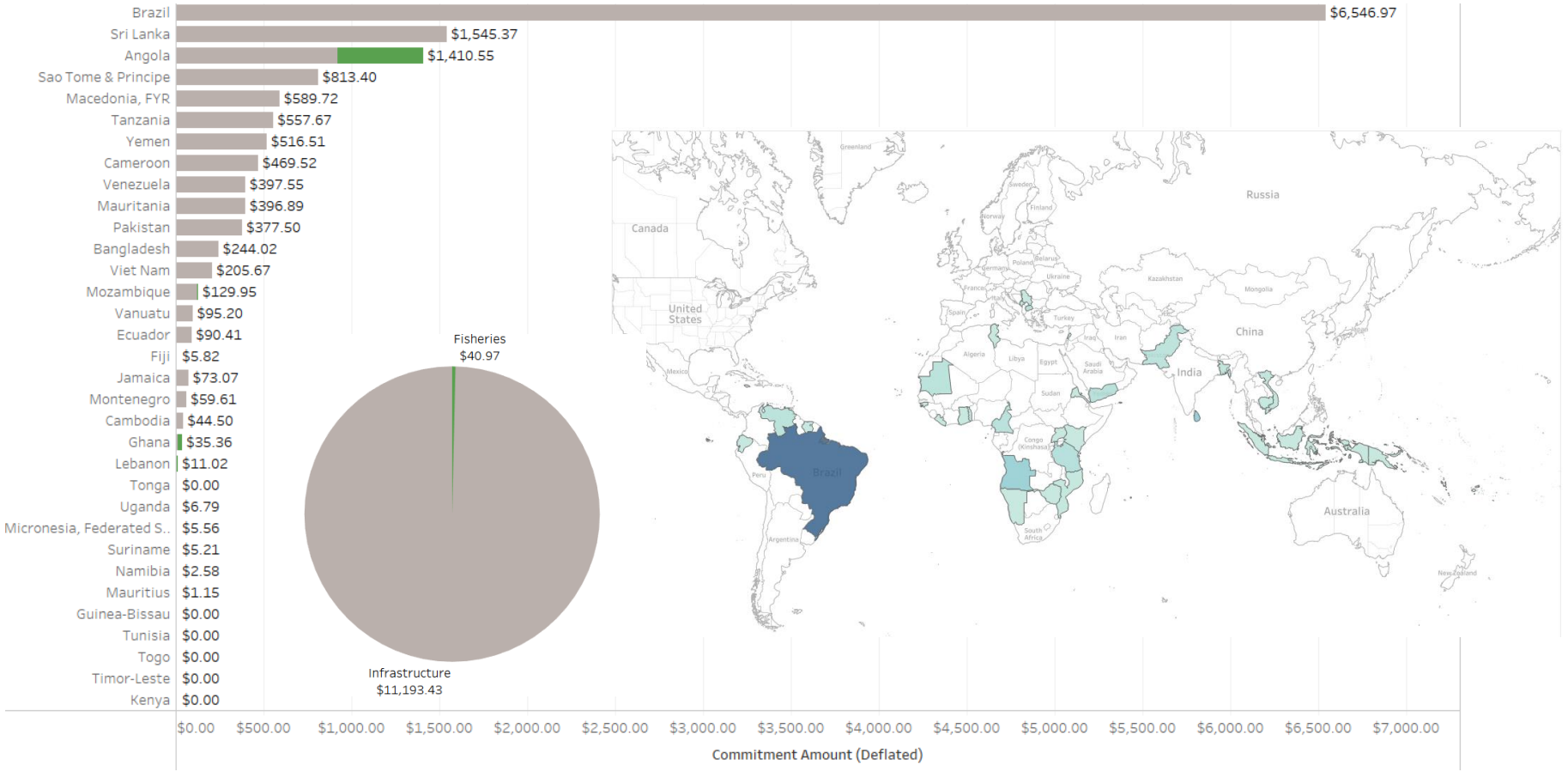


Data included are from the OECD's CRS Database and AidData (for China, does not include Taiwan). Data are for 2010-2014 globally. Years beyond 2014 were excluded because China data were incomplete.

Aid from DWFNs

CASE STUDY: China

- Nearly all of China's marine development aid went to infrastructure development, with a small amount going to fisheries.
- China's largest grant went to Brazil, but beyond that their funding focused on West and Southern Africa and Southeast Asia.
- China plans to invest US$900 billion in their One Belt, One Road Initiative, with the goal of improving trade relationships primarily through infrastructure investments.



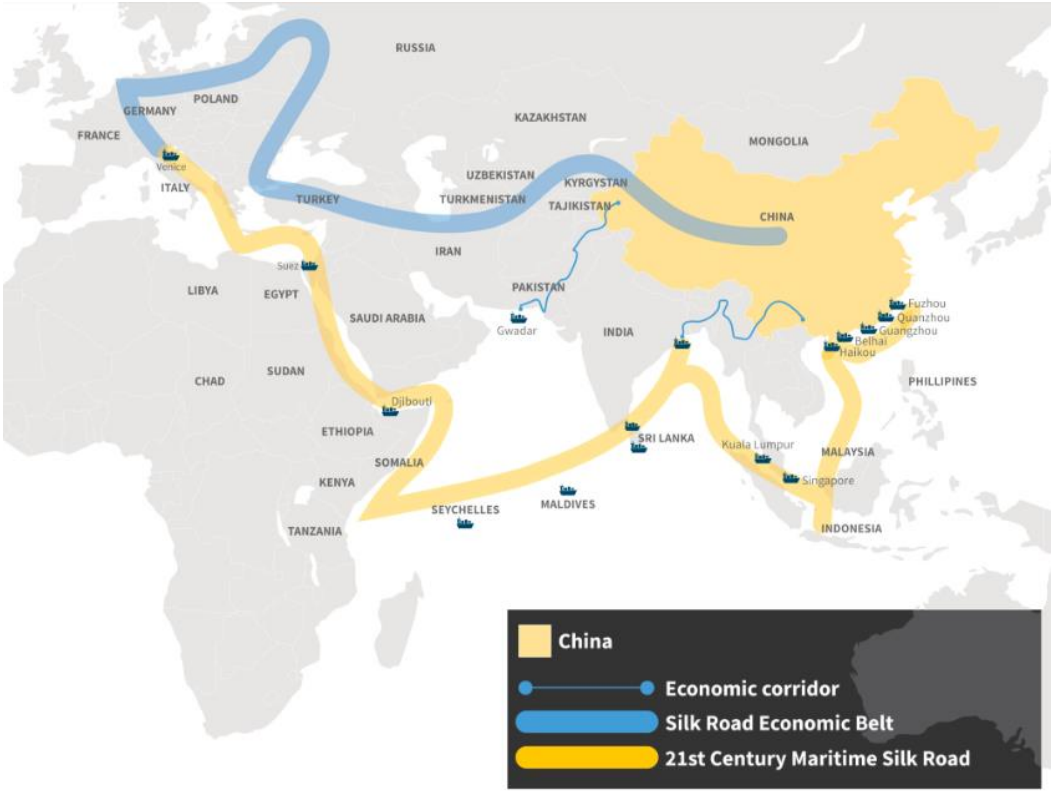
Data included are from the OECD's CRS Database and AidData (for China, does not include Taiwan). Data are for 2010-2014 globally. Years beyond 2014 were excluded because China data were incomplete.

Aid from DWFNs

CASE STUDY: China

One Belt, One Road

- Announced in 2013, China's One Belt One Road Initiative (also known as the New Silk Road) is a **massive global infrastructure project** intended to reopen channels between China and its neighbors in the west, notably Central Asia, the Middle East, and Europe.
- Initially the effort is **expected to channel US$900 billion in investment toward infrastructure projects** via the China Development Bank, with the aim of increasing global trade. China has stated it may invest upwards of US$8 trillion in the initiative, roughly 35% of global GDP.
- The initiative encompasses both land (the Silk Road Economic Belt) and maritime routes (the 21st Century Maritime Silk Road).
- **In the year to June 2017, Chinese groups announced plans to buy or invest in nine overseas ports in projects valued at US$20.1 billion**. Most of the investment is made by state-backed groups.

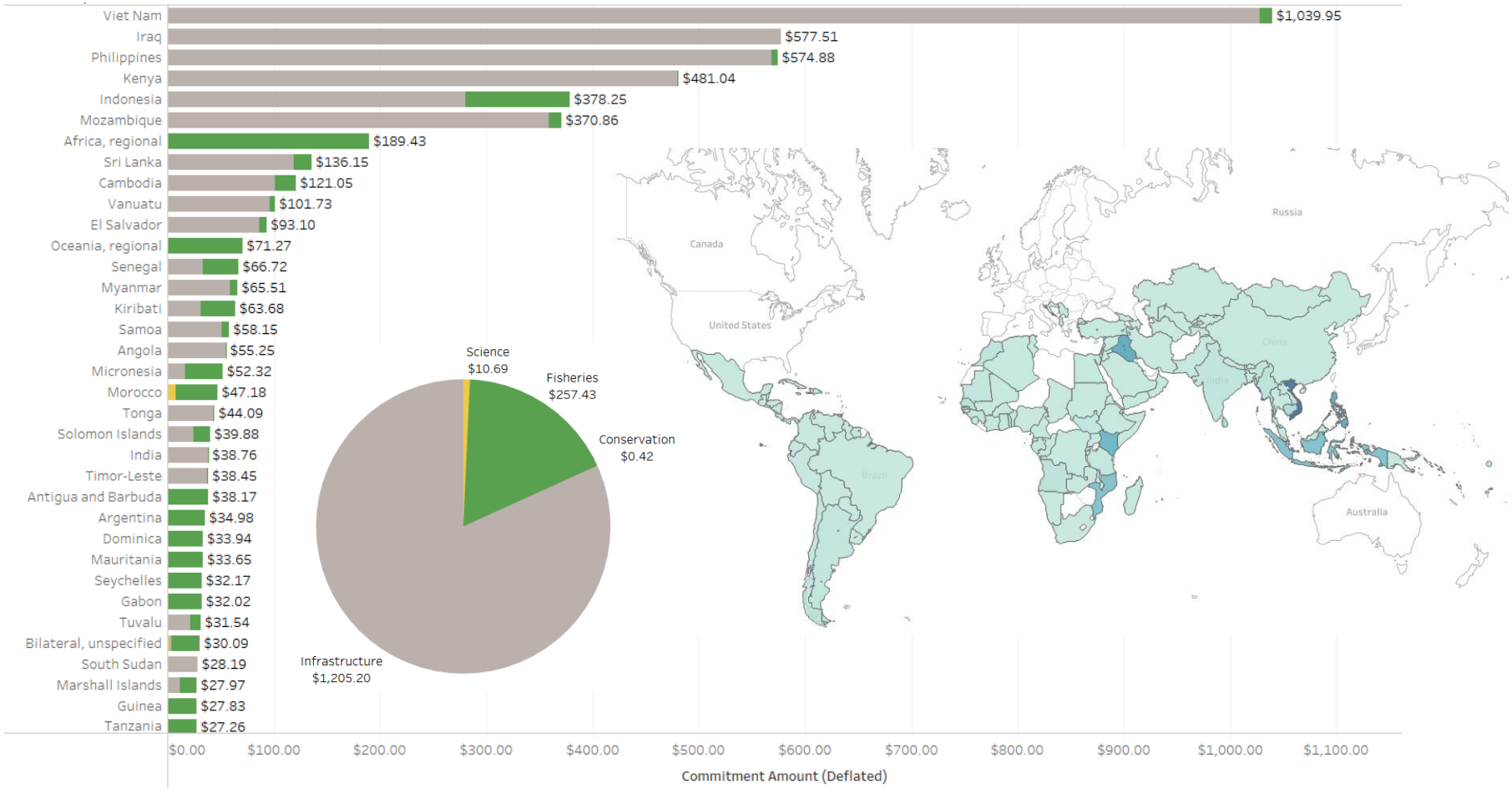


Sources: China's $900 billion New Silk Road: What you need to know. World Economic Forum. 2018.; Cai, Peter. Understanding China's Belt and Road Initiative. Lowy Institute. 2018.; Dreher et al. 2017.; CEA News Article Scan

Aid from DWFNs

CASE STUDY: Japan

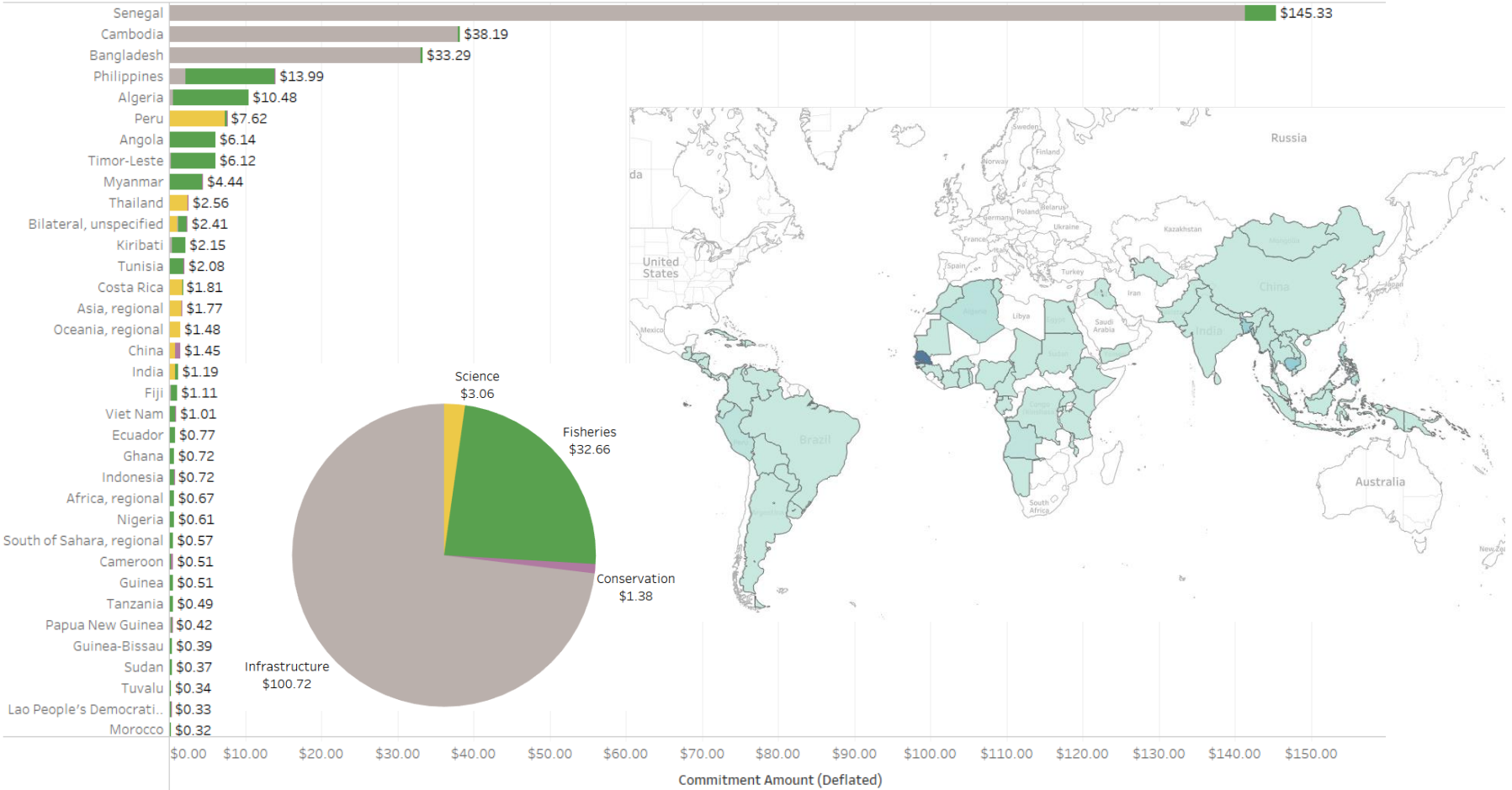
- Japan's marine funding focuses largely on Southeast Asia (Vietnam and the Philippines), with other grants going to Africa and Iraq.
- While the majority of funds went to infrastructure development, Japan was also the most significant funder of fisheries, at ~US$250 million between 2010-2016.



Aid from DWFNs

CASE STUDY: South Korea

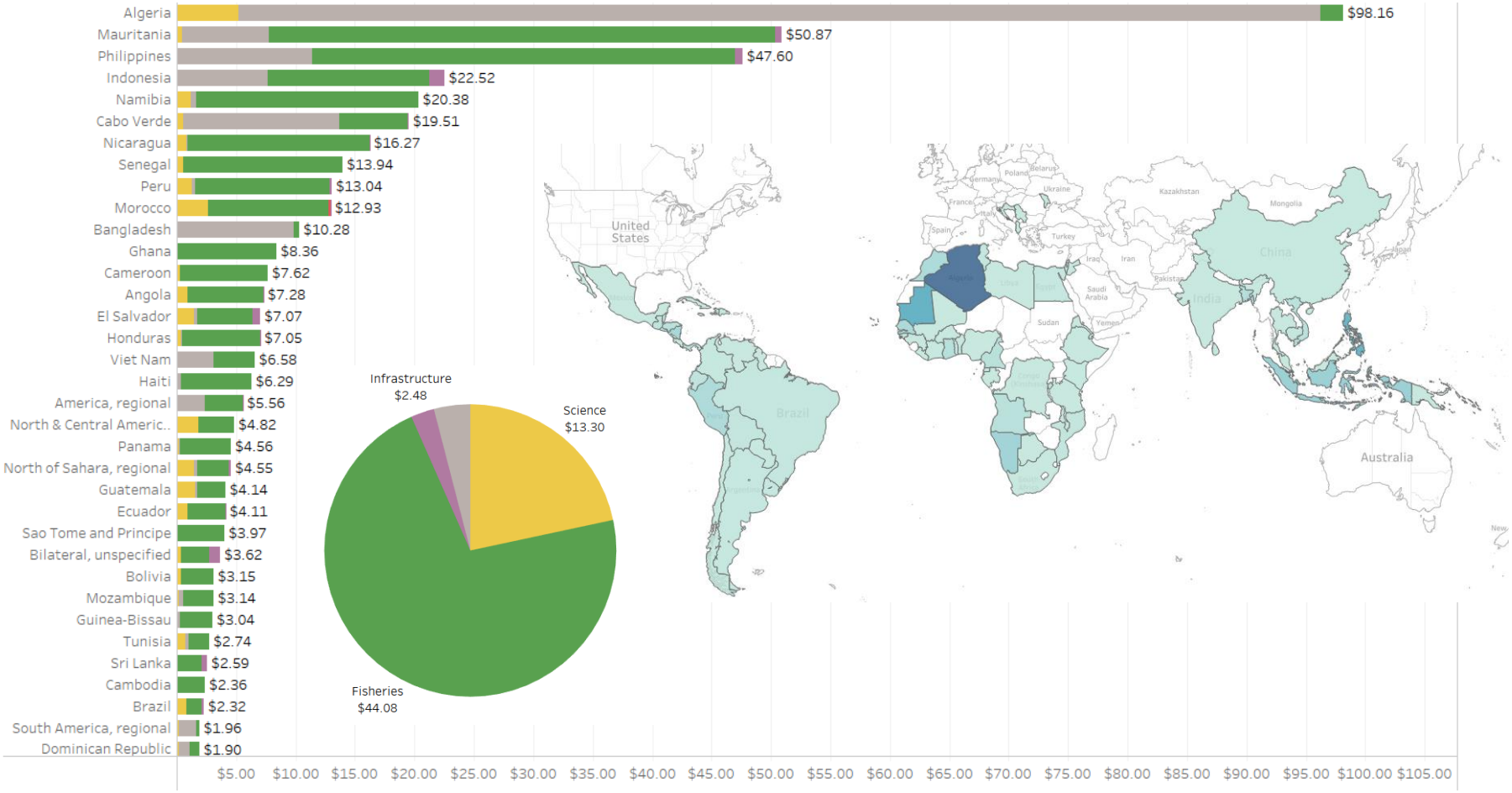
- South Korea provided nearly all of its marine funding to Senegal. The remainder of its grants were spread across Asia, Africa, and South America.
- While the majority of funds went to infrastructure development for its top recipients (Senegal, Cambodia, Bangladesh), nearly a quarter went to fisheries (~US$33 million).



Aid from DWFNs

CASE STUDY: Spain

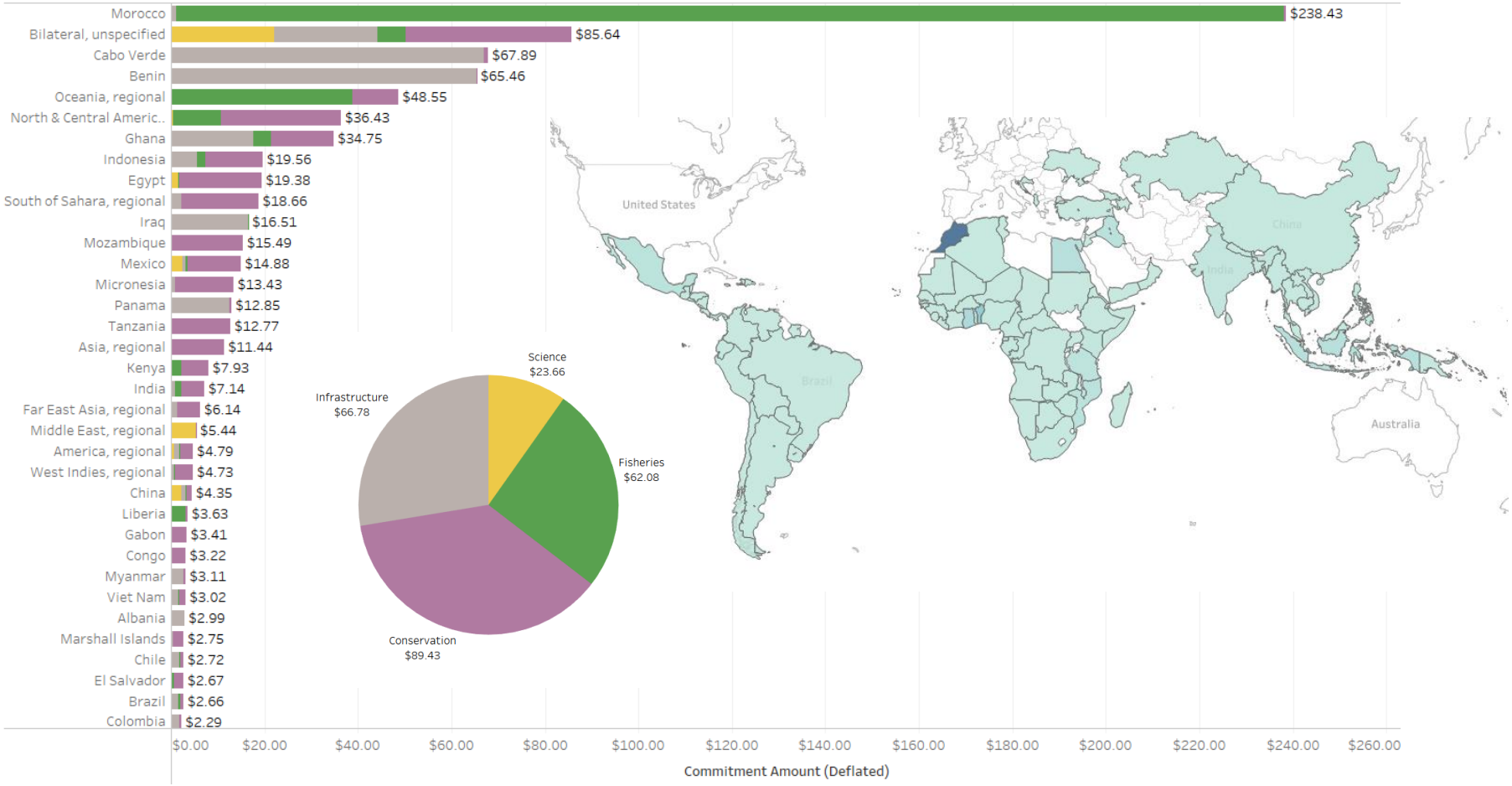
- Unlike the other case studies, Spain's assistance is primarily in fisheries development rather than infrastructure.
- Spain's assistance focused primarily in developing fisheries and ports of neighboring Mediterranean and North African countries.



Aid from DWFNs

CASE STUDY: United States

- The largest piece of marine development aid went to support Morocco's fisheries.
- Other development aid supported infrastructure, conservation, and science across the world.



Fishing Access Agreements

Level of Research Coverage	• **LIMITED**. There is one public database of fishing access agreements that covers only the EU. As such, their study has been confined to a handful of academic papers, and most agreements remain entirely opaque to the public.
Key Findings	• Historically, fishing access agreements have been thought to provide an economically efficient way for countries with advanced fisheries technology to exploit a resource, benefiting the host country in the process. • These agreements are generally not transparent, and are becoming increasingly opaque as China, Taiwan, and South Korea become dominant DWF powers. • Except for a few circumstances, these agreements generally disadvantage the host countries and provide flimsy legal cover for DWF to engage in over-exploitation, underpayment, and other illegal activities.
Experts	• **Gordon Munro**, Professor Emeritus, University of British Columbia • **Antonius Gagern,** Senior Associate, CEA • **Dyhia Belhabib**, Programme Manager, Fisheries, Ecotrust Canada
Key Resources	• Belhabib, Dyhia et al. Euros vs. Yuan: Comparing European and Chinese Fishing Access in West Africa. PLoS ONE. 2014. • Gagern, Antonius and Jeroen van den Bergh. A critical review of fishing agreements with tropical developing countries. *Marine Policy*. Vol. 38. Jul. 2012. • Trade in Fishing Services: Emerging Perspectives on Foreign Fishing Arrangements. *The World Bank.* Dec. 2014.
Future Questions	• Under what conditions can FAAs be successful? Under which should they not be used? • What would be the ecological, economic, and social benefits of banning foreign fishing fleets from EEZs?

Fishing Access Agreements

Fishing agreements define the terms under which fishing countries are allowed to fish in the EEZs of host countries.

- The large majority of fishing agreements are signed between industrialized distant water fishing nations (DWFN) and developing host countries that (officially) lack the capacity to fully fish the surplus production of their EEZs.
- Depending on host countries' monitoring capacity, agreements grant access to number of boats, vessel days, or catch volume.
- Financial compensations are often partially earmarked for development of host countries' fishing industry and/or management capacity.

These agreements are premised on the "Surplus Principle" outlined in Article 62 UNCLOS.

- All fishing access agreements are based on the idea that nations that don't have the capacity to fish their resources should sell access.
- Recent interpretations argue that UNCLOS in fact states no such thing, and host nations are under no obligation to allow access.

		Government-Government	Government-Private	Private-Private
Reciprocal	**Bilateral**	Two countries grant each other permission to fish in each other's EEZs. Usually includes management agreements. **Examples**: Reciprocal agreement between China and Japan or China and Vietnam	N.A.	N.A.
	Multilateral	Three or more countries grant each other access to EEZs. **Examples**: Trilateral agreement between Iceland, Norway, and Russia	N.A.	N.A.
Unidirectional	**Bilateral**	Fishing rights are granted to the DWFN in the host countries' EEZ. **Examples**: Fisheries partnership agreements between the EU and ACP countries	Foreign fishing companies sign agreements with governments of host countries. **Examples**: South Korean, Taiwanese, and Chinese fishing agreements with host countries in Asia and Africa	Joint ventures between foreign investors and fishing companies in host countries. **Examples**: After the termination of the EU-Senegal FPA, many Spanish operators either reflagged their vessels or went into joint ventures with local operators
	Multilateral	Two or more host countries grant DWFN access to joint EEZs. **Examples**: U.S. treaty with several Pacific Island states	Foreign fishing companies sign agreements with governments of two or more host countries. **Examples**: Fishing agreements with countries of the Nauru-agreement	N.A.

Source: Gagern and Van den Burgh. 2013

Fishing Access Agreements

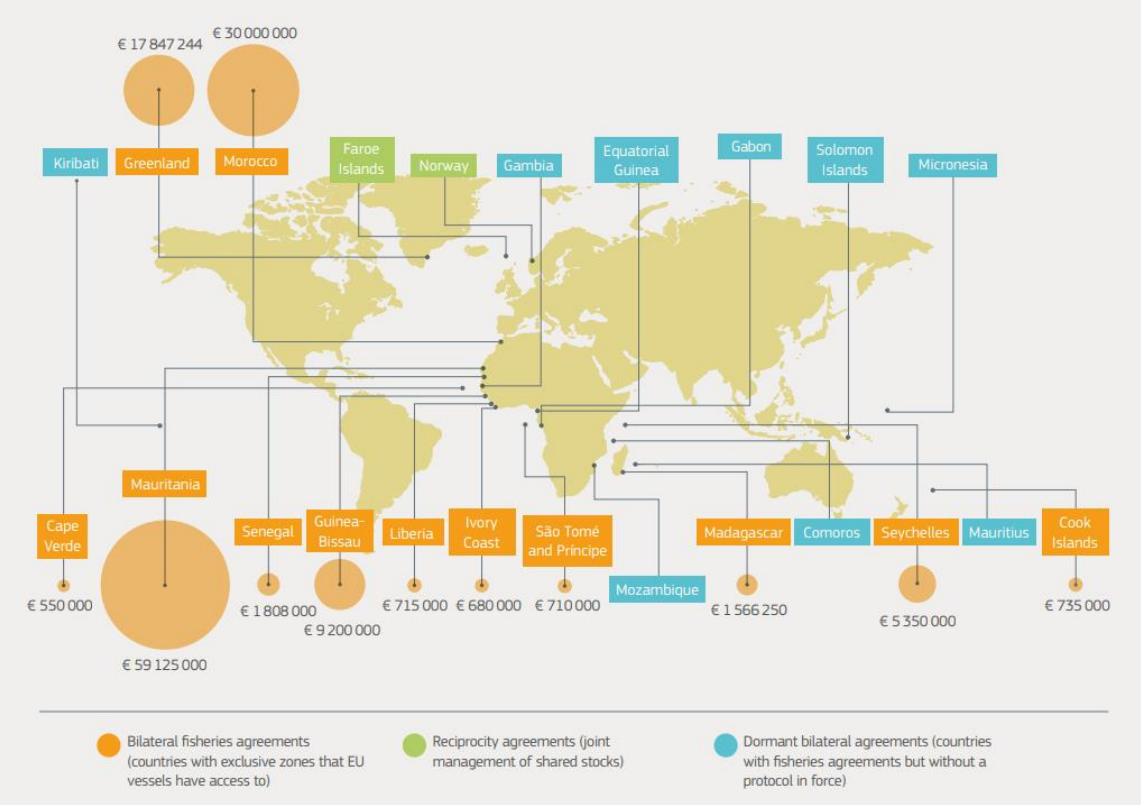
European "Sustainable Fisheries Partnership Agreements" (SFPAs) are among the most transparent.

The EU spends a total of $US 211M per year on 14 active SFPAs.

- 25% of fees are paid by vessel owners
- 15% are earmarked for fisheries sector development and governance
- Fees are negotiated based on estimated total catch (approximately €100 or $US 118 per ton)
- Mauritania, Morocco, Guinea Bissau, and the Seychelles are among the most important partner countries

The EU struggles to compete with other DWFNs who have low sustainability criteria and are more permissive with the use of license fees.

Spain leads the number of authorized vessels (162) follow by France (39), Germany (6), and Others (26).



Sources:
European Commission (2017) EU Sustainable Fisheries Partnership Agreements
European Parliament (2017) Briefing: Towards a fisheries agreement with Kenya
http://www.whofishesfar.org/raw-data

Fishing Access Agreements

The Chinese DWF is 10 times bigger than the EU DWF.

- By 2014, there were 2,460 Chinese DWF vessels with a total declared catch of 2 million tons (half of it in the EEZs of host countries)

The Chinese government leaves negotiations more and more to companies, shielding the terms from public scrutiny.

- Well above 130 Chinese DWF companies (including 39 joint ventures) currently control operations, which are heavily subsidized by the government
- The primary companies include: CNFC, Dalian Lian Run, Dalian Boyuan, and Shandong Overseas

Greenpeace estimates that 25% of Chinese vessels in West Africa engage in IUU fishing.

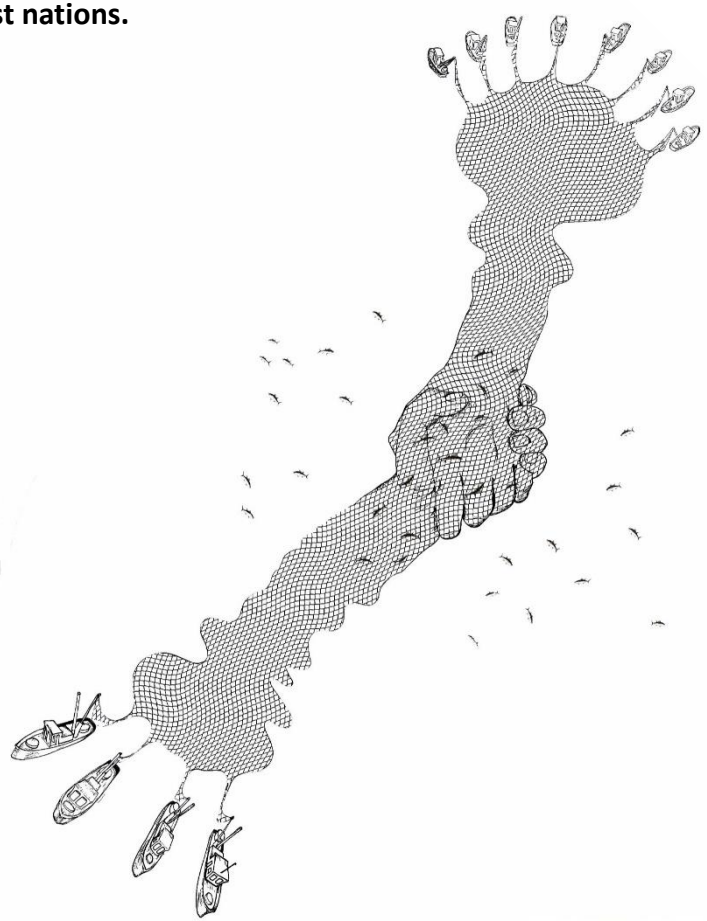
Estimates of the global extent of Chinese DWF

Sources:
Chinadialogue.net (2016) China's distant water fishing fleet growing unsustainably
Greenpeace (2015) Africa's fisheries' paradise at a crossroads.

Fishing Access Agreements

A generous interpretation of FAAs would suggest their benefits to host nations are mixed. In most cases, these agreements are highly exploitative and result in negative impacts for the host nations.

- **Benefits accrue to governments, not to fishers**: Access fees are only rarely invested into the fishing industry; in any case, fees are a fraction of the value that is captured by DWFNs.
- **Countries are getting underpaid**: Officially, the EU pays approximately 25% of the value of the catch, China up to 40%. Accounting for unreported catches, this figure drops to 4% and 8% respectively.
- **Joint ventures are not beneficial to host countries**: Companies from most DWFNs set up joint ventures to reflag vessels and benefit from less stringent local regulations. This has not often translated into sector development in host countries, but increased overexploitation.
- **Where negotiation power exists, benefits accrue**: The parties to the Nauru agreement (PNA countries) significantly increased prices of vessel day scheme by negotiating as a group of tuna-rich countries rather than individual small island states.
- **Some bright spots of domestic sector development exist**: The EU has set a good example by increasingly holding the external fleet to the same standards as the domestic fleet. Some earmarked investments have led to meaningful investments such as the construction of commercial ports (Seychelles); the purchase of fisheries inspection equipment (Ivory Coast); or the construction of sanitary control laboratory (Guinea-Bissau).



Sources:
Belhabib et al. (2015) Euros vs. Yuan: Comparing European and Chinese Fishing Access in West Africa. PLOS ONE
Greenpeace (2015) Africa's fisheries' paradise at a crossroads.
Visual credit: Max Mallol

Illegal, Unregulated, and Unreported fishing (IUU)

Level of Research Coverage	• MODERATE. There is significant study of IUU in the grey literature, and increasingly in the peer-reviewed literature, but the exact links between countries, their distant water fleets, and illegal activity remains elusive at a global scale.
Key Findings	• IUU is a significant global problem, affecting ~20% of all wild caught fish landings, and more in some regions. • IUU and DWF are often viewed as synonymous, as DWF are often engaged in the kinds of activities that have a high likelihood of abuse (e.g., flying flags of convenience). • DWF from China, Taiwan, and South Korea have been implicated in cases of illegal activity. • When countries choose to take action, solutions can effectively deter (and potentially shift) IUU activity within an EEZ and between EEZs. • Banning DWF can drastically reduce fishing effort and illegal activity.
Experts	• **Reniel Cabral**, Postdoctoral Scholar, Sustainable Fisheries Group, UCSB • **David Agnew**, Executive Secretary, Commission of the Conservation of Antarctic Marine Living Resources (CCAMLR)
Key Resources	• Agnew, David J. et al. Estimating the Worldwide Extent of Illegal Fishing. *PLOS ONE*. 2009. • Cabral, Reniel B et al. Rapid and lasting gains from solving illegal fishing. *Nature, Ecology & Evolution*. Vol. 2. 2018. • Cordes, Bernd and CEA. Illegal, Unregulated, and Unreported Fishing: A White Paper. June 2015. • Review of Impacts of Illegal, Unreported, and Unregulated Fishing on Developing Countries. MRAG. 2005.
Future Questions	• Which distant water fleets are most responsible for IUU fishing, and to what extent? • Is banning DWF from EEZs a sufficient proxy for IUU, especially in regions where IUU activity is high? • Aside from moratoria on foreign fleets, what other solutions are effective at deterring IUU?

Illegal, Unregulated, and Unreported Fishing (IUU)

The exact scale and extent of IUU fishing is difficult to quantify, but it is widely seen as a major threat to fisheries sustainability and ocean health globally.

- Estimates suggest that at least 20% of wild landings (11-26 million tons of fish) are caught illegally or otherwise unreported, representing financial losses of US$10-24 billion annually. In some areas (Central Pacific, Eastern Central Atlantic) closer to 30% of wild landings may be caught illegally.
- Indonesia, which historically has had high levels of IUU fishing, is estimated to lose ~US$4 billion annually due to IUU activity.
- Since the 1990s, IUU fishing has decreased in 11 of the FAO statistical areas, and increased in five.
- Developing countries, specifically those that have low governance scores according to the World Bank, are the countries most susceptible to IUU.

While distant water fishing on its own does not equate directly to IUU practices, these fleets are often associated with activities that have a high potential to be illegal. The kinds of activities associated with DWF that are also associated with IUU fishing include:

- Fishing on the **high seas**, outside of EEZ and regional fisheries management organizations (RFMOs) monitoring environments.
- Flying **flags of convenience**, whereby vessel owners choose to fly a flag that is unassociated with the owner's nationality. This practice is often used to avoid operational restrictions, cut labor costs, avoid taxation, and reduce expenses of other legal requirements.
- Engaging in **transshipment**, the transfer of fish at sea to "reefer" vessels, which can be used to obscure product source and for which many have documented severe human rights abuses.
- Engaging in **intensive fishing effort.**
- Fishing in **regions where there is a high prevalence of IUU activity.** Undoubtedly DWF are responsible for a significant portion of this activity.

Distant water fleets from China, Taiwan, and South Korea have all been implicated in IUU activity.

- These are the top three flag states fishing in foreign EEZs between 2013 and 2016, fishing in over 50 EEZs.

Whether or not distant water fleets are engaged in IUU activity, interventions that ban these fleets from national waters appear to be highly effective at reducing fishing pressure and could improve economic returns to host nations.

- After its moratorium on foreign fleets, Indonesia saw a 40% reduction in fishing effort, resulting in potential profit increases of 12%.
- The Gambia's ban on industrial fishing reduced foreign fishing in its EEZ to near zero.

Sources: Agnew et al. 2009; Cabral et al. 2018.; Telesetsky, Anastasia. Laundering Fish in the Global Undercurrents: Illegal, Unregulated, and Unreported Fishing and Transnational Organized Crime. *Ecology Law Quarterly.* 2015.

Illegal, Unregulated, and Unreported Fishing (IUU)

Geographically, levels of IUU are highest in the Western Central Pacific and Eastern Central Atlantic (West Africa) and lowest in the Southwest Pacific (New Zealand).

- Between 1980 and 2003 levels of IUU have decreased in 11 of the FAO statistical areas and increased in five.

The highest levels of illegal fishing are associated with high-value demersal fish, lobster, and shrimps-prawns.

- It appears that illegal catch is low for tuna, despite high levels of IUU in the areas where tuna is caught.

The estimated overall loss to fisheries is 13-31%, at an annual value of US$5-11 billion in 2003.

Summary of regional estimates of illegal fishing, averaged over 2000-2003

Region	Reported catch of case study species	Catch of case study species as a percentage of total regional catch	Lower estimate of illegal catch (t)	Upper estimate of illegal catch (t)	Lower estimate of value (US$m)	Upper estimate of value (US$m)
Northwest Atlantic	557,147	25%	22,325	82,266	20	74
Northeast Atlantic	6,677,607	60%	364.908	842.467	328	758
Western Central Atlantic	390,942	22%	21,745	58,514	20	53
Eastern Central Atlantic	1,154,586	32%	294,089	562,169	265	506
Southwest Atlantic	1,403,601	65%	227,865	673,712	205	606
Southeast Atlantic	1,351,635	79%	52,972	139,392	48	125
Western Indian	2,165,792	52%	229,285	559,942	206	504
Eastern Indian	2,263,158	44%	467,865	970,589	421	874
Northwest Pacific	7,358,470	32%	1,325,763	3,505,600	1,193	3,155
Northeast Pacific	196,587	7%	2,326	8,449	2	8
Western Central Pacific	3,740,192	36%	785,897	1,729,588	707	1,557
Eastern Central Pacific	1,374,062	73%	129,772	278,450	117	251
Southwest Pacific	451,677	61%	5,227	32,848	5	30
Southeast Pacific	9,799,047	73%	1,197,547	2,567,890	1,078	2,311
Antarctic	136654	100%	9593	9593	9	9
Total	**39,021,155**	**46%**	**5,140,928**	**12,040,052**	**4,627**	**10,836**

doi:10.1371/journal.pone.0004570.t001

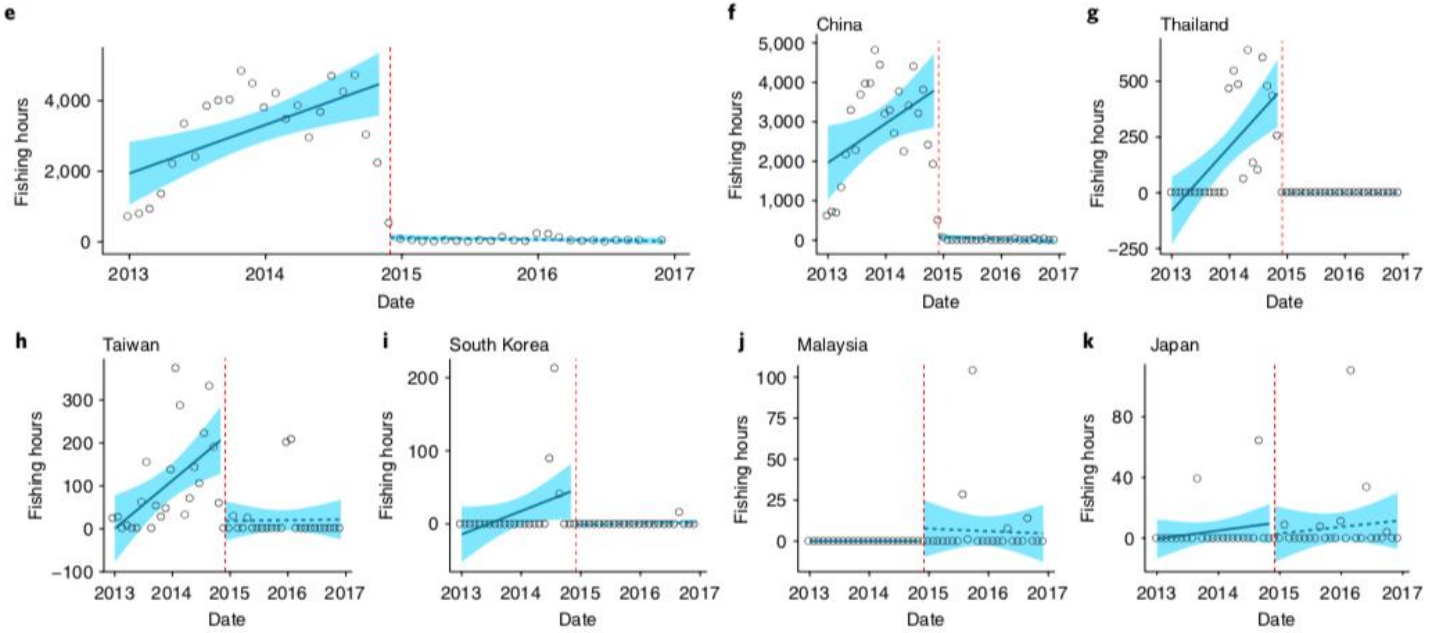
Source: Agnew et al. 2009

Illegal, unregulated, and unreported fishing (IUU)

Banning distant water fleets can have a strong effect on reducing fishing effort and illegal activity.

- After implementing strong anti-IUU policies (sinking of illegal vessels, banning foreign vessels, and banning transfer of fish at sea), Indonesia saw a 30% decline in the number of boats and a >90% reduction in the fishing hours of foreign boats in Indonesia, mostly from China, Thailand, Taiwan, and South Korea.
- Even though Indonesia is expanding its domestic fleet, fishing pressure is still expected to decline by 25-35% pre-moratorium.
- If IUU fishing policies are maintained and management policies implemented, Indonesia's skipjack catch could increase by 14% and its profit by 12%.

Fishing hours in Indonesia's EEZ before and after implementation of the foreign fleet ban*



*Data are derived from Indonesia's VMS data
Source: Cabral et al. 2018.

Worker Exploitation and Human Rights Abuses

Level of Research Coverage	• **LIMITED**. Most evidence in this field has been the result of investigative journalism and follow-up in-depth investigations by Greenpeace and other leading NGOs. There is a dearth of systematic studies, likely due to significant methodological issues associated with studying victims of abuse and the general aura of illegal activity.
Key Findings	• Fishing is one of the most dangerous occupations. The fundamental risks are exacerbated by increased likelihood of egregious human rights abuses, especially in distant water fleets. • Declining fisheries fundamentals (overcapacity, increased catch per unit effort) and the associated cost pressures are likely a driving factor in labor rights abuses. • Distant water fleets from Thailand and Taiwan have been implicated in horrific violations of human rights. Efforts to address these abuses have likely only shifted the problem.
Experts	• **Steve Trent**, Environment Justice Foundation (EJF) • **Andy Shen,** International Labor Rights Forum • **Christina Stringer,** University of Auckland • **Tara Buaksamri**, Greenpeace Southeast Asia • **Supang Chantavanich**, Professor, Chulalongkorn University
Key Resources	• Tragedy in the Marine Commons: The Intertwined Exploitation of Ocean Ecosystems and Fisheries Workers. Letter to the Special Rapporteur on Human Rights and the Environment. 2016. • Turn the Tide: Human Rights Abuses and Illegal Fishing in Thailand's Overseas Fishing Industry. *Greenpeace Asia*. 2016 • Misery at Sea: Human suffering in Taiwan's distant water fishing fleet. *Greenpeace*. 2018. • Chantavanich, Supang et al. Under the shadow: Forced labour among sea fishers in Thailand. *Marine Policy*. 2016.
Future Questions	• What is the global extent of human rights abuses in fisheries, and specifically DWF? • Are there more effective (comprehensive, accurate, secret, less costly) ways to monitor for human rights abuses? • What role do these issues play in the conservation agenda? Are there win-wins?

Worker Exploitation and Human Rights Abuses

"Fishing at sea is probably the most dangerous occupation in the world."

- Numerous studies of occupational health and safety consistently place working in fisheries as one of the most dangerous professions. In the U.S., it is the profession with the highest number of fatalities.
- Commercial fisheries are responsible for an estimated 24,000 deaths annually.
- The "human factor" is cited in 80% of all workplace incidents. Severe weather conditions contributed to 60% of fatalities.

Recent investigative pieces uncovering egregious human rights abuses have only increased our understanding of the nature and extent of the risks faced by those employed in commercial fisheries.

- Exhausting work days (20-22 hours), grossly underpaid or withheld wages, excessive fees, confiscation of documents, lack of decent food or clean drinking water, unsanitary and unsafe working and living environments, physical abuse and verbal intimidation, forcible confinement, lack of medical care, and murder have all been documented aboard fishing vessels.
- Most well studied in the Thai fisheries sector, but also uncovered in New Zealand, Russia, Turkey, South Korea, Ireland, Scotland, West Africa, and the U.S.

The relationship between overfishing and human rights abuses is logically clear, but has received limited attention in the scholarly literature, likely due to the significant methodological challenges associated with systematically cataloguing these incidents.

- According to EJF: "Declines in fish stocks have made it harder for many fishing business to be profitable. Fewer fish prompts vessels to go further out to sea and fish for longer periods of time using unsustainable methods, many of which fall under IUU fishing."
- "Given the general atmosphere of lawlessness, poor regulation, and lack of control and enforcement on the high seas, it follows that operators willing to resort to human trafficking show a similar disregard for the law when it comes to illegal fishing practices and other illegal activity, such as drug trafficking and other kinds of smuggling."

Sources:
Guidance on addressing child labour in fisheries and aquaculture. *FAO*. 2014.; Tragedy in the Marine Commons: The Intertwined Exploitation of Ocean Ecosystems and Fisheries Workers. Letter to the Special Rapporteur on Human Rights and the Environment. 2016.

Worker Exploitation and Human Rights Abuses

The most concrete examples of the relationship between DWF and labor abuses have been documented in the Thai fishing fleet and the Taiwanese DWF fleet.

- In Thailand, most documented cases of human rights abuses occurred on short-haul trips throughout Southeast Asia, especially trawlers (vs. purse seiners) and those in Indonesia.
- A recent study found an inverse relationship between duration of time at sea and odds of trafficking in the Thai fleet. However, this does not mean that the Thai DWF is free from abuses.
- Enforcement efforts by the Thai government and others seem to have shifted rather than stopped these activities, with Thai DWF vessels shifting to the coast of PNG and then to Saya de Malha Bank in the Indian Ocean (2,000 km from the nearest land mass), effectively moving when monitoring and control efforts become more stringent, and relying on reefers and transshipment to sustain their activities.

Taiwan's DWF has received a yellow card by the EU over its relationship to human trafficking and labor abuses, and its ineffective response.

- Taiwan has over 1,800 vessels flying the Taiwanese flag operating across the world, and hundreds of Taiwanese owned vessels flying other flags. These vessels caught 820,000 metric tons in 2016, valued at US$1.6-2 billion.
- Migrant fishermen based in Taiwan and in the DWF regularly have significant deductions taken from their salaries by brokers, which generate substantial debts, creating a bonded labor workforce even when captains are abusive and force them to work hours in excess of international standards. Workers sleep in squalid conditions and do not have access to sufficient food or clean water, even when in port.
- Egregious human rights abuses, systemic IUU fishing, and an ineffective Fisheries Agency that failed to uncover, prosecute, or resolve offenses led to the initial card. It was sustained because sanctions do not deter IUU, and lack of effective monitoring, control, and surveillance of the DWF led to the initial card.

"Endemic human rights abuses and poor environmental standards are encouraged by key elements of the DWF business model."

- Excess fishing capacity, uneconomic fishing practices and the resulting downward pressure on all costs, and the relatively fixed costs of fuel, equipment, and maintenance in comparison to labor are all driving factors in the humans rights abuses that appear to be endemic among the DWF fleets.

Sources: Chantanavich et al. 2016.; Greenpeace SE Asia. 2016.; Environmental Justice Foundation, 2018. Greenpeace, 2018.; Not in the Same Boat: Prevalence & Patterns of Labour Abuse Across Thailand's Diverse Fishing Industry. Issara Institute. 2017.

Research Areas & Key Players

- Overview of approach
- List of researchers and their focus areas
- Bibliography

Overview of Approach

Overview

CEA profiled all the researchers and experts we corresponded with throughout our research. Specifically, CEA covered the following for each researcher or expert:

- **DESCRIPTION OF WORK**: What is the focus of each researcher's lab or expert's program area? What are the connections to DWF?
- **KEY RESOURCES**: What are the essential papers on this topic, or that this scholar has produced? What are upcoming publications or work areas that may also be useful? What additional resources does this researcher or expert possess or recommend that would be beneficial in the study of DWFs (i.e., databases, unpublished pieces)?
- **ISSUE TAGS**: Which of this scoping effort's research questions is this researcher or expert most knowledgeable about?
- **RECCOMENDATIONS FOR FUTURE WORK:** What suggestions did this researcher or expert make to advance the field?

In addition to these summaries, we have also compiled a bibliography of all these resources which is shared at the end of this document.

We would be happy to share these detailed research summaries upon request, subject to the approval of the experts consulted.

Note: Expert names were sourced via conversations with the Packard Foundation, CEA's network, and researcher and expert recommendations. Omissions reflect limitations in our connections and our time, and are not a reflection of the expertise of those not interviewed.

List of Researchers and Their Focus Areas

Expert	Focus
Aurora Alifano, FishWise	• Human rights abuses and illegal fishing • Briefings for companies on illegal fishing
Simon Bush, Wageningen University	• Regional governance arrangements (RFMOs) and some links to IUU; tuna
Chris Costello, University of California at Santa Barbara	• Collaborations with global fishing watch around IUU fishing, DWF, impacts of conservation interventions, economic and governance arrangements
Valerie Farabee, Liberty Asia	• Anti-money laundering frameworks as a means of combating human trafficking
Tony Long, Global Fishing Watch	• Transparency of fishing effort globally
Gordon Munro, University of British Columbia	• Economic and legal principles underlying fishing access agreements
Daniel Pauly, Sea Around Us Project	• Catch reconstruction analysis through the Sea Around Us Project • Economics of distant water fishing especially subsidies
Amanda Shaver & Sally Yozell, Stimson Center	• International security implications of illegal fishing • The extent and impacts of distant water fishing fleets
Andy Shen, International Labor Rights Forum	• Labor trafficking and worker rights, focus on Southeast Asia
Rashid Sumaila, University of British Columbia	• Global fisheries subsidies, ecological and impacts of distant water fleets, China's distant water fisheries
Steve Trent, Environmental Justice Foundation	• Studying human rights abuses in Thailand's fisheries, and activism toward countries and the seafood industry
Reg Watson, University of Tasmania	• Food security and fisheries, identifying seafood sources, fishing access agreements
Boris Worm, Dalhousie University	• Extent and solutions to overfishing, AIS tracking to track global fishing fleets, marine protected areas, ecology of the human as a predator

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