



# FISHING FOR ANSWERS: Understanding Drivers and Environmental Impacts of China's Distant Water Fishing Fleet

*By Katie Lebling*

**I**n December 2012, two Chinese fishing vessels were caught inside Argentina's exclusive economic zone with multiple metric tons of presumably illegally obtained fish and squid aboard. This breach of international maritime law is not isolated; in recent years Chinese distant water fleets have been caught engaging in illegal fishing practices around East and Southeast Asia, and increasingly in more distant locations, such as South America. China has been the world's largest producer of fish since 1990, and its high level of fisheries exploitation within its domestic waters has exceeded biological replacement rates leading to a serious decline in fishery resources and degradation of its coastal marine

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environment. Besides being the world's largest fish processing and exporting country with around half its seafood production being exported to developed countries, China is also the largest consumer of seafood. With depleted domestic fisheries, the Chinese fishing industry (and the government agencies that support them) has looked into aquaculture and distant water fisheries to satisfy domestic and export demand.



## UNCLOS AND IUU FISHING

According to the United Nations Convention on the Law of the Sea (UNCLOS), which came into force in 1994, countries have jurisdiction over resources in the waters within 200 miles off their shores, an area known as the exclusive economic zone (EEZ). UNCLOS further stipulates that distant water fishing (DWF) fleets can harvest surplus fish in countries that do not have adequate capacity to exploit their fishery resources, in return for compensation to the host country. In theory this allows for more efficient fishing in developing countries that lack capacity and benefits those countries financially and technologically. China ratified this convention in 1996. Although UNCLOS addresses fishing within a state's EEZ, it largely fails to address the problem of high seas fishing.

The UN Food and Agricultural Organization (FAO) addressed the issue of illegal, unreported, and unregulated (IUU) fishing in both the high seas and within EEZs in the International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing (IPOA) within the Code of Conduct for Responsible Fisheries (Code) framework. The Code is a voluntary agreement adopted in 1995 and sets up principles and standards applicable for conservation, development, and management of fisheries.<sup>1</sup> The FAO created IPOA in 2001, which is also a voluntary agreement.<sup>2</sup>

The UN created other global instruments such as the Agreement for the Implementation of the Provisions of UNCLOS Relating to Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas to address oversight of marine fisheries. The former outlines principles for conservation and management of certain fish stocks, stipulating the use of the precautionary principle and the best available information to form the basis for management of certain fish stocks. The latter was adopted in 1993 and puts responsibility on the flag state for upholding measures for international conservation and management.

Despite these international frameworks and agreements, China's involvement in IUU fishing remains significant. Within China's own EEZ, the University of British Columbia reports that 30 percent of fisheries have collapsed, and a further 20 percent are overexploited.<sup>3</sup> The lack of fish in domestic water provides economic incentives to expand activities into international waters as well as into other countries' EEZs.



## A FAR-FLUNG FISHING FLEET

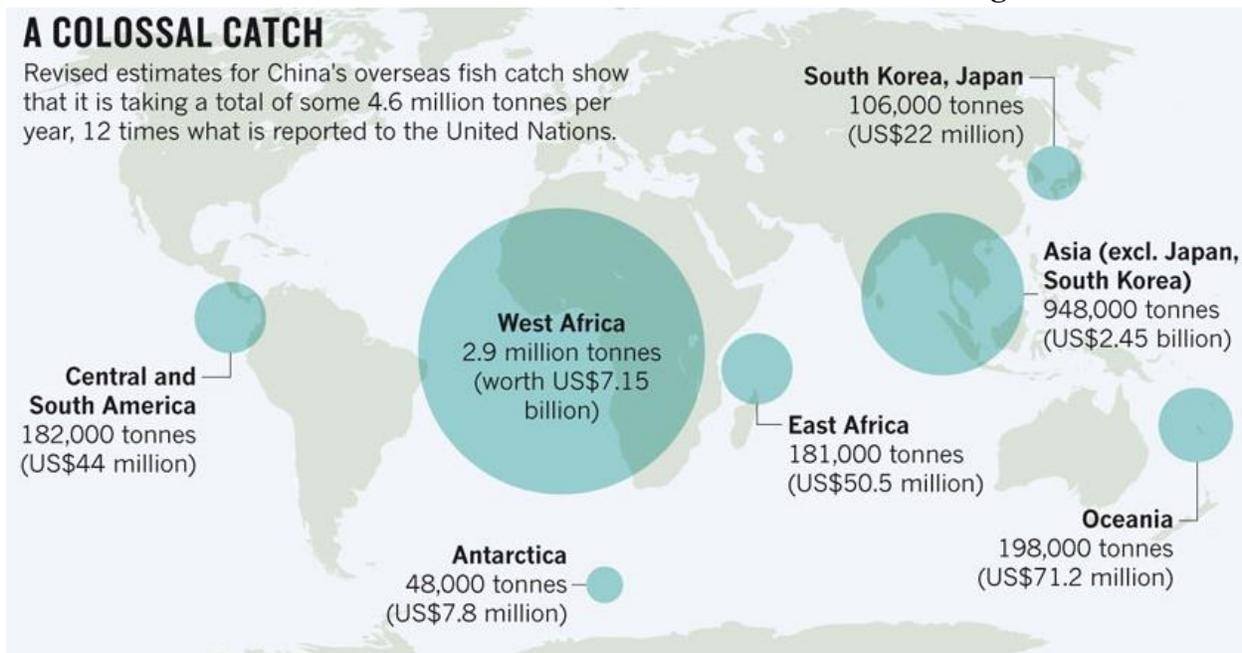
China's distant water fishing (DWF) fleet is comparatively young, but it is also the largest in the world. As fish extraction rates from China's coastal waters dropped dramatically in the 1980s, China created its DWF fleet in 1985 and since then Beijing's policy has encouraged its development over that of domestic fisheries through preferential tax policies and funding allocations.<sup>4</sup> This fleet has grown tremendously—to over 2,000 vessels—and is likely to see continued expansion. The United States, in comparison, has around 200 ships in its DWF fleet.

A study by the European Parliament estimated that, in the last decade (2000-2011), China's DWF extracted 4.6 million tons of fish annually, the vast majority of which (3.1 million tons) came from African waters, followed by Asian waters, and smaller amounts from Oceania, Central and South America, and Antarctica<sup>5</sup> (See Figure 1). Of the 3.1 million tons extracted from Asian waters, the study shows, 2.5 million tons were IUU. (See Figures 1 and 2).

The FAO reports 368,000 tons of overseas fish catch per year for China's DWF, though official Chinese statistics indicated its DWF caught 1.15 million tons in 2011; the discrepancy is likely due to both underreporting and different reporting standards

between the two entities.<sup>6</sup> By either reporting standard, China's Bureau of Fisheries is severely underreporting catch rates of Chinese fishers on the high seas and foreign waters. The amount of each species caught by Chinese fishers also remains unclear, particularly in West Africa where the European Union (EU) is another major player. EU fishers have been fishing off of West Africa for many years before China's involvement. But unlike China, the EU has more transparent agreements with various West African countries. As DWF fishing entities like the EU and Japan make an effort to improve their practices, China may take advantage of the thus decreased fishing effort and compensate with an increase in Chinese fishing.

**FIGURE 1: Revised Estimates of China's Distant Water Fishing Fleet**



Source: PEW Charitable Trusts (April, 2013) "China's Foreign Fishing is Largely Unreported."

China does not disclose fishing information regarding the countries with which it has bilateral fisheries access agreements. Thus, in practice, all activities of the Chinese DWF—whether or not they are legal—are not transparent. An EU Parliament report notes

that "the activities and catches of the Chinese distant-water fleets are almost completely undocumented and unreported, and often, as we shall see, may actually be illegal, thus spanning the entire gamut of IUU fishing."<sup>8</sup> There is evidence suggesting that China

over-reports its domestic catch numbers to the FAO because Chinese local government officials are rewarded with promotions for exceeding planned catch numbers.<sup>9</sup> In contrast, China's distant water catch may be under-reported due to international pressure.<sup>10</sup> Overall, Chinese vessels have been reported in 93 countries and Antarctica, though Chinese sources produce a much lower number; the coastal waters in which Chinese fishers have not been spotted are those of the EU, the United States, and the Caribbean.<sup>11</sup>



### HUNGRY GLOBE DRIVING DEMAND

One of the major reasons for the increased IUU fishing is increasing global demand, especially increasing domestic demand in China. As Chinese citizens are lifted out of poverty and the middle class continues to grow, demand for meat and fish, both of which are relatively expensive, grows as well. Increased consumption of meat is desirable not only because of its high protein content, but also because of its indication of higher social status. A Rabobank study of China's seafood industry indicates that as incomes rise the percentage of income spent on terrestrial protein decreases and the percentage spent on aquatic protein increases, because certain species of seafood are particular markers of status.<sup>12</sup> China's demand for seafood has tripled since 1990 in per capita terms.<sup>13</sup> It is not just Chinese demand that is fueling IUU fishing, but demand from Japan and Western countries as well. Most of China's high-value species and about half the overall catch are exported to the EU, the United States, and Japan, and the other half is brought back to China and sold domestically.<sup>14</sup>

In addition to feeding global demand for fish, expansion of China's DWF industry is a component of the central government's goals of asserting the country as a rising power and implementing China's

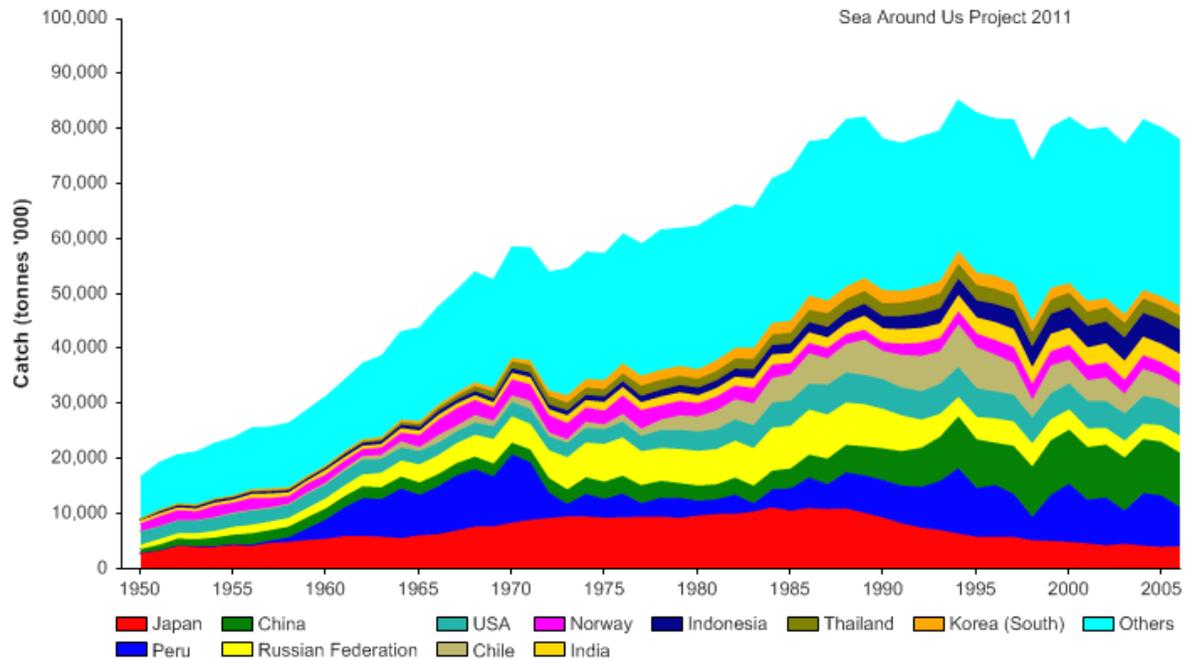
ocean economic development plan.<sup>15</sup> There is a sense of nationalism associated with this expansion, and also an idea that China deserves their fair share of the global fisheries pie. It is also important to note that China is emulating more established DWF nations in the expansion of its own DWF industry.<sup>16</sup>



### A FLOUNDERING DOMESTIC FISHERY

Fish extraction rates in China's domestic waters began to fall in the 1970s, further declining in the 1980s and 1990s in the Bohai, Yellow, East China, and South China seas. This decrease was mainly due to rising populations in not just China's coastal areas but also in Vietnam, Japan, and South Korea. Another key reason for the decline comes from the advances in fish extraction technology, which have allowed for overexploitation without leaving enough time for stocks to replenish.<sup>17</sup> China has access to massive amounts of marine territory; the China seas cover close to five million square kilometers, from temperate to tropical climates.<sup>18</sup> China has around one-fifth of the world population and consumes around one-quarter of the world's fish, and this figure is likely to continue growing for the foreseeable future.<sup>19</sup>

China's DWF expansion is also a means to combat unemployment, especially in the fisheries industry that is declining due to increased fish scarcity in domestic waters. Bilateral fishing agreements between China and Japan, Korea, and Vietnam have reduced traditional fishing grounds, contributing to unemployment in this sector.<sup>20</sup> The four main domestic fisheries in the South China Sea—the Japanese Spanish mackerel, eel, small yellow croaker, and large yellow croaker—that were plentiful in past decades have all been severely degraded. Since 1999 catches in the Yellow Sea have declined precipitously.<sup>21</sup>

**FIGURE 2: Catch Reported by Fishing Countries in the Global Ocean (1950-2006)**

Source: Sea Around Us Project. <http://www.searoundus.org/global/1/4.aspx>

In the past two decades, China has significantly increased its fish production through the expansion of aquaculture. According to recent statistics, 65 percent of China's aquatic output came from aquaculture, and the remaining 35 percent from marine capture fisheries.<sup>22</sup> However, water scarcity and water pollution from agricultural runoff, industry, and sewage threaten this food production industry. Aquaculture farmers have responded to pollution threats by adding antibiotics and pesticides into the water to keep their fish alive. Such practices, however, can pose a health risk to consumers and further exacerbate the water pollution problem.<sup>23</sup> With growing food safety scares in China, there has been increasing concern among some countries about China's aquaculture exports, which adds yet another incentive to Chinese fishing industry to exploit more distant fisheries.

## FISH PROCESSING AND TRACEABILITY IN CHINA

Although China has been the largest exporter of marine fish products since 2006, significant portions of this amount are fish caught by other countries, exported to China for processing and then re-exported out of China.<sup>24</sup> This importation requires a Certificate of Origin and a health certificate. The former is concerned mainly with setting the appropriate tariff level and does not require specific information about catch location or catch circumstances. The latter addresses sanitary issues and little else that is useful for traceability of the fish.<sup>25</sup> The China Inspection and Quarantine Bureau assigns each incoming batch of fish a unique number and does not permit mixing of different batches, which is the closest measure to traceability that exists within the system, as these identification numbers are reported again when the fish are exported from

China. Although there have been improvements in Chinese traceability efforts in recent years, these changes have mostly been driven by concern for sanitation standards rather than fish extraction origins.

## THE BIG FISH—MAJOR CHINESE INDUSTRY PLAYERS



**China National Fisheries Corporation (CNFC)**, China's largest fisheries enterprise, owns about one-third of China's distant water fishing fleet. But the industry has seen a gradual shift from state to private ownership, which Tabitha Mallory, a China fishery expert and now a Post-doctoral Fellow at Princeton-Harvard China and the World Program, cited at her January 2012 Testimony before the U.S.-China Economic and Security Review Commission as one factor that has contributed to less reliable extraction numbers being reported.<sup>26</sup> The main types of fish exploited by China's DWF are various species of squid in all three major oceans, tuna in the Indian Ocean and Oceania, and horse mackerel in the South Pacific.<sup>27</sup> CNFC in particular focuses on octopus, yellow croakers, sole, cuttlefish, and shrimp in the Atlantic and has eight overseas branches in West Africa, including processing facilities in Mauritania, Senegal, and Las Palmas that export to the EU and the U.S.<sup>28</sup> CNFC was the first Chinese company to expand into West Africa in the mid-1980s.

Another major player in China's DWF industry is the state owned **China Poly Group Corporation**, which in 2010 signed a 25-year access agreement with the government of Mauritania, which spans far longer than most EU-Africa access agreements. It includes \$100 million Chinese investment in a processing and manufacturing center in Mauritania, which is expected to create 2,000 local jobs.<sup>29</sup> Among some fishery experts there is concern that the Chinese fleet will out-compete local fishermen in Mauritania and

threaten their livelihoods. The unusual length of the access agreements could exacerbate the problems of overexploitation and local livelihood deterioration.

**China Fishery Group** is a third major player in Chinese DWF operations. It is a subsidiary of a Hong Kong-based company that is run out of Singapore with major operations in Latin America and plans to expand into West Africa. The Group's ownership is not entirely clear because Hong Kong's registration and statistics system is different from that of the mainland.

## METHODS TO MAXIMIZE CATCH



The main fish extraction method employed by Chinese fishermen is trawling, which entails towing a fishing net attached to the back of a boat through the water. The type and depth of the net determine the relative damage caused to the ocean environment and non-target species. Bottom trawling is considered the most damaging type of fishing practice; it involves essentially plowing the sea floor and pulling up everything caught in the net. Just under half of the fish caught by Chinese fishing vessels (47 percent) are caught using trawling, around 15 percent are caught with each gillnetting and set netting, and small amount are caught with lines, hooks and purse seines—6 and 5 percent, respectively.<sup>30</sup>

### Live Reef Fish Trade

One particularly damaging and lucrative market is that of live reef fish. These fish are often taken still alive from reefs in the coral triangle, which includes waters in Southeast Asia around Indonesia, Malaysia and the Philippines. Fishermen harvest the fish by using not only traps, but also cyanide to stun the fish, which severely damages the rest of the reef organisms; or explosives which kill most fish except for some that are left stunned and then collected. Live reef fish are prized in China—particularly in Hong Kong—mostly

for food, but also for aquariums and exotic jewelry. High-end restaurants stock their aquariums with these fish so diners can choose which one they want to eat that night; their allure is often based on their color and rarity rather than their taste.<sup>31</sup> For the leopard coral grouper, one species emblematic of many, demand far exceeds supply. With such high prices there is incentive for fishermen to continue fishing especially if there are no other employment options in the area. However, these short-term gains will likely drive this species to extinction. Some regions that are involved in this illegal fishing trade have come to realize that the only way to ensure sustained profits from these fishing sites is to keep fish populations high enough for replenishment - but this is the exception rather than the norm at this point.<sup>32</sup>

## EFFECT ON LOCAL FISHERIES IN WEST AFRICA

The ocean off of West Africa is one of the planet's major upwelling sites. Significant amount of nutrients are available to support large fish populations. This area has become the "Wild West" of the sea, with foreign, technologically advanced trawlers harvesting so much that fish populations have become scarce for the locals. These practices often force local fishermen to travel greater distances to find sufficient fish sources. Furthermore, these actions have greatly reduced access to vital protein for many countries that already rely on UN food aid.<sup>33</sup>

Even then these fishermen regularly surrender most of their catch to foreign markets, and return home to meals often devoid of protein. Fish carcasses, stripped of their filets that were sent for export, are sold in local markets. According to a *National Geographic* report, beyond the illegality and exploitation of local fishermen, the system is inefficient also because much of the bycatch (non-target fish that get caught in nets along with target species), composed of desirable and

edible species that could feed people in local communities, is thrown back into the ocean.<sup>34</sup>

Foreign fishing fleets, like those from China and the EU venturing into West African waters, will often sign fisheries access agreements under UNCLOS, which are supposed to increase efficiency by allowing fish that would not otherwise have been exploited a chance to be harvested for financial compensation to the host country. However, because of little knowledge regarding fish stocks in West African waters, fish extraction rates in bilateral agreements are often set higher than what is sustainable.<sup>35</sup> Another significant information gap is that foreign fishing fleets are not familiar with local fisheries management and policy and thus often overfish the area, or neglect to report all the fish they catch, which can severely deplete fish stocks.

Most importantly, many of these African countries lack adequate enforcement capacity in their domestic waters.

Ultimately, fishing fleets follow money, and if customers in the West or Japan are willing to pay a higher price for fish, then fish will be exported rather than sold in the host country. The massive fish extraction has led to increased use of terrestrial resources and protein deficit in some West African countries—development deficiencies that are likely to continue for generations to come.<sup>36</sup>

Vessels with European, South Korean, and Chinese flags target Senegal and its waters. Lack of resources for enforcement and rampant corruption make it very difficult for Senegal to monitor foreign intrusions into its water, allowing these massive vessels to take more fish in one day than most artisanal fishermen can catch in a year in their traditional wooden fishing boats.<sup>37</sup> Some vessels hide their flags or change their names to avoid regulation when fishing illegally. These unmarked vessels have been the cause of most IUU incidents off the West African coast in recent

years. Foreign exploitation of local marine resources has the potential to further destabilize the region and push communities that survive on fisheries toward piracy or other crime.<sup>38</sup>



## STRATEGIES TO AVOID FISHERY COLLAPSE

One method that West African nations could use to better manage domestic fisheries is to create a system of individual transferable quotas (ITQs) or individual fishing quotas (IFQs). Fisheries experts or scientists generally determine the total allowable catch (TAC) of a certain fish species within a certain period of time, and shares of this total are allotted to each fisherman. Fishermen can usually buy and sell these quotas among themselves to determine the most efficient allocation of effort. It is a way of avoiding the overexploitation that often happens with common pool resources through creation of a market and long-term rights to fish populations. Evidence from the world's 121 fisheries with ITQ systems in place shows that they dramatically reduce the probability of collapse.<sup>39</sup> Thus, if West African nations create a quota system and integrate it within their EEZ they can begin to build a stronger domestic governance structure to protect fisheries.

The question then becomes whether or not this type of system could be feasible in international waters. Implementing an ITQ system in international waters would likely be difficult due to an array of factors, principal among them being a lack of enforcement capacity. Monitoring fishing laws in the open ocean is virtually impossible, and the incentive for cheating is high. Determination of total allowable catches is technically difficult, time-consuming, and costly, and it is unclear which countries would be responsible for determining these outside of their domestic waters. Lastly, many fish stocks migrate in and out of different countries' EEZs, which adds another layer of complexity to these determinations. Nevertheless, if all West African countries add an ITQ system into

bilateral fishery agreements it could be an important signal to Chinese and European fishing fleets that sustainability is a priority for the region.

As an alternative to ITQs, some argue that significantly limiting fishing capacity is necessary to rebuild stocks,<sup>40</sup> while others propose creating a global fisheries management organization, or a global record of fishing vessels.<sup>41</sup> Another measure that has not yet been applied, but would be beneficial to preservation of global fishery stocks, is the Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing. This agreement allows for increased control of port states over foreign vessels' entry into their ports, prior notification, transport of fish, documentation, and inspection.<sup>42</sup> The FAO approved this agreement in November 2009 and will enter into force once 25 members of the FAO have ratified it.



## INFORMATION, THE TRULY SLIPPERY FISH

There is a major knowledge gap or even apathy among fishermen, wholesalers, and customers as to the environmental impact of fishing practices and often basic information on fish populations. This disconnect prevents customers from making appropriate demands and decisions. For example, a significant portion of the fish coming into the Hong Kong market is wild-caught, but there is no requirement to show specifics of how and where these fish are caught. This lack of transparency means that the whole processing and consumption end of the supply chain is a black box. Notably, many retailers and wholesalers do not require certificates listing this information nor do most consumers appear to take notice of the ecological footprint of their fish consumption. Ultimately consumers need to be better educated on the impact of their fish purchases and have greater access to information on unsustainably harvested fish. Although environmental awareness is growing in China, it has yet to reach the

point where people will willingly demand more expensive fish products because they are sustainably harvested, or forego the purchase of a particular species because it is endangered. Nonetheless, some notable initiatives, such as the 2012 ban on shark fins, have been pursued by the government. Yet despite these efforts, shark fins continue to be sold in the private sector.

Some environmental nongovernmental organizations in the United States and EU have partnered with industries to create education on sustainable fish harvests, which is a trend that needs to expand more broadly.



### TAIL END PONDERINGS

China's distant water fisheries have grown dramatically in the past two decades due to the combined forces of increasing domestic demand, declining domestic fishery resources, unemployment in domestic fisheries, and the nation's goal of asserting its rising oceanic power and claiming what it believes is its rightful share of high seas' resources. The most prominent destination for Chinese DWF is the west coast of Africa. Due to lack of transparency with fisheries access agreements, it is unknown how much of Chinese activity is legal, but there is significant and warranted concern that Chinese vessels are extracting fish far in excess of what they report and what is sustainable for the species. Furthermore, Chinese vessels' technological capability is far greater than that of the local fishing vessels, which leads to out-competition of local fishermen and a protein deficit in many areas that rely heavily on the ocean as a source of protein.

Requiring more accurate data on fisheries extraction rates and more transparency in their access agreements should be an effective way for importing nations to pressure China. If sustainability becomes important for market access then Chinese DWF would be motivated to report. In terms of Chinese

DWF in West Africa the international aid and environmental watchdog community could:

- Increase efforts to improve governance and enforcement in West African nations—possibly through regional coordination among affected African nations;
- Support nations that are already engaging in sustainable fishing practices;
- Invest in research and exchanges to determine appropriate regulations for high seas fisheries; and,
- Educate consumers in western nations to demand better traceability of the fish products they purchase.

Bilateral fishery agreements have not been proven effective in promoting sustainable fishing. Such agreements have not halted overfishing, due to both lack of enforcement mechanisms and the fact that fish migrate between areas covered by one agreement to another. In Africa, the agreements don't work because Chinese fishers have more leverage and less incentive to fish sustainably than in its near seas. According to Tabitha Mallory, a Princeton-Harvard China and the World Postdoctoral Fellow, what really needs to happen is that “West African countries need to unite without outsider involvement and form a regional fisheries management organization that establishes fishing boundary lines and fish quotas. A regional organization could grant the Chinese DWF formal license to fish in the region and allow West African nations a say in the DWFs practices near their shores.”

Tabitha Mallory also noted that “it is vital for the world to begin moving forward to address unsustainable fishing in the high seas, which is on the rise. Even the Chinese realize that EEZ fishing opportunities are disappearing as developing countries implement stricter regulations over their waters.”<sup>43</sup> She expressed concern that as China and other major DWF countries ramp up their high seas

fishing capacity, the international community has yet to create any governance institutions for vast areas of the high seas.

The Chinese government and business sector has begun to pay attention to the ecological footprint of the country's investment overseas. China, for its part, could start conducting its own studies and initiate dialogues on the ecological footprint of DWF fleets. Sustainable fishing is ultimately a commitment to maintaining a long-term market. The Chinese fishing industry has already seen massive unemployment among fishers in the South China Sea as some major

stocks of fish have disappeared. It is vital that Chinese industry and policy circles come to see that unsustainable fishing practices in DWF could ultimately destroy this lucrative market, not only hurting the industry, but also undermining some of the country's food security goals. China in particular could add fishery governance to its aid and investment in West Africa. Ultimately, poor oversight by the Chinese government is the main driver of the over-extraction by the Chinese DWF fleet, and engaging China on this topic will be key to solving the problem of overfishing.

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## END NOTES

- <sup>1</sup> Australian Government: Department of Agriculture, Fisheries and Forestry. "Code of Conduct for Responsible Fishing." [Online]. Available: <http://www.daff.gov.au/fisheries/legal-arrangements/code-conduct>.
- <sup>2</sup> UN FAO. (2013). "International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing." <http://www.fao.org/fishery/ipoa-iuu/about/en>
- <sup>3</sup> Blomeyer, Roland; Goulding, Ian; Pauly, Daniel; Sanz, Antonio; and Stobberup, Kim. (2012, June 22). "The Role of China in World Fisheries." European Parliament: Directorate General for Internal Policies.
- <sup>4</sup> Xue, Guifang. (2006). "China's Distant Water Fisheries and its Response to Flag State Responsibilities." *Marine Policy* 30: 651-658.
- <sup>5</sup> Blomeyer, Roland; Goulding, Ian; Pauly, Daniel; Sanz, Antonio; and Stobberup, Kim. (2012, June 22).
- <sup>6</sup> Blomeyer, Roland, et al. Ibid.
- <sup>7</sup> Pew Charitable Trusts. (April 2013). "China's Foreign Fishing is Largely Unreported." [Online]. Available: <http://www.pewenvironment.org/newsroom/fact-sheets/chinas-foreign-fishing-is-largely-unreported-85899465404>.
- <sup>8</sup> Blomeyer, Roland, et al. Ibid.
- <sup>9</sup> Reg Watson and Daniel Pauly. (2001). "Systemic distortion in world fisheries catch trends." *Nature* Vol. 414
- <sup>10</sup> Blomeyer, Roland, et al. Ibid.
- <sup>11</sup> Pala, Christopher. (2013, April 2). "Detective work uncovers under-reported overfishing." *Nature*. [Online]. Available: <http://www.nature.com/news/detective-work-uncovers-under-reported-overfishing-1.12708>.
- <sup>12</sup> "The Dragon's Changing Appetite: How China's Evolving Seafood Industry and Consumption are Impacting Global Seafood Markets." (October 2012). *Rabobank International: Food and agribusiness Research and Advisory*. [Online]. Available: [http://transparentsea.co/images/c/c5/Rabobank\\_IN341\\_The\\_Dragons\\_Changing\\_Appetite\\_Nikolik\\_Chow\\_October2012.pdf](http://transparentsea.co/images/c/c5/Rabobank_IN341_The_Dragons_Changing_Appetite_Nikolik_Chow_October2012.pdf).
- <sup>13</sup> "The Dragon's Changing Appetite." Ibid.
- <sup>14</sup> Mallory, Tabitha Grace. (2013, March). "China's distant water fishing industry: Evolving policies and implications." *Marine Policy*. 38:99-108.
- <sup>15</sup> Mallory, Tabitha. (2013, April). *China, Global Governance, and the Making of a Distant Water Fishing Nation*. Dissertation, Baltimore: Johns Hopkins University, 358pp.
- <sup>16</sup> Mallory, Tabitha. Ibid.
- <sup>17</sup> Rosenberg, David. (2005). "Managing the Resources of the China Seas: China's Bilateral Fishing Agreements with Japan, South Korea, and Vietnam." *The Asia-Pacific Journal: Japan Focus*. [Online]. Available: <http://www.japanfocus.org/-David-Rosenberg/1789>.
- <sup>18</sup> Zhan, Bingyi and Wang, Stanley. "Marine Fishery Resource Management in PR China." (1992). *Marine Policy*.
- <sup>19</sup> "The Dragon's Changing Appetite: How China's Evolving Seafood Industry and Consumption are Impacting Global Seafood Markets." (October 2012). *Rabobank International: Food and agribusiness Research and Advisory*. [Online]. Available: [http://transparentsea.co/images/c/c5/Rabobank\\_IN341\\_The\\_Dragons\\_Changing\\_Appetite\\_Nikolik\\_Chow\\_October2012.pdf](http://transparentsea.co/images/c/c5/Rabobank_IN341_The_Dragons_Changing_Appetite_Nikolik_Chow_October2012.pdf).
- <sup>20</sup> Mallory, Tabitha Grace. (2012, January 26). "China as a Distant Water Fishing Nation." Testimony Before the U.S.-China Economic and Security Review Commission. [Online]. Available: [http://transparentsea.co/images/c/ca/12\\_1\\_26\\_mallory\\_testimony.pdf](http://transparentsea.co/images/c/ca/12_1_26_mallory_testimony.pdf)
- <sup>21</sup> Liang, Jialin and Jiang Han. (2012, October 19). "Overfishing Pushes 80% of Fishermen Towards Bankruptcy." *chinadialogue*. [Online]. Available: <http://www.chinadialogue.net/article/show/single/en/5221>.
- <sup>22</sup> UN FAO. Fisheries and Aquaculture Department Country Profile: China. [Online]. Available: [http://www.fao.org/fishery/countrysector/FI-CP\\_CN/en](http://www.fao.org/fishery/countrysector/FI-CP_CN/en)
- <sup>23</sup> Barboza, David. (2007, December 15). "In China, Farming Fish in Toxic Waters." *The New York Times*. [Online]. Available: <http://www.nytimes.com/2007/12/15/world/asia/15fish.html?pagewanted=all&r=0>
- <sup>24</sup> Clarke, Shelley. (2009). "Understanding China's Fish Trade and Traceability Systems." *Traffic Wildlife Trade Monitoring Network: WWF and IUCN*.
- <sup>25</sup> Clarke, Shelley. Ibid.
- <sup>26</sup> Mallory, Tabitha Grace. (2012, January 26). "China as a Distant Water Fishing Nation." Testimony Before the U.S.-China Economic and Security Review Commission.
- <sup>27</sup> Blomeyer, Roland, et al. Ibid.
- <sup>28</sup> Blomeyer, Roland, et al. Ibid.
- <sup>29</sup> "Greenpeace Opposes China Mauritania Fishing Deal." (2011, July 7). *Voice of America: Asia News*. [Online]. Available: <http://www.voanews.com/content/greenpeace-opposes-chinese-fishing-deal-in-mauritania--125207604/141954.html>
- <sup>30</sup> Blomeyer, Roland; Goulding, Ian; Pauly, Daniel; Sanz, Antonio; and Stobberup, Kim. "The Role of China in World Fisheries." (2012, June 22). European Parliament: Directorate General for Internal Policies.
- <sup>31</sup> Irvine, Dean. (2011, February 9). "Small Fish, Big Business: Asia's Billion Dollar Live Reef Fish Trade." *CNN: World*. <http://www.cnn.com/2011/WORLD/asiapcf/02/08/reef.fish.trade/index.html>.

- 
- <sup>32</sup> Irvine, Dean. (2011); Michael Fabinyi. (2011). "Historical, Cultural, and Social Perspectives on Luxury Seafood Consumption in China," *Environmental Conservation*, Vol. 39, No. 1., pp. 83-92.
- <sup>33</sup> Vidal, John. (2012, April 2). "Senegal's fishing community will act on foreign fleets if government doesn't." *The Guardian*. [Online]. Available: <http://www.guardian.co.uk/global-development/2012/apr/02/senegal-fishing-community-act-foreign-fleets>.
- <sup>34</sup> Olson, Randy. Ibid.
- <sup>35</sup> Inyckyj, Milan. (2007). "The Legality and Sustainability of European Union Fisheries Policy in West Africa." MIT *International Review*. [Online]. Available: <http://web.mit.edu/mitir/2007/spring/fisheries.html>.
- <sup>36</sup> Inyckyj, Milan. Ibid.
- <sup>37</sup> Valdmanis, Richard and Aka, Simon. "Illegal Fishing Plunders and Strains West Africa." (2012, March 15). *Reuters*. [Online]. Available: <http://www.reuters.com/article/2012/03/15/us-westafrica-fishing-idUSBRE82E0HD20120315>.
- <sup>38</sup> Valdmanis, Richard and Aka, Simon. (2012, March 15).
- <sup>39</sup> Costello, Christopher; Lynham, John; Lester, Sarah; and Steven Gaines. (2010).
- <sup>40</sup> Sumaila UR, Cheung W, Dyck A, Gueye K, Huang L, et. al. (2012). "Benefits of Rebuilding Global Marine Fisheries Outweigh Costs." *PLoS ONE* 7(7): e40542. doi:10.1371/journal.pone.0040542
- <sup>41</sup> UN FAO. (2013). "Global Record of Fishing Vessels." [Online]. Available: <http://www.fao.org/fishery/global-record/en>
- <sup>42</sup> UN FAO. "Port State Measures Agreement." *Fisheries and Aquaculture Department*. (2013). [Online]. Available: <http://www.fao.org/fishery/topic/166283/en>.
- <sup>43</sup> Tabitha Mallory Interview, September 3, 2013.

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