



Bottom Trawl Fisheries in China and Their Global Impact

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ABOUT THE STUDY

The expansion of Bottom Trawl Fisheries (BTF) fisheries that 'bulldoze' demersal marine life and habitat non-selectively has long been a great concern around the world. Studies have indicated that the number of global fishing vessels was twice the level that would produce maximum sustainable profits, losing potential benefits of at least \$50 billion in 2004 alone. As the world's dominant commercial fishing practice, BTF has consistently contributed 25% biomass of global annual catches since late 1980s, including 60% of the discards from that biomass [1]. Substantial evidence has accumulated to show that BTF extracts non-targeted and rare marine species indiscriminately, degrades benthic marine ecosystems, unleashes contaminants from sediments.

Mitigating impacts of BTF requires countries to reduce both their fishing effort and constrain their footprints at seas. Historically, fishing efforts and footprints of BTF have generally moved offshore from domestic to distant waters, and from developed (e.g. European Union, North America) to developing regions (e.g. Asia, Africa), largely driven by resource availability, technology development, policies, and profitability. Over the past few decades, some developed nations have stabilized their overall fishing effort and footprints both in domestic and distant waters [2]. But developing countries, especially in Asia, have been expanding their share for decades along with increasing their economic power, foreign investment, and global consumption.

A great challenge in probing BTF is that many developing countries have not gathered or published data on their fishing capacity and fishing effort. In the past ten years, global fishing capacity and effort have been frequently reconstructed. A common trend is that such capacity and effort expanded rapidly from the late 1970s throughout 2010; notably this trend is dominated by Asian fleets which continue to grow [3]. Such a prominent rise is likely due to the rapid development of trawling since 1970s in Asia, where BTF is massive (e.g. ~83,000 BTF vessels targeting shrimp) but poorly monitored and managed.

The People's Republic of China is a leading fishing power in Asia,

largely due to its massive BTF. Currently, the estimated catch by Chinese BTF accounts for 28% of the total worldwide, dwarfing all other countries. Meanwhile, China is also home to the largest number of registered trawlers, with 30,000 trawlers registered in 2018. Although most Chinese vessels fish only in domestic waters 3000 fishing vessels (with probably about half engaged in BTF) operate in distant waters under bilateral agreements with foreign nations [4]. Notably, China's BTF in domestic waters contribute a large portion of the 'trash fish' used directly or indirectly in animal farms, especially its aquaculture, which has been the major supply of food fish in China and worldwide.

MTL or marine trophic index has been widely adopted as an indicator for sustainable fisheries or ecosystem health by scientists [4]. However, in line with other criticisms, we suggest that using MTL to measure sustainability could be misleading in the case of bottom trawling. Bottom trawling can show increases in MTL at certain times even under egregious fishing pressure [5,6]. One example would be China's BTF after a fisheries moratorium directed at protecting high trophic level species and lasting several months.

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