

GLOBAL CHINA INITIATIVE



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# Swimming Upstream

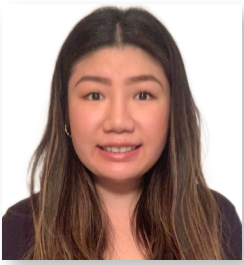
## ASSESSING CHINA'S OVERSEAS INVESTMENT PUSH FOR AQUACULTURE

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### ABSTRACT

This paper explores a seeming paradox between China's ballooning demand for imported seafood and its relative dearth of outbound aquaculture investment. It uses the "push and pull" framework of researching Chinese investment to weigh China's incentives for increasing outbound investment on equal footing with host countries' incentives for drawing said investment. It identifies \$1.3 billion in Chinese international aquaculture investment over the past 15 years and considers economic and governance bottlenecks to further expansion in the sector. The results show that host countries have significant policy space to direct Chinese investment toward sectors that are in line with their domestic seafood strategies and to regulate it according to their own local environmental and social priorities. In fact, establishing these policy frameworks appears key to Chinese investments' ability to come to fruition. Especially due to the significant risks that aquaculture can pose to aquatic ecosystems and the communities that they support, it is crucial for host countries to establish their own sectoral priorities, to determine whether expanded aquaculture production falls within those priorities and if so, to establish robust industrial, environmental and social policies to maximize the economic benefits of this investment and mitigate its social, environmental and economic risks.





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## INTRODUCTION

China is the world's largest home of aquaculture (raising aquatic plants and animals for food), responsible for over half of global production as of 2016 (Zhao et al. 2021). Furthermore, its demand for seafood is expected to grow dramatically in the next few years, with the gap between local demand and local production expected to more than double within the next decade (Crona et al. 2020, FAO 2022a). However, the sector does not rank highly among the country's outbound investment or development finance commitments (Ray et al 2021; Scissors 2022). This seeming paradox is intensified by Chinese consumers' recent preference for imported rather than domestically produced seafood. This paper explores this area of tension between China's growing push for overseas aquaculture investment and host countries' relative lack of corresponding interest. It pursues what researchers and policymakers can learn regarding investor incentives and host-country policy space from the interplay of "push and pull" factors in this particularly environmentally sensitive sector.

Following the introduction, the paper proceeds in five additional sections: Section 2 gives context of environmental governance in the Belt and Road Initiative (BRI) and explains the "push and pull" framework used here to investigate investment dynamics. Section 3 examines the "push" factors propelling Chinese interest in outbound aquaculture investment. Section 4 does the same for host-country "pull" factors. Section 5 details the resulting mismatch in incentives and how China and investment host countries have resolved these tensions with partial success, by channeling investment toward more other seafood-related sectors, such as fishing and fish processing. Finally, Section 6 discusses the lessons for policymakers and civil society, in China and in BRI host countries.

## CONTEXT: HOST-COUNTRY AGENCY IN BRI ENVIRONMENTAL GOVERNANCE

Aquaculture is a challenging sector for environmental governance and thus an interesting case for considering the shared responsibility of China and host countries in BRI investments. Aquaculture-related environmental risks are concentrated in surrounding aquatic ecosystems. Three main channels of risk merit discussion: the introduction or removal of species, altering waterways and changes to the water itself.

Farmed species may be directly introduced into an existing ecosystem without sufficient regard to consequences for local biodiversity. Predatory wild fish may be removed, or prey wild fish may be collected to encourage growth of farmed populations. Escaped fish may spread disease to wild populations and genetically modified fish may produce unwanted genetic changes in wild populations (Carballeira et al. 2021). In the case of one Norwegian marine fishery, from 2010-2018, 305 separate incidents of escape totaling almost 2 million fish have been observed and there are worries this could exacerbate wild population decline (Føre 2021).

The flow and composition of bodies of water may be altered to help production, which in some cases can obstruct passage for wild fish. These heavy modifications of habitat can lead to local extinction of wild species and at the very least it can heavily affect the food web (Cole et al. 2009). Aquatic contamination – including wastewater, excess feed, antibiotics and growth hormones – may leach into surrounding waters. When these contaminants contain high levels of organic nutrients, such as nitrogen and phosphorous, they can greatly affect the water quality of the ecosystem and encourage algae blooms. Such algae may sometimes be toxic to both wild species and humans and lead to eutrophication (Carballeira et al. 2021), a decline in available oxygen marked by rapid increases in plant life, which can create 'dead zones' for other species (Conley et al. 2009). Overall, aquaculture



can take pressure off wild fisheries, but the effective monitoring and control of firms' environmental performance is crucial to avoid widespread impacts on surrounding waterways and the ecosystem services they provide to local communities.

Chinese outbound investment and development finance follow a "country systems" approach to environmental governance. This governance framework is based on China's "Five Principles of Harmonious Coexistence", and until recently has generally deferred to host countries in overseeing environmental performance of Chinese investors (Wen 2004). A growing literature has examined host countries' response to this policy space. For example, Ray et al. (2017) find that Chinese investors in Latin America do not perform differently on the whole from their Western counterparts but vary their performance across host countries in line with their different national regulatory contexts. Tritto (2021) finds that BRI investment in Indonesia expanded the number of subcritical coal-fired power plants, in line with host country priorities. Coenan, Newig and Meyfroidt (2022) examine a BRI case study in Montenegro and similarly find lackluster environmental oversight and performance, based not on pressure from China but from the Montenegrin government itself.

Until now, this literature has focused more on the governance and performance of investments rather than on host countries' interest in attracting entire sectors of investment based on their overall environmental impacts and risks. Given the well-documented environmental concerns in the aquaculture sector (see for example Condie et al. 2022; Cullen-Knox et al. 2019) it is worth exploring this question.

To do so, this paper draws on the "push and pull" framework developed by Kong (2021), Kong and Gallagher (2021a, b) and Li et al (2022), which traces supply and demand for Chinese energy investments in coal-fired, hydropower and renewable energy sectors, respectively. In the push-pull framework, the supply "push" of Chinese investment and demand "pull" from host countries are assessed separately to examine each side's incentives and economic and social benefits (Kong and Gallagher 2021). In this study, the push-pull model characterizes the dynamic between China's economic interest in aquaculture abroad and host countries' economic, environmental and social priorities that jointly influence Chinese overseas aquaculture investment.

## **PUSH FACTORS FROM CHINA**

Two main factors explain China's increasing interest in outbound aquaculture investment: expanding food demand for Chinese consumers simultaneous to an increasing awareness of the environmental impacts of the aquaculture sector, making it less attractive for continued domestic expansion in the short term. In response to these two factors, the Chinese government has encouraged investment overseas while appropriate environmental standards can be implemented domestically.

### **Expanding Demand for Seafood**

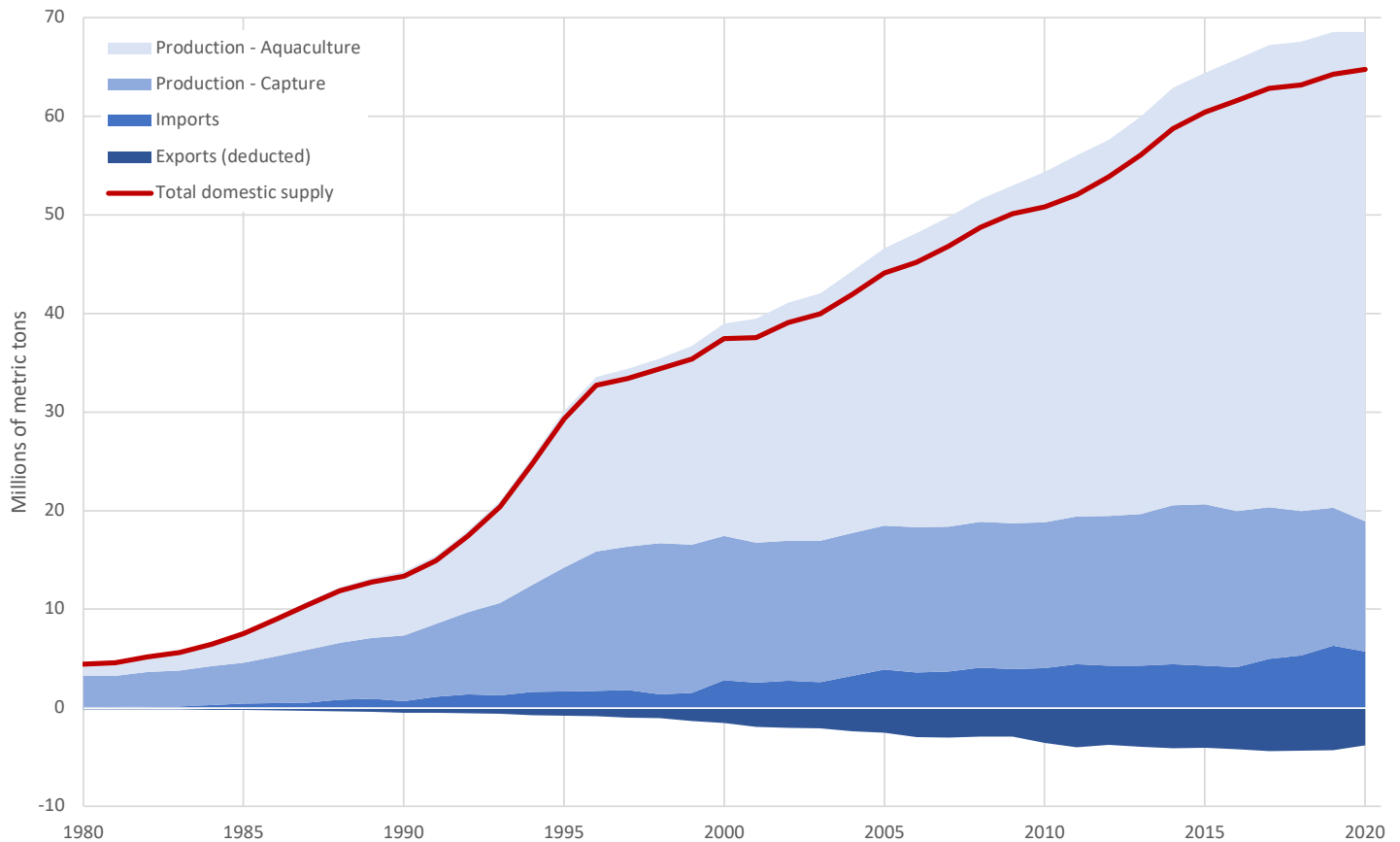
Chinese demand for seafood has increased steadily over the past few decades, with almost a ten-fold per capita increase in consumption from 1980-2015 (Crona et al. 2020; Zhang et al. 2021). It is projected to continue rising in the near future and by 2030 projections estimate a production shortfall of up to 18 million tons, or more than twice the level of 2020 imports shown in Figure 1 (Crona et al. 2020). Domestic capture industries are unlikely to match the demands of Chinese consumers, given that they have been in decline (as Figure 1 shows) and in view of increasingly strict measures, including multiple moratoriums targeting multiple freshwater and coastal capture industries (Xie 2022a; Xie 2022b; "China Focus" 2021). Similar measures have targeted domestic aquaculture (Godfrey 2019).



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**Figure 1: Chinese Seafood Supply, 1990-2020**



**Note:** China includes Hong Kong and Macao.

**Source:** Authors' calculations from FAO 2022a.

This prolonged growth in Chinese demand for seafood is related to the trends of urbanization and rising incomes within China. In China, seafood purchase and consumption are positively correlated with income (Zhang et al. 2021), as well as residence in urban rather than rural areas (Crona et al. 2020).

Beyond an absolute increase in demand, the changing nature of the domestic demand may also be just as important in incentivizing investment in foreign aquaculture. The government has promoted a shift in the national diet from “eating well” to “eating healthy” (Zhang et al. 2021), which has likely been partly spurred by food scandals in China (Fabinyi et al. 2016). Chinese seafood consumers associate the seafood sourced from some countries with the notion that they have ‘cleaner waters’ (Crona et al. 2020). Therefore, as part of a focus on “eating well”, foreign farmed fish may be assumed to be of higher quality. This is in line with a study of seafood marketing indicating that Chinese consumers are more concerned about food safety than any other issue (Qidong et al. 2014).

Even after decades of urbanization, 60-80 percent of seafood in China is still bought by consumers from wet markets, most of it without certification information (Malcorps et al. 2021). However, urban residents have led the way in purchasing more food from supermarkets, where safety certifications may be more visible and relevant (Newton et al. 2021). They are also more amenable to purchasing frozen or processed products, which are much more likely to be imported and marine in



origin (Fabinyi et al. 2016; Newton et al. 2021). Finally, the increased availability of a broader array of seafood has spurred consumer interest beyond the traditional diet in which domestically produced grass and silver carp are dominant, especially among urban residents (Abbott et al. 2021; Fabinyi et al. 2016; Newton et al. 2021).

For the reasons described above, foreign aquaculture investment appears poised not only to meet a quantitative rise in China’s seafood demand but also qualitative shifts in consumer preference that favor imported sources for that seafood.

### Environmental Concerns Limiting Domestic Production

Despite the increasing demand detailed above, China has seen a consistent decrease in the rate of growth of aquaculture fish production in recent years (FAO 2020). This decrease is in major part due to state policy. This is consistent with stronger domestic fishery regulation in China to address the sector’s many environmental risks, including removal of aquaculture pen systems from rivers, lakes and reservoirs (Newton et al. 2021) and generally stricter enforcement of production standards (Godfrey 2019). The Chinese government has not been quiet about these concerns, issuing a public “Shining Sword” campaign (listed among seafood policies in Table 2) partly dedicated to cleaning up domestic seafood production (Godfrey 2019). The government has thus made the environmental problems of domestic aquaculture a public issue. In conjunction, announcements of expanded investment in foreign aquaculture serve the purpose of informing consumers of alternate ways to satisfy seafood demand.

This tighter regulation has likely borne fruit, as evidenced by the 1 percent decline in total national acreage dedicated to aquaculture from 2019-2020 (Godfrey 2021a). However, production from aquaculture rose almost 3 percent in the same year, which may mean that tighter regulation is occurring simultaneously with increased efficiency (Godfrey 2021a). Thus, the tougher policies targeting domestic aquaculture do not necessarily herald a decline in net production: in fact, China’s most recent Five-Year Plan calls for an increase in domestic seafood production from 65 million tons in 2020 to 69 million tons in 2025 (Chun 2022). However, even this anticipated increase in production is unlikely to meet the even greater projected demand and, as such, the role of imported seafood—including from aquaculture sources—is likely to remain important (Crona et al. 2020).

**Table 1: Selected Chinese Seafood Policies, Pronouncements and Guidance**

Official policy pronouncements and Chinese name	Description
The “Shining/Bright Sword” Campaign 《中国渔政亮剑》 <sup>a</sup>	A yearly series of policy pronouncements aimed at enforcing fishery regulations, especially enforcement of fishing bans and cracking down on illegal fishing
Measures on the Administration of Fishing Permits <sup>a</sup>	Fuller implementation of fishing vessel permitting system that as of 2018 had led to a decrease of 17,000 fishing vessels
Opinions on Speeding up the Development of Aquaculture 《关于加快推进水产养殖业绿色发展的若干意见》 <sup>b</sup>	Press release by 10 different government ministries. List of three general principles and twenty-six policy recommendations for aquaculture reform. Key ideals include transforming China from a “Large Aquaculture Country” to a “Strong Aquaculture Country”. Emphasis is given to better and more comprehensive management and regulation throughout the industry.
Various fishing moratoriums across Chinese waters	Starting in 1995, various fishing moratoriums have been implemented in Chinese inland and coastal waters: starting from 1995 in the East, Yellow and Bohai Seas, 1999 in the South China Sea (seasonal bans) and from 2019 (total ban) across the entirety of the Yangtze. <sup>c,d</sup>

Sources: a. Ministry of Agriculture and Rural Affairs 2022; b. Ministry of Agriculture et al. 2019; c. Zhang et al. 2020; d. Zhang 2020.



Considering the predicted consumption-production deficit (Crona et al. 2020), foreign aquaculture investment has been explicitly promoted by the Chinese government. New foreign aquaculture initiatives have often been broadcast. Recently, the focus has turned to the Pacific Islands (Godfrey 2021b) where China has expressed investment interest as a resource for countries seeking to develop their fishery sectors (Godfrey 2016). In 2018, China established the “Tropical Countries Aquaculture Science and Technology Innovation Cooperation Project” as a formal framework that can be applied throughout the BRI for investment and agricultural cooperation (Godfrey 2018).

## **PULL SIDE: ENVIRONMENTAL AND ECONOMIC BOTTLENECKS**

Despite the long-term expansion of China’s seafood demand and the publication of a series of Chinese government pronouncements and policies aimed at improving the quality – rather than simply the quantity – of domestic production, Chinese outbound investors have encountered less enthusiasm for new aquaculture projects overseas. Two main bottlenecks are evident: environmental bottlenecks of establishing appropriate protections to mitigate risks and economic bottlenecks of effectively linking new investment to host country development goals.

### **Environmental Bottlenecks: Mitigating Risks to Ecosystems and Small-Scale Producers**

While China has been strengthening its regulatory framework for the aquaculture and fishing industries, BRI host countries have been aware of the same issues and pursuing similar policy paths. For example, Indonesia – the world’s second largest aquaculture producer behind China – has set ambitious goals for scaling up aquaculture by an annual average of 8.5 percent until 2030 to meet rising domestic demand (Henrikkson et al 2019). In this context, a broad scholarly literature has developed examining the feasibility of these goals and potential best practices to meet them. Among limiting factors, environmental and social concerns rank high, including threats to smallholder producers from expanding commercial ventures, risks to existing aquatic biodiversity from the introduction of new species and from aquaculture waste and risks to aquaculture projects of all scales from climate change (Henrikkson et al 2017; Henrikkson et al 2019; Hidayati et al 2021; Sukadi 2006; Phillips et al 2015; Prokoso et al 2020; Rimmer et al 2013). Recognizing the risks to both small and large-scale operations, the Indonesian government has announced two major aquaculture initiatives: capital loans for commercial-scale operations and the establishment of over 100 small-scale “aquaculture villages” to support small-scale producers (Indonesia Seafood 2021; “Aquaculture Villages” 2022).

In Vietnam, where aquaculture has historically formed an important support for both subsistence and commercial livelihoods, recent expansion of the sector has brought new attention to the importance of mitigating negative impacts on aquatic ecosystems (Thanh Vinh 2006). The national government has recognized these concerns and responded in cooperation with transnational industry groups and environmental civil society, facilitating the adoption of industry standards and forming a Public-Private Partnership Cooperation Agreement for Responsible Fisheries and Aquaculture with industry and environmental groups (“Signing Ceremony” 2013; Thu Ha and Bush 2010; Thi Anh et al 2011).

The development of these policy and public-private partnership (PPP) initiatives signals a potential for future expansion of the sector in Indonesia and Vietnam. In other BRI host countries, however, policy responses have not kept up as well with awareness of environmental and social concerns, creating the potential for conflict. The potential for environmental-based conflict is particularly acute



in host-country contexts where local communities depend on healthy aquatic ecosystems for livelihoods. For example, in the coastal West African nations of Sierra Leone and The Gambia, direct Chinese investment in aquaculture has not been advanced, but investment has been channeled to related sectors such as fishmeal plants that process local fish, in such a way as to seemingly complement, rather than compete with, the local seafood industry. Even in these cases, however, inadequate environmental management has led to serious conflict.

In Sierra Leone, a potential Chinese fishmeal plant investment, which would source local fish, has triggered conflict over the potential for factory waste to damage local ecosystems and threaten small-scale fishing livelihoods as well as ecotourism. Disputes have arisen over the process of project approval, with the government facing accusations of circumventing due diligence steps including prior consultation with affected communities (“Government Response” 2022; Godfrey 2021c; Oirere 2021). Local civil society groups including the Institute for Legal Research and Advocacy for Justice (ILRAJ) and Namati have mobilized for project cancellation and greater transparency (Nyabiage 2021). In The Gambia, a Chinese-owned fishmeal plant was damaged in a 2011 arson attack linked to community dissatisfaction over environmental and economic impacts (Konyim Okai 2021). Thus, effective government management of environmental and social risks represents a potential bottleneck for a “pull” factor of outbound Chinese aquaculture investment.

### **Economic Bottlenecks: Linking Investment to National Development Goals**

Inbound international aquaculture investment can support two main economic goals for host countries: contributing to the host countries’ seafood supply and increasing economic activity and export revenue. On both fronts, the extent to which Chinese investments can further these local goals can be an important factor to local acceptance and success of a given project.

In the Philippines, for example, a limiting factor is the differing tastes in seafood for export to China and for domestic consumption. China donated 300,000 leopard coral grouper (also known as coral trout) fry to the Philippines to help develop its aquaculture and mariculture industries for export to China. However, this fish species is not well known or widely consumed in the Philippines, so any expansion of this industry through additional investment from China is unlikely to boost the Philippines’ domestic supply of seafood (China Oceanic Development Foundation 2021; Fabinyi 2019). As the prior example of Indonesia demonstrates, BRI host countries have strong incentives to favor investments that will help them meet domestic consumption goals in addition to bringing in new sources of export revenue, rather than investments that only meet the latter goal.

An additional economic bottleneck may arise from the fact that Chinese consumers prefer to eat coral trout immediately after it has been killed, with live fish often populating restaurant fish tanks (Yan 2014). Thus, while cultivation of this species lends itself well to the live fish trade, there is no possibility for the Philippines or any other international investment host country to develop a supply chain with additional value added from processing and packaging related seafood (Godfrey 2018).

This lack of additional economic value added has already stymied additional potential Chinese aquaculture investment in the Philippines. Fabinyi (2019) describes a Chinese aquaculture initiative that did not reach fruition in the province of Zambales. While the Chinese government was keen to invest in aquaculture in this province, local Zambales stakeholders were more interested in investments in improved capacity and technology for capture fisheries. As many fishing households and businesses were heavily invested in the capture fisheries industry, they saw little economic benefit to expanding into aquaculture instead of improving efficiency and value added in existing supply chains.



## SYNTHESIS: LIMITED DIRECT AQUACULTURE INVESTMENT, GREATER INVESTMENT IN RELATED SECTORS

While Chinese demand for imported seafood is growing dramatically, outbound aquaculture investment has encountered several important bottlenecks overseas. Table 2 synthesizes the aforementioned push and pull factors, by location and type of actor.

**Table 2: Push-Pull Forces of Chinese Investment in Overseas Aquaculture**

	China-based push drivers	Host-country pull bottlenecks
Country level	Increasing demand for imports	Mismatch with domestic seafood consumption patterns
Industry and corporate level	Weaknesses of domestic fishing Shining sword campaign	Relative lack of value added
Individual level	Domestic dietary preference Increasing seafood consumption	Local environmental threat to smallholders

**Source:** Authors' elaboration.

As Table 2 shows, a common theme around potential Chinese offshore aquaculture investment is a difference between objectives in China and host countries that are difficult to reconcile. As a result, relatively few active investments have come to fruition. Table 3 lists these projects. Although they amount to \$1.3 billion in total, one deal accounts for the majority: Joyvio's purchase of Australis Seafoods in Chile for \$987 million in 2019. These investments primarily (though not universally) involved investment in already existing aquaculture projects, rather than new greenfield investments. Acting through mergers and acquisitions allows Chinese firms to circumvent the bottlenecks in Table 2, by limiting any expansion of production. The one new ("greenfield") investment, in Sweden in 2013, remained dormant until it was dissolved in 2019.

Beyond direct aquaculture investments, the Chinese government and Chinese firms have been active in complementary activities and agreements. These are detailed in Table 4. Many of these initiatives directly address the bottlenecks in Table 2 by offering host countries training and technology.

Finally, a third group of initiatives has channeled China's push factors into related sectors that circumvent pull-side bottlenecks. These projects, detailed in Table 5, include support for expansion of existing capture fishing (through new ports or boats) or additional value-added for existing aquaculture industries (including seafood processing plants). They involve not only Chinese firms but also China's two most active policy banks: the China Development Bank and Export-Import Bank of China.





**Table 3: Chinese Aquaculture Investments Overseas**

Country	Year	Amount (USDm)	Detail
Brunei	2009	\$10.0	Two Chinese firms (Guangxi Wangwangda Farmers Company Limited and Raoping Jinhang Deep Sea Cage Development) entered into joint ventures with Brunei firms to develop new aquaculture and mariculture projects, worth a total of \$10 million. <sup>a</sup>
Madagascar	2009	\$6.3	China National Fisheries Corporation acquired Madagascar Fisheries in a joint venture with the Japanese Maruha Group and establishes SOMAQUA, also involved in the processing of live fish and shellfish for export. <sup>b</sup>
Australia	2010, 2011	\$57.6	Pacific Andes International Holdings Ltd acquired 19.8 percent of Tassal Group Ltd, a salmon producing company in 2010 and increased its holdings to 22.8 percent in 2011. <sup>c,e</sup>
Sweden	2013	-	Sino Agro Food formed a Swedish subsidiary for aquaculture, though it remained dormant and was dissolved in 2019. <sup>d</sup>
Japan	2014	\$1.4	Xinzhong Japan Co Ltd was acquired by Asiasea Industry (Dalian) Co Ltd, which was later acquired by Zhangzidao Group. <sup>e</sup>
Australia	2015	\$56.6	Beijing Properties (Holdings) Ltd acquired Cell Aquaculture Ltd. <sup>e</sup>
Russia	2017	\$90.0	Dalian Yifeng Sea Products pledged \$90 million to build a hatchery in the Russian Far East to breed sea cucumbers and scallops, supply fry to local aquaculture farms and deliver some share of its products for export. <sup>g,h,i</sup>
Russia	2018	\$74.5	Dalian Wenlian Aquaculture Company pledged \$74.5 million for fish breeding activities on about 900 hectares and plans to extend fish breeding plots to 4,000 hectares and build a related factory. <sup>g</sup>
Chile	2019	\$987.3	Joyvio Agriculture Development Co acquired Australis Seafoods SA <sup>e</sup>
Malaysia	2019	\$48.6	Fujian TianMa Science & Technology Group Co Ltd acquired Wonder Fry Sdn Bhd. <sup>e,k,l</sup>
Total announced		\$1,332.3	

**Sources:** a. "China Firms" 2009; b. Chen and Landry 2016; c. Pacific Andes International Holdings 2012; d. Sino Agro Food 2022; e. DeaLogic 2022; f. "Zhangzidao Group" 2014; g. Financial Times 2022; h. Ali 2018; i. Vorotnikov 2018; White 2018; k. Cai 2022; l. Fujian Tianma 2019.

**Table 4: Other Initiatives (Joint Agreements, Demonstration Projects, etc.)**

Country	Year	Detail
Namibia	2007, 2014	Technical and grant assistance for domestic aquaculture production training and research centers, including Kamutjonga Inland Fisheries Institute (2007) and Hardap Inland Aquaculture Center (2014). <sup>a,b</sup>
South Africa	2009	South African Agriculture Technology Demonstration Centers (ATDC). <sup>b</sup>
Uganda	2010	Uganda-China Friendship ATDC. <sup>b</sup>
Tunisia	2015	Technical and grant assistance for domestic aquaculture production, most notably the Melloulech Shrimp Farm project. <sup>a</sup>
Philippines	2017	Chinese donation of 300,000 leopard coral grouper fry (2017) to develop the Philippines' aquaculture for export to China. <sup>c</sup>

**Sources:** a. Custer et al 2021; b. Jiang et al. 2016; c. Fabinyi 2019.



**Table 5: Other Seafood-Related Investment Including Fishing and Processing**

Country	Year	Detail
Madagascar	1990	Longfei Maloci established a cement firm but later diversifies into processing of live fish and shellfish for export. <sup>a</sup>
Vietnam	2006	Uni-President Enterprises announced an \$18 million investment for a second aquaculture feed plant. <sup>b,c</sup>
Angola	2006	The Export-Import Bank of China lent Angola \$88 million for the purchase of boats, including 10 shrimp boats. <sup>d</sup>
Angola	2006	The Export-Import Bank of China lent Angola \$64 million for the purchase of boats, including 10 fishing boats. <sup>d</sup>
Angola	2001	The Export-Import Bank of China lent Angola \$16 million for the purchase of boats, including 10 fishing boats. <sup>d</sup>
Madagascar	2012	Dragon Produits De La Mer Sarlu announced a 5,000 MGA investment in collecting, processing and preserving seafood. <sup>c</sup>
Mozambique	2014	The Export-Import Bank of China lent Mozambique \$120 million to rehabilitate the Beira Fishing Port. <sup>d</sup>
Madagascar	2015	Haifu International Sarlu announced a 25,000 MGA investment in fishing and processing of industrial and artisanal fisheries products for sale and export. <sup>c</sup>
Gambia	2017	Golden Lead Import and Export Trade and NESSIM Trading establish two fishmeal plants, worth \$33 million. The Gambian government later ordered Nessim to suspend operations and ordered Golden Lead to cease expansion efforts, due to local environmental and smallholder livelihood concerns. <sup>e,f</sup>
East Timor	2017	Guangxi Yixin Fisheries Development Co. Ltd develops the \$400 million Manatto Laraan South Fishery Port Aquaculture Park, including a fishing port, fishing boat shipyards, marine fishing operations, seafood sorting and processing plants. <sup>a</sup>
Ghana	2019	The China Development Bank lent Ghana \$186 million for the construction of eleven coastal fishing landing sites. <sup>d</sup>
Mauritania	2019	The Export-Import Bank of China lent Mauritania \$87 million for the Integrated Marine Industrial Park and Capital Fishing Port. <sup>d</sup>
Vanuatu	2019	China National Fisheries Corporation announced a \$1 million investment in a fisheries plant project. <sup>g</sup>

**Sources:** a. Wu 2018; b. Lin 2006; c. Chen and Landry 2016; d. Ray et al 2021; e. “Breaking - Golden Lead” 2021; f. “NESSIM Fish Meal” 2018. g. “China National Fishery Corporation Opens Vanuatu Tuna Factory” 2019.

The following sections describe selected projects in more detail to highlight specific approaches to overcoming mismatching between push and pull factors.

### Enhancing Existing Aquaculture: Uganda

In the case of Uganda, where Chinese activity in aquaculture has taken the form of a demonstration center, the arrangement resembles a collaborative project that aims to enhance and develop existing resources within Uganda. The governments of both countries have launched the Kajjansi Aquaculture Research and Development Center in Uganda, which is funded by the government of China and is being built by Sichuan Huaqiao Fenghuang group. The center will continue research on new fish species, offer technical training and technical demonstration of highly effective freshwater aquaculture techniques. The center is also designed to foster freshwater fry breeding techniques and demonstrate better fish feed processing and application. And finally, all the species will be distributed to farmers across Uganda (“China-Uganda Aquaculture Project Launched” 2009).

Additionally, the launching of Agriculture Technology Demonstration Centers (ATDCs) in 2006 marked a new intensive phase of Chinese aid in the agriculture industry in Africa. ATDCs were set



up to develop sustainable practices through PPPs and to promote Chinese commercial pursuits. In Uganda, the Sichuan HuaqiaoFenghuang Group works as the implementing agency for the ATDC and their primary focus is freshwater aquaculture (Jiang et al. 2016).

The projects in Uganda highlight the conditions for successful investments in the aquaculture industry, which essentially resemble collaborative projects that ultimately benefit the host countries with minimal environmental impact and strive to move beyond the goals of Chinese producers catering to Chinese demand.

### **Fostering Related Sectors In Africa And Asia**

Another approach to aligning push and pull incentives is the development of local seafood supply chains and related industries, including capture fishing and seafood processing. Two examples in East Timor and Madagascar illustrate this approach.

China's East Timor Manatto Laraan South Fishery Port Aquaculture Park was developed by Guangxi Yixin Fisheries Development Co., Ltd. It includes a fishing port construction, fishing boat shipyards, marine fishing operations, seafood sorting and processing plants. The investment took place in 2017 for a total investment of \$400 million (Wu 2018).

In Madagascar, two companies are active throughout the seafood supply chain: SOMAQUA and Longfei. SOMAQUA is the product of a joint venture acquisition of a previously Japanese firm, in partnership with the Japanese Maruha Group. Longfei, while initially present in Madagascar's cement industry, later diversified to include aquaculture activity (Chen and Landry 2016). Both companies are particularly involved in processing live fish and shellfish for export and operate in Mahajanga on the northern coast of the island. Further, Longfei has a holding plant for the purpose of farming seafood for export in Ivato, near the airport that serves Antananarivo.

## **DISCUSSION AND POLICY RECOMMENDATIONS: LESSONS FROM VARYING EXPERIENCES**

In the past decade, China has engaged in overseas aquaculture via several structural channels, for instance, technical and grant assistance to scale up BRI host countries' aquaculture production and infrastructure investment in fishing ports or processing plants (Godfrey 2018). Host countries also establish local agencies such as Hardap Inland Aquaculture Center in Namibia, Kajjansi Aquaculture Research and Development Center in Uganda and South African Agriculture Technology Demonstration Centers to serve as receiving agencies to cooperate with China's technical or financial engagement. Yet, the economic and environmental impact of these projects on host countries vary.

Operational Chinese overseas aquaculture investments have been concentrated in the acquisition of already-existing aquaculture projects in higher income nations such as Sweden, Malaysia, Japan and Australia. In these contexts, robust policy frameworks have been established to safeguard regional socio-economic and environmental interests prior to China's involvement. For instance, Australia's aquaculture sector has been of rising significance in its economy in the past decades. From 2008-2018, employment in fishing expanded, the quantity of seafood production increased by 17 percent and its value increased by 33 percent (OECD 2021). To continue to support the industry, the Australian government set up guidelines and financial support to ensure sustainability in aquaculture and to improve workers' welfare. In 2018, \$119.5 million was spent financing fisheries by Australian government agencies (OECD 2021). Australia also provided financial support of \$10 million through policies directly benefiting individuals and companies in aquaculture in 2018 to increase fishers' income and lower cost of inputs (OECD 2021). Total Allowable Catch (TAC) limits and fish



stock assessment are also in place to secure sustainable development in Australia. Under these established host country conditions, Chinese investment from companies, such as Pacific Andes International Holdings Ltd., are less likely to create environmental damages and social costs to local communities and the human systems.

In contrast, developing nations such as the Philippines and Sierra Leone lack comprehensive policy strategies and frameworks to maximize the economic benefits and mitigate environmental and social risks associated with the aquaculture sector. As of September 2022, the initiatives in these countries have not come to fruition, demonstrating the challenge of balancing incentives between China and the host country (Oirere 2021). The example of an unsuccessful aquaculture investment attempt in the Zambales province of the Philippines shows the importance of developing sectoral strategies for fostering livelihoods and maximizing value added for local producers already active in the seafood sector. The conflict over environmental and social risks from a potential investment in Sierra Leone shows that environmental concerns are also intrinsic to local economies and livelihoods and thorough due diligence policy frameworks are crucial to ensuring net benefits for local economies. Meanwhile, Indonesia and Vietnam have recently overhauled their aquaculture strategies and may be better poised to support new investments in the future.

Across these examples, the existence of industrial policies and environmental regulations do not appear to be disincentives to Chinese investors' "push" incentives. Rather, these host-country strategies and protections appear to be key to ensuring the success of Chinese investments. Thus, BRI host countries interested in attracting Chinese aquaculture and seafood-related investment have the opportunity and policy space to establish their own strategies for the sectors and take steps to consider and mitigate risks to aquatic ecosystems and the small-scale producers who depend on them. In fact, taking these steps appears to be a necessary precursor for maximizing the changes of successful partnership. Thus, it is incumbent upon BRI host countries to establish sectoral strategies and robust social and environmental protections prior to seeking Chinese aquaculture investments.

For its part, China would be wise to continue its progress in developing a "Green BRI" and aligning its outbound investment with international best practices, in addition to the legal requirements of host countries. As recent pronouncements by high level Chinese authorities, including the National Development and Reform Commission (2021; 2022) have made clear, the government of China has recognized that successful investment requires not only meeting host country standards but international best practices.

Furthermore, as China develops its own environmental protections for its domestic aquaculture sector, it would be wise to facilitate outbound investment by sharing the research and best practices that it produces through the platform of the BRI. In particular, the "whole-lifecycle" approach championed by China's Ministry of Ecology and Environment and Ministry of Commerce in their 2021 "Green Development Guidelines," once developed into specific strategies and protections for aquaculture, appear well poised to address the "pull" bottlenecks discussed (NDRC 2021). Within this approach, upstream due diligence, such as thorough environmental impact assessments and the development of projects that coincide with national goals for sustainable livelihoods, could avoid difficulties like those seen in the Philippines and Sierra Leone. Downstream project monitoring and accountability mechanisms can protect small-scale producers from impacts to local ecosystems. The technology utilized by China to channel fishing away from high-impact areas can be shared across the BRI to facilitate greater cooperation in the seafood sector. As Guo, Gallagher and Zhang (2022) recommend and as the relative success of technical cooperation initiatives demonstrate, using the BRI as a platform to share best practices is a core precursor to maximizing the economic benefits while mitigating risks to aquatic ecosystems and the livelihoods and economies that depend on them.



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# GLOBAL CHINA INITIATIVE

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