OCEAN
RECOVERY

CAN BLUE BONDS FINANCE A FISH STOCK RECOVERY?

Briefing Paper
August 2020

Planet Tracker

The oceans cannot sustain the ongoing imbalance driven by declining wild fish stocks and rising demand. A period of restraint is needed to allow ecosystems to replenish. We outline a proposal to facilitate this with the creation of a blue bond. This would compensate the industry for its temporary loss in cashflow and provide a return for investors when fish stocks recover.

FISHERIES IN DECLINE
BUT RECOVERY IS POSSIBLE

Demand for seafood is projected to increase to 2050.[i] However, under a business-as-usual (BAU) scenario, wild-catch fishery production is expected to at best plateau[ii] or, more likely, decline.[iii] To meet healthy diet requirements in 2050, taking into account current levels of food waste, seafood production must increase by 118%.[iv]

It can be demonstrated that the implementation of management systems and the robust monitoring of fish stocks is generally accompanied by improving stock status and trends.[v,vi] Conversely, minimal management oversight can be coupled with rises in illegal, unreported and unregulated (IUU) fishing.[vii,viii]

Encouragingly, research released this year shows that, under the correct conditions, the health of the ocean and commercially fished stocks can recover by 2040.[ix] There are also examples of regional regeneration which include:

- The rebound in fish stocks during World War I and World War II following a marked reduction in fishing.
- The improved health of the Black Sea and Adriatic Sea after the collapse of the Soviet Union from 1989, following the reduction in fertilizer application and leakage.[x,xi]
- In South Africa's Tsitsikamma National Park, one of the oldest protected marine areas in the world, the density of commercially important fish is around 42 times higher than in the nearby fishing grounds.[xii]
- Fished areas near highly to fully protected marine areas, experience a fourfold increase in catch per unit effort (i.e. total catch divided by total amount of effort used to harvest the catch, an indirect measure of fish stock).[xiii]
- Catch per unit effort in fish traps outside a network of fully protected marine protected areas in waters off St. Lucia increased between 46% and 90% within five years of designation.[xiv]

Therefore, it can be evidenced that a resource-efficient solution can be achieved through the allocation of reserves or no-take zones.[xv]

THE ECONOMIC BENEFITS OF RECOVERY

Evidence indicates that the global costs-benefits ratio - the overall monetary benefits of a project relative to its costs - for fisheries management reform is about 9.2:1, with the ratio higher than 200 in some countries.[xvi]

In addition, improved wild-catch sustainability impacts on aquaculture and in a dramatic way. As explored in Planet Tracker's recent report "Loch-ed Profits", feed for fish farming is one of the largest elements in aquaculture's cost structure. It can account for up to 50% of operating costs.[xvii] Furthermore, the price of fishmeal and fish oil feeds are forecast by the World Bank to rise by 90% and 70% respectively by 2030, because of wild-catch supply constraints.[xviii]

Lastly, stable ocean ecosystems provide a buffer against acidification which benefits the non-feed-based aquaculture species, such as oysters and other molluscs, by promoting healthier growth.

MODELLING AN OCEAN RECOVERY THROUGH A TEMPORARY REDUCTION IN WILD-CATCH

To explore whether a global recovery in fish stocks is feasible, we have constructed a simple model, with two scenarios, inspired by existing literature and FAO projections. To determine appropriate financial calculations, Planet Tracker has analysed the fishing industry. We have examined all commercial fishing companies worldwide, based on the North American Industry Classification System (NAICS) code 11411 "Fishing" and used only wild-catch operations. Because of a lack of data, for the purpose of this report, we have assumed that artisanal fisheries generate similar margins to commercial fishing companies. The consequences of these scenarios for related sectors such as aquaculture, processing or distribution are not discussed here.

For both scenarios we have used the following assumptions.

NATURAL CAPITAL ASSUMPTIONS:

- 2 billion tonnes of fish in the ocean were assumed in Year 0.[xix]
- We model fish stocks as a function of natural population growth (estimated at 6.6%, based on previous fish stock evolution and wild-catch data as a percent of fish stock), wild-catch, bycatch (estimated at 40% of global wild-catch)[xx] and IUU fishing (15%-30% of global wild-catch),[xxi] with some overlap between bycatch and IUU fishing.
- We then assume that fishing effort (a metric incorporating the time, energy and money spent on fishing) grows at half the rate of fish stocks, with the differential explained by technological progress.

FINANCIAL ASSUMPTIONS:

- Earnings before interest and taxes (EBIT) margins in the fishing industry in Year 0 are estimated at 9%, the average margin for the 426 companies engaged in fishing worldwide that report EBIT margins.[xxii]
- The average tax rate used for free cash flow computations is 20%, depreciation and amortisation equal capital expenditures on average and changes in working capital are negligible, meaning that free cash flow[a] (FCF) averages 80% of EBIT.
- The discount rate used for future cash flows is 8%.
- It is assumed that no additional inflation in fish price will take place alongside existing inflation, and that operating expenses per tonne of fish caught are growing in line with fishing effort.

[a] The cash a company generates after accounting for cash outflows to support operations and maintain its capital assets. Free cash flow is a measure of profitability that excludes the non-cash expenses of the income statement and includes spending on equipment and assets as well as changes in working capital from the balance sheet.

FOR THE BUSINESS AS USUAL SCENARIO, ADDITIONAL ASSUMPTIONS USED ARE AS FOLLOWS - SEE FIGURE 1:

- Over the next 25 years, fish stocks will shrink by 1.9% a year on average, in line with the decline in fish biomass over the 1974-2014.[xxiii] (This could be too optimistic as it does not factor in the impact of climate change, with some research projecting an average decline of 5% in wild-catch fish stocks for every 1°C of warming).[xxiv]
- We assume no growth in wild-catch by 2050, in line with FAO forecasts.[xxv]

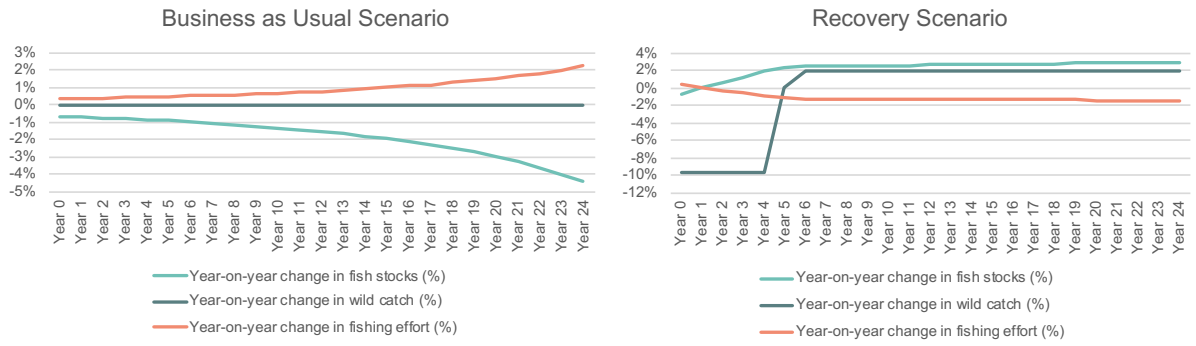

Figure 1. *Year-on-year Change in Fish Stocks, Wild-Catch and Fishing Effort in Recovery and Business as Usual Scenarios.*[xxvi]

FOR THE SECOND 'RECOVERY' SCENARIO THESE ADDITIONAL ASSUMPTIONS ARE USED - SEE FIGURE 2.

- A 10% reduction in wild-catch over five years compared to a base year (equivalent to a 40% reduction in total), followed by a 2% growth in catch every year.
- We derived this 2% growth rate as the maximum growth rate that oceans could sustain based on the natural fish stock growth rate (excluding the impact of fishing).

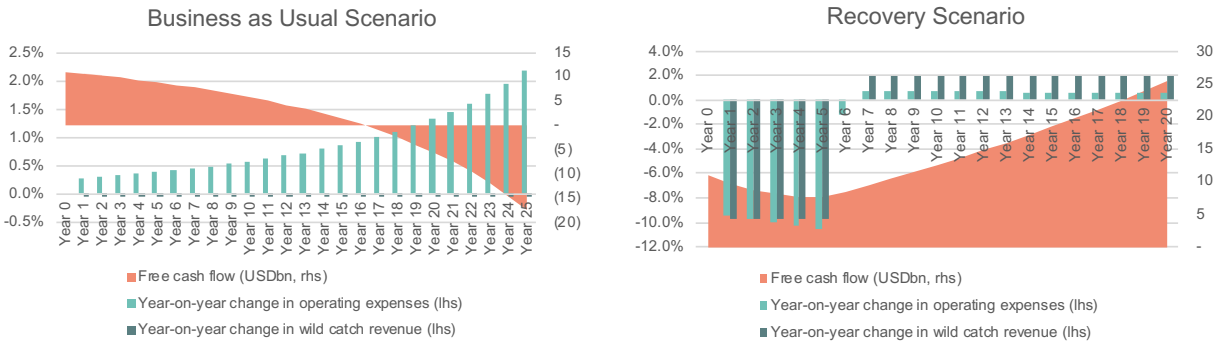

Figure 2. *Commercial Fishing Companies: Year-on-Year Change in Wild-Catch Revenue and Operating Expenses, along with Evolution of Free Cash Flow.*[xxvii]

WHAT THE SCENARIOS SHOW US

When we compare the two scenarios outlined above, we note that the business as usual scenario reveals higher free cash flow in the early years. Profits and free cash flow then level off with the recovery scenario in the fifth year and drop below the recovery scenario from Year 6 to become negative in Year 17. This means that in our modelling, commercial fishing companies will not be able to finance themselves through funds generated by their own operations from Year 17 and will require external capital. The main driver of this decline is the increase in fishing effort (i.e. longer time at sea and higher costs), which translates into higher operating expenses per tonne of fish caught.

The recovery scenario reveals a different profile. Initially, free cash flow declines more steeply than in the business as usual scenario to Year 5 (since wild-catch volumes decrease 10% year-on-year every year). Once fish stocks recover, a growth in free cash flow commences, driven by a lower fishing effort and an increase in wild-catch volumes.

The growth in operating profit (and cash flow) slows down in the later years as margins have expanded and therefore operating leverage diminishes. From year 13, even though free cash flow continues to grow in nominal terms, its rise is lower than the discount rate used (8%), explaining why the figure below shows a small decline.

Overall, the sum of the discounted free cash flows to the fishing industry in a recovery scenario would be around USD 90 billion higher when compared to a business as usual scenario over 25 years - see Figure 3.

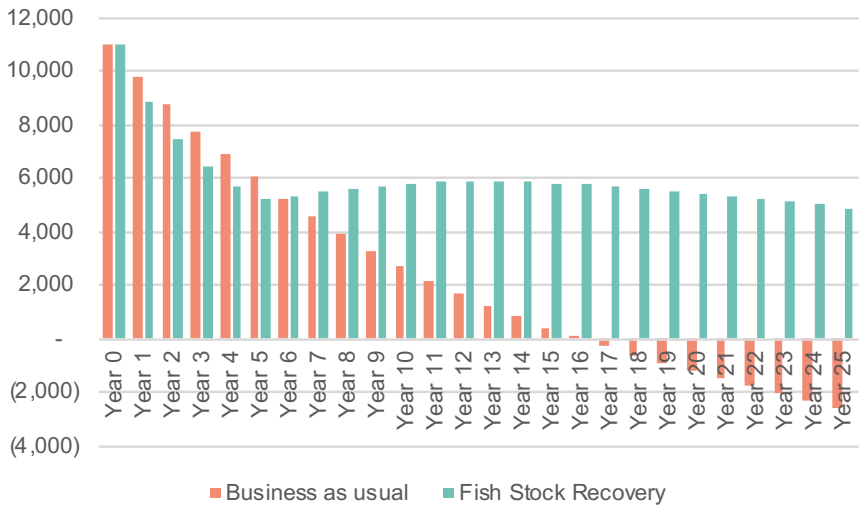

Figure 3. *Discounted Wild-catch Free Cash Flow (USD million).*[xxviii]

COULD A BLUE BOND FINANCE A RECOVERY IN FISH STOCK?

For commercial fishing companies, reduced catch translates into lower profit (*ceteris paribus*). While many companies might agree that replenishing fish stocks is the way forward, few of them are likely to be able or willing to bear the short-term financial consequences of such voluntary transition.

So, could investors provide a solution by investing in a blue bond? Planet Tracker proposes the following model.

HYPOTHETICAL BOND STRUCTURING

Companies engaged in wild-catch fishing generate an estimated USD 11 billion in free cash flow from wild-catch with fish stocks at current level.[xxix] Rather than suffering from a declining cash flow, as fish stocks shrink, they could accept a voluntary decrease in the quantity of fish caught for a set period of time. We suggest a decline of 10% a year for 5 years, through the introduction of global quotas.

Initially, EBIT and FCF would decrease. Some or all of the difference in FCF would then be financed by investors (100% of the difference over 5 years in our scenario).

THIS 'BLUE BOND' WOULD WORK AS FOLLOWS:

- Investors pay companies (via an intermediary) the difference in free cash flow compared to a business as usual scenario every year for 5 years, provided that they demonstrate they are fishing at the agreed reduced capacity level.
- A supranational organisation (e.g. the International Finance Corporation or the World Bank) would act as the intermediary between investors and fishing companies, to underwrite the risk initially and allow the bond to achieve a higher rating than if it was issued by the corporates directly.
- From year 6, when there is sufficient evidence that stocks are recovering, companies can fish at a higher level again and investors cease payments.

- From year 6, fishing companies repay investors part of the cash invested, with the 'coupon' being calculated as a function of the wild-catch (in our scenario, USD 50 per tonne of fish caught). This would continue until the bond's maturity (year 20 in our scenario).
- If stocks are not deemed to be at a sustainable level during the period, investors have lost their money. An alternative would be the use of a performance-linked coupon based on fish stock levels but execution would be more challenging given the difficulty of accurately measuring fish stocks over short periods.
- If at any time a company fishes more than it is permitted, it has to refund the whole of the funding provided by investors. A penalty could also be added.
- This ensures that the interests of investors and fishing companies are aligned by targeting sustainable fish stocks. Ideally, the mechanism would be based on quotas set at the UN level and part of the funding would be dedicated to installing monitoring, control and surveillance tools that would ensure that companies signing up to that scheme abide by the rules. No doubt, IUU fishing would still exist, but unless it increases dramatically it would no longer threaten fish stocks.

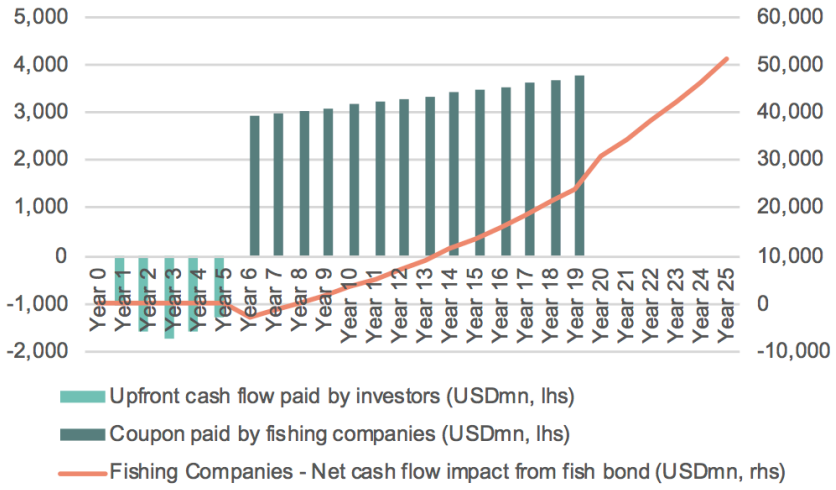

***Figure 4**. A Blue Bond to Finance Fish Stock Recovery: Simplified Cash Flow Schedule and Net Cash Flow Impact for Wild-Catch Companies in a Recovery vs Business as Usual Scenario.*[xxx]

In our modelling, that blue bond would generate an internal rate of return (IRR) of 26% for investors, who would need to finance a total of USD 7 billion over five years and would be paid back a total of USD 46 billion (undiscounted) over the following 14 years. That IRR could be lower if the bond was underwritten by a supranational organisation such as the World Bank or a sovereign state (see sensitivity analysis in the Appendix).

For the fishing companies, the net present value of this investment would be USD 42 billion, with no upfront investment. And perhaps most importantly, fish stocks could be 75% higher in twenty-five years than they are now and hopefully growing at around 3% p.a.

BARRIERS TO SUCCESS

Beyond the simplistic assumptions used, we are aware that there are many obstacles to be overcome in order for such a blue bond to work. The major ones are discussed below.

Finding the right bond issuer

While the above calculation was made for the entire sector, there is no entity representing the sector as a whole and capable of issuing a bond on its behalf. The challenge is to find a bond issuer with a superior credit rating and the ability/readiness to underwrite substantial performance risk. The most likely entity would be a supranational organisation like the World Bank. A similar structure can be found with the involvement of the World Bank's Global Environment Facility and a 'rhino bond', which is under development.[xxxi] Alternatively, a 'back-to-back' structure, whereby an organisation like the IFC issues a bond replicating the structure of several issuers, could be constructed. This was implemented with a green bond involving the World Bank and Yes Bank.[xxxii]

On the agreement of a global quota for fish

Regeneration of large marine ecosystems requires international collaboration, agreement and diligence. Fisheries are sometimes used as a political bargaining chip in international negotiations[xxxiii] and for securing financial or technical support.[xxxiv]

However, on August 17th, the European Commission adopted a proposal to implement the multiannual management plan for some fish stocks in the Western Mediterranean by continuing the political commitment to further reduce the fishing effort in the area by up to 40% over five years (2020-2024) via fishing quotas, coincidentally the same wild-catch reduction over the same period that we have included in our modelling.[xxxv]

Lessons from the past

Unfortunately, investors may recall attempts in the past to raise bonds to salvage a marine infrastructure. In 2013 and 2014, Mozambique borrowed nearly USD 2 billion for marine infrastructure, 6% of Mozambique's entire GDP at the time.[xxxvi] USD 850 million was raised in the form of a 'tuna bond' to upgrade their fishing infrastructure.[xxxvii] However, alongside other illegal activity, the proceeds of the debt were used to purchase military equipment.[xxxviii] To ensure debt issuances are used for marine restoration a robust means of verification would be needed.

Agreeing appropriate monitoring and regulation

To avoid some companies exceeding their permitted quota, monitoring and surveillance tools would be needed at scale. Furthermore, management and enforcement capabilities need to be strong. The Port State Measures Agreement, an international agreement that seeks to prevent IUU fishing, offers a possible framework.

Financial institutions' needs

Transparency and accountability are key requirements for financial institutions to meet their fiduciary responsibilities. Impact investors and sustainability-oriented funds will need to ensure that the possible ripple effects on the fishing industry are suitably managed.

Equity investors

Because the bond would alter the financial performance of fishing companies, some equity investors might not support the bond, especially short-term investors. Company valuations which rely on operating margins or earnings would be detrimentally impacted in the early years. However, over the longer term, the blue bond would lower the volatility of FCF and increase the net present value of cash flows.

Impact on seafood processing companies

The lower production of seafood for 5 years would impact on the seafood value chain. Seafood processors, traders and retailers may suffer from reduced supply and higher prices. Processors may mitigate some of the impact of lower wild-catch supply by re-tooling in favour of aquaculture products.

Impact on employment

In 2018, an estimated 59.5 million people were engaged in the primary sector of fisheries and aquaculture.[xxxix] Fishing communities are vulnerable in the face of overfishing, climate change and the overcapacity of fishing fleets. Research from Zhoushan City in 2020 found that fishers with a high level of 'vulnerability' accounted for 37.4% of the total workforce. Vulnerability was defined as advanced age, low education levels or reliance on fishing as the main source of income.[xl] Many communities were transitioning to tourism[xli] or aquaculture, but small-scale fisheries are multidimensional, complex and at risk of marginalisation.[xlii] To achieve a sustainable, just transition, aiding livelihood transitions of fisher communities to adapted meaningful work is required.

CAN IT WORK?

The positive news is that there is evidence that holistic management policies for the blue economy improve sustainability and profitability at a regional scale.[xliii] Improved accounting of production from fisheries and aquaculture, centralisation of historical data sets and systematic scientific surveys will continue to improve our understanding of fisheries, leading to more effective planning and reform.[xliv]

Inevitably a reduction in wild-catch fishing, enabling a replenishment of the ocean's health, would lead to an increase in the demand and price of aquaculture products during the transitional period. This, in turn, would lead to greater revenue growth and create the opportunity to invest in innovative technology at scale. Aquaculture has the potential to fill part of the production gap while fisheries recover.[xlv]

Companies with both aquaculture and wild-catch businesses should weigh up potential short-term declines in the supply of wild-catch against an increase in aquaculture production. Such a long-term corporate strategy would assist in achieving Sustainable Development Goal 14.[xlvi] A co-ordinated transition scenario is financially conservative for the seafood industry, as it minimises transition costs and supply chain disruption. Such a transition is challenging, but possible: 27% of the companies engaged in commercial fishing are also engaged in aquaculture.[xlvii] Conversely, as much as 36% of aquaculture companies (both private and public) are also engaged in commercial fishing.[xlviii] Put another way, 145 companies currently engaged in both aquaculture and wild-catch may hold the key to the future of fish stocks.[xlix]

It is clear that ocean fishing is on an unsustainable course of rising demand and falling supply but could recover if the reset button is pushed. Restrictions on catch, along with a proper debt financing vehicle, would assist in creating a financially viable transition scenario to sustainable oceans. A blue bond provides a more profitable route than the business-as-usual scenario, over the long-term. However, such a financing mechanism requires transparency, traceability and co-ordination. If the will is there, the prize is the ability to feed the world a healthy diet and prevent the deterioration of ocean ecosystems.

APPENDIX: SENSITIVITY ANALYSIS

Coupon paid to investors by fishing companies (USD/tonne of wild-catch)	Percentage reduction in wild-catch: Year 5 vs Year 0	-60%	-50%	-40%	-30%	-20%	-10%
10	IRR Investors	-8%	-3%	3%	8%	14%	n.s.
	IRR Fishing Companies	161%	242%	287%	n.s.	n.s.	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
30	IRR Investors	2%	9%	17%	22%	28%	n.s.
	IRR Fishing Companies	80%	93%	93%	n.s.	n.s.	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
50	IRR Investors	9%	17%	**26%**	31%	36%	n.s.
	IRR Fishing Companies	56%	60%	**57%**	114%	n.s.	n.s.
	Fish stock CAGR	3.8%	3.1%	**2.3%**	1.3%	0.3%	-0.2%
70	IRR Investors	13%	22%	32%	37%	42%	n.s.
	IRR Fishing Companies	44%	45%	41%	52%	n.s.	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
100	IRR Investors	19%	29%	40%	44%	49%	n.s.
	IRR Fishing Companies	34%	33%	29%	31%	27%	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
150	IRR Investors	26%	38%	50%	53%	57%	n.s.
	IRR Fishing Companies	24%	22%	19%	18%	13%	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
200	IRR Investors	32%	44%	58%	60%	63%	n.s.
	IRR Fishing Companies	18%	16%	13%	11%	6%	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
300	IRR Investors	42%	55%	71%	70%	72%	n.s.
	IRR Fishing Companies	11%	9%	6%	4%	-2%	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%
500	IRR Investors	55%	71%	88%	85%	85%	n.s.
	IRR Fishing Companies	3%	1%	-2%	n.s.	n.s.	n.s.
	Fish stock CAGR	3.8%	3.1%	2.3%	1.3%	0.3%	-0.2%

Note: n.s. = not significant.The cells in bold are the central assumption used in our modelling.

Figure 5.
A Blue Bond to Finance Fish Stock Recovery: Resulting IRR for investors and fishing companies as well as compound annual growth rate (CAGR) in fish stocks based on different levels of coupon and different percentage reductions in wild-catch.[I]

Coupon paid to investors by fishing companies (USD/ tonne of wild-catch)	Difference in FCF for fishing companies paid by investors (pre-financing)	50%	60%	70%	80%	90%	100%
10	IRR Investors	11%	9%	7%	5%	4%	3%
	IRR Fishing Companies	43%	46%	51%	58%	71%	287%
20	IRR Investors	22%	19%	16%	14%	13%	11%
	IRR Fishing Companies	41%	44%	47%	53%	64%	140%
30	IRR Investors	29%	26%	23%	21%	19%	17%
	IRR Fishing Companies	38%	41%	44%	49%	57%	93%
50	IRR Investors	40%	36%	33%	30%	28%	**26%**
	IRR Fishing Companies	34%	35%	38%	41%	46%	**57%**
70	IRR Investors	48%	44%	40%	37%	34%	32%
	IRR Fishing Companies	29%	31%	32%	34%	37%	41%
100	IRR Investors	58%	53%	49%	46%	43%	40%
	IRR Fishing Companies	24%	25%	26%	27%	28%	29%
200	IRR Investors	80%	74%	69%	65%	61%	58%
	IRR Fishing Companies	12%	13%	13%	13%	13%	13%

Note: The cells in bold are the central assumption used in our modelling.

Figure 6.
A Blue Bond to Finance Fish Stock Recovery: Resulting IRR for investors and fishing companies based on different levels of coupon and proportion of FCF financed by investors.[li]

REFERENCES

i World Bank (2013). Fish to 2030.

ii Troell, Jonell, Crona (2019). The role of seafood in sustainable and healthy diets: The EAT-Lancet Commission. report through a blue lens.

iii Galbraith, Carozza, Bianchi (2017). A coupled human-Earth model perspective on long-term trends in the global marine fishery.

iv Troell, Jonell, Crona (2019). The role of seafood in sustainable and healthy diets: The EAT-Lancet Commission report through a blue lens.

v Ye & Gutierrez (2017). Ending fishery overexploitation by expanding from local successes to globalized solutions.

vi Hilborn, Amoroso, Anderson, Baum, Branch, Costello, de Moor, Faraj, Hively, Jensen, Kurota, Little, Mace, McClanahan, Melnychuk, Minto, Osio, Parma, Pons, Segurado, Szuwalski, Wilson, Ye (2020). Effective fisheries management instrumental in improving fish stock status.

vii Allianz (2019). Illegal, unregulated and unreported fishing.

viii Angew, Pearce, Pramod, Peatman, Watson, Beddington, Picher (2009). Estimating the Worldwide Extent of Illegal Fishing.

ix Duarte, Agusti, Barbier, et al. (2020). Rebuilding marine life.

x Oguz (2017). Controls of Multiple Stressors on the Black Sea Fishery.

xi Duarte, Agusti, Barbier, et al. (2020). Rebuilding marine life.

xii Buxton, Smale (1989). Abundance and distribution patterns of three temperate marine reef fish in exploited and unexploited areas off the Southern Cape coast.

xiii Worm et. al (2002). Impacts of Biodiversity Loss on Ocean Ecosystem Services.

xiv Roberts et. al (2001). Effects of Marine Reserves on Adjacent Fisheries.

xv Holland (2002). Managing fisheries without restricting catch or effort: the use of marine reserves for inshore fisheries.

xvi Mangin, Costello, Anderson, Arnason, Elliott, Gaines, Hilborn, Peterson, Sumaila. (2018). Are fishery management upgrades worth the cost?

xvii Rana, Siriwardena, Hasan (2009). Impact of rising feed ingredient prices on aquafeeds and aquaculture production.

xviii World Bank (2013). Fish to 2030.

xix Phys.org (2009). Researcher gives first-ever estimate of worldwide fish biomass and impact on climate change.

xx Davies, Cripps, Nickson, Porter (2009). Defining and estimating global marine fisheries bycatch.

xxi National Intelligence Council (2016). Global Implications of Illegal, Unreported and Unregulated (IUU) Fishing.

xxii Planet Tracker calculations based on FactSet (2020).

xxiii Christensen, Coll, Piroddi, Steenbeek, Buszowski, Pauly (2014). A century of fish biomass decline in the ocean.

xxiv Lotze, Tittensor, Bryndum-Buchholz, Eddy, Galbraith, Barange, Barrier, Bianchi, Blanchard, Bopp, Büchner, Bulman, Carozza, Christensen, Coll, Dunne, Fulton, Jennings, Jones, Mackinson, Maury, Niiranen, Oliveros-Ramos, Roy, Fernandes, Schewe, Shin, Silva, Steenbeek, Stock, Verley, Volkholz, Walker, Worm (2019). Global ensemble projections reveal trophic amplification of ocean biomass declines with climate change.

xxv FAO (2020). The State of World Fisheries and Aquaculture 2020.

xxvi Planet Tracker (2020).

xxvii Planet Tracker (2020).

xxviii Planet Tracker (2020).

xxix Planet Tracker calculations, based on FactSet (2020).

xxx Planet Tracker (2020).

xxxi The Global Environment Facility (2020). Wildlife Conservation Bond.

xxxii Environmental Finance (2016). Special Award for Innovation (Structure) - Yes Bank / IFC 'back-to-back' transaction.

xxxiii Gourtsoyannis (2020). Scottish fishermen warn UK Government: 'We are not a Brexit bargaining chip'.

xxxiv European Parliament (2020). International fisheries relations.

xxxv European Commission (2020). Council Regulation fixing for 2021 the fishing opportunities for certain fish stocks and groups of fish stocks applicable in the Mediterranean and Black Seas.

xxxvi Coppola (2017). Mozambique Is About To Default On Its 'Tuna Bond'.

xxxvii Cotterill, Seddon, Croft (2020). Russia's VTB sues Mozambique over 'tuna bond' scandal.

xxxviii Reuters (2016). SEC investigates banks that sold Mozambique's 'tuna bond': WSJ.

xxxix FAO (2020). The State of World Fisheries and Aquaculture.

xl Chen, Su, Yu, Hu (2020). Livelihood Vulnerability of Marine Fishermen to Multi-Stresses under the Vessel Buyback and Fishermen Transfer Programs in China: The Case of Zhoushan City, Zhejiang Province.

xli Fabinyi (2020). The role of land tenure in livelihood transitions from fishing to tourism.

xlii Nayak (2017). Fisher communities in transition: understanding change from a livelihood perspective in Chilika Lagoon, India.

xliii GEF (2020). A holistic approach for sustainable fisheries and a Blue Economy.

xliv Szuwalski, Jin, Shan, Clavelle (2020). Marine seafood production via intense exploitation and cultivation in China: Costs, benefits and risks.

xlv Garcia, Rosenberg (2010). Food security and marine capture fisheries: characteristics, trends, drivers and future perspectives

xlvi SDG 14 – Life Below Water.

xlvii Planet Tracker calculations, based on FactSet (2020).

xlviii Planet Tracker calculations, based on FactSet (2020).

l Planet Tracker (2020).

li Planet Tracker (2020).

ABOUT PLANET TRACKER

Planet Tracker is a non-profit financial think tank aligning capital markets with planetary boundaries. It was created to investigate the risk of market failure related to environmental limits. This investigation is primarily for the investor community where ecological limits, other than climate change, are poorly understood, even more poorly communicated and not aligned with investor capital.

Planet Tracker generates breakthrough analytics to redefine how financial and environmental data interact with the aim of changing the practices of financial decision makers to help avoid both environmental failure and financial collapse.

SEAFOOD TRACKER

Fish stocks and other key ocean resources are in steep decline. By undertaking financial research illustrating the value at risk from this resource mismanagement to companies and their owners, Planet Tracker stimulates change using investors and credit financiers to publicly adopt and implement robust stewardship policies aimed at delivering on sustainable blue economy objectives – e.g. SDG 14 Life Below Water. Our aim is to align capital markets with the sustainable management of ocean resources.

ACKNOWLEDGEMENTS

Authors: François Mosnier, Archie Cage, John Willis

planet-tracker.org planet_tracker

WITH THANKS TO OUR FUNDERS

This report is funded in part by the Gordon and Betty Moore Foundation through the Finance Hub, which was created to advance sustainable finance.