Received: 16 December 2016 | Revised: 26 March 2017 | Accepted: 16 April 2017

DOI: 10.1002/aqc.2794

WILEY

SUPPLEMENT ARTICLE

Innovative financing for the High Seas

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Abstract

1. Innovative financing, that is the development of new funding sources and mechanisms including from the private sector, can be used to deliver promising ocean conservation opportunities. Capital markets are increasingly accessible for sustainable development and climate finance, and are gaining traction for biodiversity conservation. Such financing concepts could also be applied in the High Seas. Drawing on natural capital economics as a way to ascribe economic value, specific marine investment opportunities can be identified and made accessible to new financiers and funding processes.
2. International waters cover nearly half of the planet's surface, yet governance deficiencies have meant that marine habitats and ecosystems are rapidly deteriorating. Improved governance through the proposed Marine Biodiversity Implementing Agreement discussed under the 1982 UN Convention on the Law of the Sea and delivery of the Sustainable Development Goals, in particular ocean goal 14, will require additional financial support for High Seas solutions, including for the effective management of marine reserves.
3. For projects to be attractive to funders they need to be clearly structured and deliver quantifiable benefits. A comprehensive ocean data infrastructure could be put in place to support large-scale marine conservation monitoring cost-effectively. This infrastructure could serve also other ocean users, thereby defraying the cost and could be delivered through public–private partnerships. Development finance and climate finance provide examples for relevant pathways for such integrated approaches.
4. Existing efforts to find additional funding for ocean solutions can be enhanced through the range of specific innovative ocean finance mechanisms that are identified. These offer the prospect of long-term support.
5. This review draws on progress made at the IUCN World Conservation Congress in Honolulu, Hawai'i in September 2016 and builds on the momentum created by the Paris Agreement and the Sustainable Development Goals.

KEYWORDS

acidification, climate change, ecosystem services, high seas, marine protected area, ocean, UNCLOS

1 | INTRODUCTION

The High Seas play a key role in sustaining life on Earth and provide vital ecosystem services (Rogers, Sumaila, Hussain, & Baulcomb, 2014) such as the provision of food, the generation of oxygen and the capture of carbon. Over-exploitation, pollution, introduced species, habitat loss and climate change threaten the sustainability of these services. Ocean areas beyond national jurisdiction cover almost half of the surface of the planet, yet receive very limited funding for their protection (Global Ocean Commission, 2016). Activities in the High Seas are managed individually or by sectoral bodies, with limited consideration for cumulative or synergistic impacts or for the need for coordinated, connected and comprehensive conservation of marine species and habitats (Druel & Gjerde, 2014). While Parties to the Convention on Biological Diversity (CBD) recognize the importance of large international sea areas as 'ecologically or biologically significant areas' (EBSA) (Freestone, 2014), regional agreements and mandates to protect marine biological diversity cover only a small

proportion of the High Seas (Mahon et al., 2015). Significant shortfalls in terms of marine biodiversity protection remain (Klein et al., 2015), while adequate funding has been identified as a key success factor for marine protected areas (Gill et al., 2017). In this paper we describe approaches to close the High Seas financing gap to help address these challenges.

In June 2015, the UN General Assembly (UNGA) agreed to develop an international legally binding instrument under the 1982 Law of the Sea Convention (United Nations, 1992) for the conservation and sustainable use of marine biological diversity in ABNJ (A/RES/69/292) (Rochette et al., 2015) and two preparatory meetings took place in 2016, achieving progress on a range of issues (Chair's overview of the second session of the Preparatory Committee, 2016). The proposed implementing instrument would allow for the establishment of effective networks of marine protected areas (MPAs) and other area-based management, include regimes for environmental impact assessments and marine genetic resources and rules for capacity building and technology transfer (Ban et al., 2014). Adequate financing mechanisms will be required to support this effort. Investment is also needed in the High Seas for ocean observation and research and in future for the management and monitoring of area-based measures and other potential open ocean management (High Seas Alliance, 2014) which comes at some cost (McCrea-Strub et al., 2011).

The cumulative economic impact of inadequate ocean management practices is becoming clear with better understanding in valuing the ocean (Beaudoin & Pendleton, 2012) and in quantifying the economic value of marine services (Spalding, Brumbaugh, & Landis, 2016). Recent estimates by the Global Environmental Facility (GEF) indicate that the ocean generates at least US$200 billion dollars per year (Hudson & Glemarec, 2012). Yet as an open-access resource the global ocean lacks investment into activities necessary to protect and sustain the marine environment (Global Ocean Commission, 2015). The GEF has provided some funding to support delivery of the CBD Aichi targets (Global Environment Facility, 2012) but additional financial resources are needed to fund further marine protected areas including those created through regional conservation initiatives (Rochette et al., 2014).

UNEP/ GEF's report entitled 'Catalyzing Ocean Finance' aimed to identify ways to leverage additional ocean funding, by using initial public-sector financing in order to engage further private money (Hudson & Glemarec, 2012). It suggested that correcting market and policy failures through science-based integrated ocean planning and other instruments would not only act as a catalyst to restore and protect coasts and oceans, but could also generate sizeable business activity, including jobs in support of marine ecosystem protection. This requires, however, also investment in capacity development for ocean policy makers and other stakeholders. Catalyzing Ocean Finance estimates that reducing and in some cases arresting the degradation of coastal and ocean resources would require an initial public investment of about US$5 billion over the next 10–20 years.

To encourage private financial investment flows will require risk mitigation tools. The provision of guarantees that cover various categories of risk, such as political risk insurance and the support of investment pre-feasibility work can help to structure transactions that can be attractive for private partners to co-invest into (Mohammed, 2014). Such an approach may deliver more significant financial flows from the private sector and commercial entities to address issues such as ocean hypoxia, ocean acidification, over-fishing and marine invasive species. The more mature fields of development finance and climate finance are explored below, with particular emphasis on the role of private finance in delivering the infrastructure and services required for effective High Seas conservation and governance. These approaches to close the High Seas financing gap draw on:

1. progress in the related fields of development and climate finance. These are linked to the ocean as part of the Sustainable Development Goals and include concepts to bring private finance to deliver additional scale;
2. economic valuations of the ocean. Investments in protecting natural capital have a high rate of return but have been neglected owing to shortcomings in marine governance and lack of political focus, issues that can now be addressed; and
3. effective and sustainable ocean solutions that draw on advances in ecosystem science and technology. These can create a pathway for financial innovation that goes hand in hand with ocean management that will be fit for purpose.

This paper is structured as follows:

1. The concept of innovative finance and its use in related fields
2. The case for innovative finance for High Seas conservation
3. Specific proposed ocean financing mechanisms

2 | INNOVATIVE FINANCE

2.1 | The concept

The term 'innovative finance' describes a set of financial solutions that create scalable and effective ways of channelling private money, in particular from global financial markets towards solving pressing global problems (Madsbjerg, 2016). Private funders require clear structures, predictable cash flows and transparent ways to assess risks and returns. The innovative finance approach identifies avenues to deliver such clarity and is deployed in development finance and climate finance (Westphal, Canfin, Ballesteros, & Morgan, 2015).

2.2 | Development finance

In order to mobilize large pools of private capital to address pressing social, economic and environmental challenges requires new incentives for development and long-term investment (Committee of Experts on Sustainable Development Financing, 2014). Such mechanisms aim to generate additional development funds by tapping new funding sources and engaging new partners such as donors and private sector firms (Gutman & Davidson, 2007). The goal is to make financial flows more efficient, faster and results-oriented, linking flows to measurable performance (Joint Ministerial Committee of the Boards of Governors of the Bank and the Fund on the Transfer of Real Resources to Developing Countries, 2016). The global health sector

shows that innovative mechanisms are successful if they provide financing in the most automatic manner and deliver participatory governance (Gartner, 2015).

In October 2016 the United Nations announced the creation of a new platform for innovative finance for the delivery of the Sustainable Development Goals. The proposed Financial Innovation Platform will provide a multi-stakeholder forum to help finance progress on the Goals.[1] Shaping the risks, returns, and other incentives facing market actors will help mobilize private financing support to achieve the Goals (Kharas & MacArthur, 2016). A key aspect will be 'blended finance', leveraging development finance and philanthropic funds to attract private capital into financial arrangements that drive social, environmental and economic progress and offer financial returns for private investors in line with market expectations, based on real and perceived risks (World Economic Forum, 2015). UNEP's recent inquiry has identified a number of areas of high potential for sustainability innovations (United Nations Environment Programme, 2015). Public–Private Partnerships (PPPs) can be an effective instrument to deliver needed key infrastructure but requires the institutional capacity to create, manage and evaluate such PPPs.

2.3 | Climate finance

Climate finance is a rapidly growing field (Buchner, Trabacchi, Mazza, Abramskiehn, & Wang, 2015) and focus of the newly established Green Climate Fund (Green Climate Fund, 2015). At the 15th meeting of the Conference of the Parties to the UN Framework Convention on Climate Change, developed countries committed to US$ 100 billion per year by 2020 to meet the needs of developing countries (UNFCCC Conference of the Parties, 2009).

In 2104 over half of the US$25 billion invested in public climate adaptation finance was dedicated to water management, land-use, risk management and coastal protection (Climate Policy Initiative, 2015). Local projects based on coastal zone management (Adaptation Fund, 2016) that deliver ecosystem services, improve water quality, allow for ecotourism, sustainable fisheries and aquaculture can be treated as a new conservation asset class that is attractive to a new set of conservation investors. Integrating biodiversity offsets into project structures can allow for additional revenues. To incentivize the local private sector and unlock domestic capital, innovative financial instruments that de-risk climate change investments such as guarantee and equity investments by the GCF can be used and have the potential for scale-up in these financial instruments in the future (Soanes, Rai, Steele, Shakya, & Macgregor, 2017).

Infrastructure finance offers interesting possibilities for climate finance based on long term collaboration between the public and the private sector (Subacchi, Pickford, Tentori, & Huang, 2014). Current low interest rates result in low financing costs, allowing de-risking and blending private financing with concessional finance (Bhattacharya, Oppenheim, & Stern, 2015).

Green bonds, and in particular the Climate Bonds Initiative, provides an interesting example (Climate Bonds Initiative, 2016a). Its standards aim to maximize viable bond issuances with verifiable environmental and social outcomes. Green bonds have raised over US$ 100 billion in 2016, with over 60% of the funding raised by government issuers. Agreed standards and processes allow a broader investor base to access this market (Brown, Buchner, Wagner, & Sierra, 2011). The latest proposals for agriculture and land-use-related investments already include wetlands, mangroves, and coastal and riverine fisheries. Further work will be required to include the full range of sustainable marine infrastructure in such standards. Given the scale of this sector, its relevance to advanced financial markets and its ability to deliver new actors and partners rapidly, this area offers a relevant opportunity for ocean finance (Thiele, 2015a).

Mark Carney, Governor of the Bank of England (Carney, 2016), has suggested five measures that should be taken to help scale the green bond market further: (1) developing a 'term sheet' of standardized terms and conditions for a green bond; (2) creating voluntary definitional frameworks, certification and validation to give certainty that the project being financed is 'green'; (3) integrating environmental risk and green certification into credit ratings; (4) developing green bond indices; and (5) assessing the scope for standardization and harmonization of principles for green bond listings to promote efficient trading and adequate liquidity. This approach can be replicated to provide guidance for the development of blue bond standards.

Finally, the significant funding needs to deliver on the Agenda 2030 and the Sustainable Development Goals, including Ocean Goal 14, has led to a number of concepts for financial mechanisms, including insurance solutions and impact bonds as pay-for-performance mechanisms to fund the protection of ecosystems, while also offering private investors a return (Jomo, Chowdhury, Sharma, & Platz, 2016). Other concepts include fees on activities, and resilience bonds to promote investment in infrastructure that mitigates climate risks are other related concepts. While the climate finance space is still evolving it offers relevant lessons and opportunities for the related marine area (Kharas & MacArthur, 2016).

2.4 | Natural capital and biodiversity finance

Natural capital finance represents a large and still underdeveloped private sector investment opportunity (Financial Innovations Lab® Report, 2015). Quantitative estimations of ecosystems services show that attractive financial returns can result from preventing ecosystem degradation. 'Blue-carbon' wetlands play a key role in global carbon sequestration, mangrove ecosystems alone could be storing as much as 20 billion tons of carbon (Herr et al., 2015). Quantifying, certifying and trading mechanisms could deliver significant cashflows. A recent study identified 54 funding sources for mangrove finance in Asia and argued that the potential scale of private-sector funding is much larger than currently available from the public sector (Beresnev & Broadhead, 2016).

Private investors – individuals, pension funds and sovereign wealth funds – could supply an important proportion of the funding needed to preserve the world's most important ecosystems. Traditional conservation funders such as public bodies, multilateral development banks and philanthropists can play an important role in

[1]http://www.un.org/sustainabledevelopment/blog/2016/10/un-private-sector-to-create-platform-for-financing-sdgs/

developing new channels for such private engagement (Buebe, Meiher, & Wittmer, 2015). Private investors surveyed intend to deploy more than US$ 5 billion in conservation impact investments in the next five years (NatureVest, 2014). This will require financing vehicles that can take such investments and formats that will allow secondary market sales to recycle funds.

Under the Convention on Biological Diversity (United Nations Environment Programme, 1992) 'innovative financial mechanisms' include payments for ecosystem services and biodiversity in climate change funding and in international development finance. Its supplementary 2010 Nagoya Protocol for Access and Benefit Sharing provides for monetary and other obligations.

The Coalition for Private Investment in Conservation (CPIC) launched at the IUCN World Conservation Congress in September 2016 aims to identify investment opportunities that provide measurable, science-based conservation benefits and social impact to participating communities and to biodiversity, while delivering at-scale financial returns for investors. It describes the effort needed as follows:

> *In order to fill this financing gap, a concerted, systematic effort focused on creating investment products that provide a conservation and financial bottom line is necessary to deliver the following outputs: 1) Measures of return and monitoring systems for natural and social capital in addition to financial capital; 2) Increased availability of expertise in building finance vehicles for investment, including through de-risking, blended finance, cash-flow analysis and business planning; and 3) Priority 'blueprints' for delivering risk-adjusted returns from specific types of investment in natural capital (Coalition for Private Investment in Conservation, CPIC, 2016).*

Traditionally, 80% of biodiversity finance comes from non-market mechanisms such as domestic budget allocation, Official Development Assistance (ODA) and debt-for-nature swaps (Parker, Cranford, Oakes, & Leggett, 2012). The allocation of such public finance is dependent on political will and public opinion. However, biodiversity conservation needs long-term, reliable sources of market financing (Huwyler, Kaeppeli, Seramova, Swanson, & Tobin, 2014). These may include payments for ecosystem services and biodiversity offset mechanisms (Githiru et al., 2015), business-biodiversity partnerships and innovative sources of international development finance (Ferraro & Pattanayak, 2006). An investor-driven approach can help to deliver funding (Credit Suisse, World Wildlife Fund,, & McKinsey, & Company, 2014) on the basis of a full assessment of ecosystem services values (Fétiveau, Karsenty, Guingand, & Castellanet, 2014).

A recent report on the future of multilateral development banks (Ahluwalia, Summers, & Velasco, 2016) identifies the need for more focus on global public goods, such as loss of biodiversity and the effects of mis-pricing shared natural resources on poverty and sustainable growth. Asset owners are increasingly demanding that environmental metrics be disclosed and integrated into financial statements, driving more investment into nature conservation, restoration, and rehabilitation activities (Havemann, Schuster, Leigh-Bell, Negra, & Levonen, 2016).

3 | RATIONALE FOR INNOVATIVE FINANCING OF BIODIVERSITY CONSERVATION IN THE HIGH SEAS

3.1 | Blue natural capital finance

The High Seas are a crucial part of the global natural capital, delivering critical ecosystem services as well as a significant store for carbon (Laffoley, Baxter, Thevenon, & Oliver, 2014). Conserving 20–30% of global oceans in marine PAs could create 1 million jobs, sustain fish catch worth US$70–80 billion/year and provide ecosystem services with a gross value of roughly US$4.5–6.7 trillion/year (UNEP-WCMC and IUCN, 2016). The economic assets at risk in the ocean are even more substantial. The annual 'gross marine product' (GMP) – equivalent to a country's annual gross domestic product (GDP) – is at least US$2.5 trillion; the total 'asset' base of the ocean is at least US$24 trillion (Hoegh-Guldberg, 2015).

Market-based mechanisms could potentially generate up to 50% of biodiversity finance for coral reefs in 2020 (Parker et al., 2012) and can be considered for other ecosystem services. Valuing ecosystem services to a particular sector, such as the value of clean water to aquaculture can be a way to demonstrate to prospective investors the value of investing in policy interventions for prevention, good management and incentives for sector behaviour change. The proposed 'TEEB (The Economics of Ecosystems and Biodiversity) for Oceans & Coasts' study led by the UNEP Regional Seas Programme draws attention to the economic benefits of ocean and coastal biodiversity and healthy ecosystems and emphasizes the unrealized benefits of preserved and enhanced whole ecosystem structures, functions and processes to the well-being of humans and nature. This approach can contribute to reviving the ocean economy (Hoegh-Guldberg, 2015).

Licensed access, for instance franchising whale-watching activities, and visitor fees can provide direct sources of revenues (Spalding et al., 2016). Market mechanisms such as cap-and-trade and mitigation payments are additional ways to deliver cash and provide incentives (Bos, Pressey, & Stoeckl, 2015). The Ocean Appreciation Program proposes a voluntary fee per container shipped across the ocean, to be spent on ocean conservation efforts, calculating a potential revenue of US$ 3 billion (Ocean Recovery Alliance, 2016).

Key tools would be mechanisms that address and reduce the types of risk a project faces, such as through the provision of first-loss capital, a form of credit enhancement whereby an investor, for instance a donor, agrees to bear an initial loss in order to facilitate participation of other funders (Global Impact Investing Network, 2013).

Financial institutions are looking to better understand natural capital risks, opportunities and impacts associated with their direct operations and their investment, lending or insurance portfolios (Association of Chartered Certified Accountants, 2014). Environmental stress testing is required but still in its infancy in terms of method, data availability, and policy and regulatory response (Climate Disclosure Standards Board, 2015).

New models of investment and finance can provide incentives for the scaling up of investment in strategic ways (Shames & Scherr, 2015).

The Natural Capital Coalition is producing a Finance Sector Supplement to the Natural Capital Protocol to help financial institutions better understand natural capital risks, opportunities and impacts associated with their operations. This allows them to align their investment, lending or insurance portfolios to sustainability criteria as well as providing tools to manage their exposure to sectoral and sovereign natural capital risks. China has adopted an ocean accounting approach (Wang, 2016) and the insurance sector has begun to assess changes in ocean risk (XLCatlin Deep Ocean Survey, 2016).

3.2 | Financing ocean infrastructure to deliver High Seas governance

New technologies such as remote sensing via satellites and in-sea devices represent mechanisms to monitor the High Seas, collect important data and enforce protected areas. Engaging private sector partners skilled in the provision of these technologies would help the protection of the marine environment and facilitate the implementation of marine spatial planning approaches. These can be facilitated through long-term contractual arrangements, whereby the financing partner would commit to purchase relevant data packages over the life of the infrastructure.

3.2.1 | Scaling ocean observation

Ocean Observatory infrastructures connected with fibre-optic cables for real-time analysis are needed to build an effective global ocean observing network, as only comprehensive data can help address conservation complexity (Heimbach et al., 2014). The Deep Ocean Observing Strategy proposed by the Global Ocean Observation System provides an approach to consider essential ocean variables over the next 5–10 years (Bax, Harden-Davies, Thiele, Halpin, & Dunn, 2016). Significant cost savings could be made if the telecommunications cables needed for data back-haul were to be shared between traditional telecommunications users and such observatories.

Advances in technology such as ultralight aircraft and drones are increasingly used to monitor marine conservation areas. Pollution from vessels and marine structures, spreading harmful chemicals and dangerous noise, can for instance be monitored with sensors and microphones. Satellites such as the Sentinel system of the European Space Agency provide comprehensive ocean data and could be used to help to transition to comprehensive ocean zoning and marine protected area design. Environmental earth observation satellites can survey ocean wave spectra to identify phytoplankton or pollution levels from slight shifts in water colour. They provide a record of sea surface temperature, confirm ongoing sea-level rise and offer salinity and ice-melt data. These data are already provided at very low cost, the investment need primarily relates to the development of appropriate algorithms.

The deep ocean drives the physical shifts that for example lead to shorter sea ice seasons in the Polar regions and big ecosystem changes. New robotic technologies are opening avenues for studying these processes in natural communities and offer insights into how the ocean's rapid physical and evolutionary dynamics combine into decade-long environmental signals that show how climate shifts will alter ecosystems in the future. Ocean acidification trends similarly require detailed monitoring through new sensors such as those developed under the EU SenseOcean project and similar US initiatives. These efforts aim to reduce costs by integrating sensor packages and improving robustness. Mechanisms for implementation and compliance, including reliable systems of surveillance and enforcement, are required (Thiele, 2015b). Technological advances offer tools to reduce cost and increase efficiency.

3.2.2 | Addressing over-fishing

A well-protected ocean will lead to the recovery of fish stocks and other marine life. Studies have shown that reduced fishing pressure increases biodiversity, enhances carbon storage, and offers a better quality of recreational fishing (Martin, Ballance, & Groves, 2016). Unsustainable practices such as bottom-trawling destroy benthic habitats and fisheries by-catch of endangered species such as turtles and seabirds has a major impact on marine ecosystems. Better gear, updated practices, camera monitoring, real-time spatial management and satellite-coordinated enforcement measures can help to reduce by-catch and discards significantly.

The World Bank and FAO study *The Sunken Billions* demonstrated that many fishing activities are economically not viable without subsidies (Arnason, Kelleher, & Willmann, 2009) and closing the High Seas to fishing may be a cost-effective measure (White & Costello, 2014). Subsidies to the fisheries sector (such as for vessel construction and fuel tax waivers) enable fishing to continue beyond the point at which it would otherwise be unprofitable. The countries that in the past provided the most subsidies were Japan (US$ 5.1 billion), India (US$ 4.5 billion), the EU (US$ 3.2 billion) and China (US$ 2.7 billion); in total seven countries provide two-thirds of all subsidies (MRAG, 2010). The World Trade Organization is the global body to address subsidies and as SGD Goal 14.6 calls for prohibiting certain forms of fisheries subsidies which contribute to over-capacity and over-fishing four new initiatives have been brought froward at the WTO.[2] Economic incentives and private financing can also stimulate innovation in better fishing gear, better traceability and accountability and in enabling better management. Other approaches and impact investors focus on developing more sustainable alternatives, for instance in bivalve and kelp farming.

3.2.3 | Marine carbon

The contribution of the ocean to carbon sequestration and global climate health is large, as the recent IPCCC report confirmed, allocating resources under the UNFCCC process and the Paris Agreement needs to reflect the extent to which greenhouse gas emissions cause ocean acidification. Quantifying blue carbon sequestration and developing tradeable ocean carbon certificates could help to develop marketable products and allow for the allocation of High Seas carbon certificates as a funding source (Laffoley et al., 2014). In addition to coastal mangroves and salt marshes the High Seas and its biomass are important carbon stores (Lutz & Martin, 2014).

[2]https://www.wto.org/english/news_e/news17_e/fish_24jan17_e.htm

3.2.4 | Maritime emission reduction

Shipping consumes approximately 300 Mt of fuel per year, about 85% of which is heavy fuel oil, causing disproportionate greenhouse gas emissions and contributing to the black carbon problem. Operational efficiency can be improved through speed reduction and increased utilization. Other cost-effective measures include frequent propeller polishing and foul-resistant hull coating, which can be incentivised through financing measures, including differential port fees. Globally total shipping emissions can be halved by 2050 under strict efficiency standards compared with a business-as-usual approach. In the interim, industry commitments both through the IMO and on a voluntary basis to carbon reduction could provide offset funding for High Seas efforts.

3.2.5 | Ocean energy opportunities

Ocean energy, for instance tidal and wave, is abundant, geographically diverse and renewable. It could meet 10% of the European Union's power demand by 2050 and the global market for ocean energy could see 337 gigawatts of installed capacity (Ocean Energy Forum, 2015). So far there is limited availability of equity from venture capital sources or the public equity markets due to low project returns. The use of loan guarantees to cover the risk of default could help to leverage more finance into the ocean energy sector. A common reserve fund available to multiple projects in the initial roll out phase would help to spread the risk and reduce the cost of providing guarantees. This is a growing Blue Economy opportunity but to deliver meaningful benefits its cost needs to come down and its potential environmental impacts need to be fully assessed (Economist Intelligence Unit, 2015).

3.2.6 | Ocean tourism

Global tourism contributes 9% of world GDP (US$ 7 trillion) and coastal/ocean tourism makes up a significant part of this. It is thus a major ocean user and further steps are required to ensure its sustainability. Sustainable marine tourism (Hess, 2015) can be a further source of income for marine conservation areas (Cisneros-Montemayor, Barnes-Mauthe, Al-Abdulrazzak, Navarro-Holm, & Sumaila, 2013). Payment structures based on user fees have been proposed (McDonald, Mangin, Thomas, & Costello, 2016) but the impact of human pressures on fragile ecosystems needs to be considered.

4 | INNOVATIVE FINANCING MECHANISMS FOR OCEAN PROGRESS

4.1 | Ocean impact technology funds

There are a number of opportunities for true marine technology breakthroughs, for instance in measuring, in data algorithms and in bio-science. Marine genetic resources are used for applications in medicine, industry and cosmetics. An ocean impact fund could provide a mechanism for appropriate impact investing (Brest & Born, 2013). By adhering to strict sustainability criteria new specialist funds can attract private impact investors who look beyond the strictly financial returns to societal benefits. There is a growing investor pool keen to find appropriate situations and the marine space can offer true scale and uniqueness. The Sustainable Development Goals provide a framework for such an investment approach and a number of impact investors have already targeted particular goals, including ocean goal 14 (Global Impact Investing Network., GIIN, 2016). The recently announced Althelia Sustainable Ocean Fund is one example.[3]

At this early stage the total amount of ocean impact investment is small but the sector is rapidly growing. Impact funding has a number of advantages for the beneficiary, as impact investors can provide expertise, share the interest in delivering social and environmental goals and have longer-term time horizons, They can deliver equity capital flexibly at a critical early and potentially risky stage.

4.2 | Debt finance

Global development finance institutions such as the World Bank, regional development banks such as the European Investment Bank, the European Bank for Reconstruction and Development, the Asian Development Bank, the African Development Bank, the Caribbean Development Bank or the Corporacion Andina de Fomento (CAF) and newly established multilateral lenders such as the Green Climate Fund, the Asian Infrastructure Investment Bank and the New Development Bank can play a role in delivering debt finance to ocean projects. The World Bank administers the Adaptation Fund set up by Article 12 of the Kyoto Protocol. A key priority for this fund is climate-smart ocean economies, local engagement and infrastructure investments. Further resources for this purpose were committed at the recent UNFCCC COP 22 by a number of countries. Marine infrastructure will be the focus of the recently launched China Ocean Strategic Industry Investment Fund (China Ocean Strategic Industry Investment Fund, COSIIF, 2016). It will be crucial that project developers structure the transactions in a way to optimize the conservation benefits.

A number of global development finance institutions such as the World Bank, the GEF and UNEP are aligning their financing priorities to the 2030 Agenda. A blended finance approach delivering ocean debt solutions in line with Sustainable Development Goal 14 can help to attract private finance contributions. United Nations Environment Programme – Finance Initiative (UNEP FI)[4] is a partnership with the global financial sector created to promote sustainable finance.

4.3 | Capital market products

Listed bonds and other capital market products dedicated to ocean solutions can provide opportunities for additional funding, in particular if linked to other initiatives that aim to standardize, verify and deliver specific SDG-compatible funding products, such as through the Climate Bonds Initiative. Bonds certified under this process provide private investors with predictable cash flows while delivering specific funding. These bonds are increasingly raised by a diversity of issuers and could be structured to deliver High Seas benefits, provided that they fit the relevant verification criteria. Work is progressing on setting up criteria for projects in the marine space and these standards will be published shortly (Climate Bonds Initiative, 2016b). Such bonds will be

[3]https://althelia.com/2016/10/19/althelia-sustainable-ocean-fund-statement/

[4]http://www.unepfi.org

of particular relevance as refinancing tools for projects that have been successfully put in place in the marine space and now deliver predictable cash flows. They can also serve to package a number of smaller projects which will be key to scaling up to a level that will make an engagement attractive to larger investors. The recently launched Seychelles Blue Bond[5] is an example for this form of innovation.

4.4 | Concessions

A specific approach for introducing private funding into High Seas management in the form of contracts and concessions could be considered where a private manager would deliver professional management, for instance of marine protected areas or of selected related services, against the ability to generate revenues from external sources, such as ecotourism. This approach may be specifically suited to certain high value sites and public access and acceptance issues would need to be carefully addressed.

4.5 | Risk alleviation measures

The restoration of wetlands, water and wildlife habitat is a US$3 billion industry (Bank, 2015). Wetlands 'mitigation banks' broker credits to offset negative environmental impacts of real estate, transportation and energy projects through the creation of more-than-equivalent positive impacts nearby. Funds such as *Ecosystem Investment Partners* have raised more than US$300 million to finance the restoration of thousands of acres of wetlands (Rogan, 2016). Integrated coastal management provides a further private investor opportunity (Benedetti & van Lavieren, 2015) and can deliver green payments for blue carbon (Murray, Pendleton, Jenkins, & Sifleet, 2011).

High Seas insurance concepts could cover the potential damage caused by measurable ocean phenomena (warming, currents, hurricanes and tropical storms, etc.). Quantifying ocean risks and offering specific insurance cover could provide new opportunities for the insurance industry, with parametric insurance, that is payment against a pre-agreed triggering event, being of particular relevance. Other forms of risk pooling, for instance by delivering an index of sustainable ocean projects could also be considered. Private sector engagement and creativity will be required to make further progress in this area.

A specific risk that arises when trying to promote sustainable marine solutions is the potential of fraud and illegality. Various solutions have been proposed to address this challenge, including better forms of observation, inspections and transparent data access. An interesting proposal to address such data integrity issues suggests the use of open-source data protocols through a computer-based ledger system, a so-called blockchain. This tool has been proposed for instance for mangrove carbon credits and for tuna (Economist Ocean Innovation Challenge, 2016). Beyond its immediate use as a funding mechanism, engagement of the emerging 'fintech' financial technology sector brings ocean challenges to a young and most dynamic part of the finance industry, whose cooperation and engagement could be crucial in delivering transformative innovation.

[5]http://www.seychellesnewsagency.com/articles/6856/Seychelles+to+issue+blue+bonds+worth++million+to+benefit+fisheries+industry

4.6 | Blended High Seas financing concepts

Finance for new capital investments in ocean infrastructure including the ongoing activities to deliver better governance, such as the management and enforcement of a future global network of marine protected areas, can be offered in a blended format (Hudson & Fulton, 2016). A mixed-use ocean monitoring infrastructure funded in the form of public-private partnerships, would be an effective format, drawing on satellites, floating devices and private–sector subsea telecom cables, linked to active sensors and branching units to deep ocean observatory systems (Thiele, 2015b). Marine conservation concession arrangements that allocate future cash flows generated by marine protected areas including licences/recreational usage fees, blue carbon credits and future mitigation banking credits have also been proposed.

4.7 | Ocean Sustainability Bank

A new Ocean Bank for Sustainability and Development has been proposed as a funding mechanism for a proactive marine protection infrastructure, based on the model of the European Bank for Reconstruction and Development (Thiele, 2015a). An open letter published in the Times of London on 8 June 2015, World Ocean Day, and signed by 19 representatives of marine organizations states 'we also need to think beyond existing structures and think of an ocean sustainability bank. There are development banks around the world but no bank for 70% of the planet's surface' (WWF, 2015).

Such an institution could be funded from multiple sources, including member states, usage fees and private sources. It could cooperate closely with other new institutions such as the Green Climate Fund and the Asian Infrastructure Investment Bank and would function as a hub for knowledge, debt, equity, and grant finance and as a lead institution to structure ocean projects (Cicin-Sain et al., 2016). Operated on a commercial basis, it would cover its costs, benefiting from the credit status of donor members to borrow on capital markets. Such a dedicated ocean finance institution can provide loan guarantees and equity and debt instruments, as well as structure transactions and partner with new investors. It can cooperate effectively also at the regional level (Llewellyn, English, & Barnwell, 2016) and act as project developer and training institution.

4.8 | Trust funds

Trust funds can act as a supplementary funding mechanism, as demonstrated by three examples. First, the Mesoamerican Reef Fund (MAR Fund) is a private non-profit organization between four countries to protect that reef eco-region by strengthening the management of protected marine and coastal areas. It offers long-term technical and financial assistance. The MAR-Fund endowment is invested in perpetuity in international financial markets, with the interest used to support small projects implemented by civil society and local communities for the benefit of coastal and marine protected areas (MAR Fund, 2014). Second, PACÍFICO is an umbrella group comprising five Latin-American conservation trust funds as an effective permanent platform for capture of resources and funding for comprehensive coastal and marine management in the Eastern

Tropical Pacific. Third, the endowment fund established to cover the costs of management of the Phoenix Island Protected Area in Kiribati provides compensation to the government for the opportunity cost of withholding fishing licences (MRAG Asia Pacific, 2016). The submission of the Pacific Small Island Developing States to the 2nd BBNJ Prepcom[6] expressly referred to a trust fund which could provide a special allocation to SIDS, supported through royalties, milestone payments and mandatory fees. Likewise the G77 plus China suggested that 'A trust fund within the possible clearinghouse mechanism on access and benefit-sharing could be established with a view to ensuring a fair and concrete sharing of benefit'.[7]

While trust funds have been successful, they can also lead to fragmentation of effort where lack of clear lines of accountability in allocations of management and staff time, and limits on accountability of top management occurs (Ahluwalia et al., 2016). Successful ocean finance will require through a collaborative combination of earmarked funds, strong project planning and coordination, and innovation within marine technology development and transfer.

5 | CONCLUSION

Protection of biological diversity conservation in the High Seas to address anthropogenic threats to marine ecosystems requires a new, innovative finance approach. As the IUCN submission to the BBNJ Prepcom 3 Chair states 'innovative financing will be needed to support international cooperation, development of technologies and collaborative research and thus should be key priority areas under the new agreement' (IUCN, 2016).

This paper has explained the rationale and provided a range of specific examples showing how this approach can be applied, both in terms of accessing new funding sources and in terms defining clear asset values, cash flows and new revenue sources in advance of which new financing structures can be set up. Identifying the significant economic value of the natural capital of the ocean is not enough, specific financiable projects and clearly identified funding sources and mechanism are also required. Mainstreaming and scaling private sector sources provides a significant opportunity to deliver the infrastructure required for effective High Seas governance. There is considerable political interest in ocean issues in key international fora such as the UN, the EU, and G7 (Williamson, Smythe-Wright, & Burkill, 2016) and finance could be a vital tool to deliver engagement and help address critical issues of ocean risk and natural capital degradation.

Innovative finance is a supporting measure, it can be a mechanism to complement and support the important other efforts that are required. These need to range from legal and institutional progress towards better ocean governance to efforts to exchange knowledge, transfer technology, build capacity and increase transparency. Initially private sector finance is more likely to be accessible for marine protected areas in national waters with existing, predictable regulatory regimes but work in the exclusive economic zones could be a pathway for broader engagement. Marine conservationists, working in partnership with philanthropy, civil society and public development finance institutions can work with finance professionals to identify, structure and design viable projects, co-opt new funding partners and structures and help to deliver ocean solutions.

Engaging with the finance sector, including the dynamic and rapidly growing digital economy, industry leaders and funders helps marine conservation to gain attention and support. Piloting new instruments and structures, supporting the development of open access data, applying modern technologies and means of communication can help to engage a broad base of stakeholders. This is crucial to scale up the necessary investment not only in exclusive economic zones but also in the High Seas to a level more commensurate with the challenge of ensuring that the largest ecosystems on our planet retain their full value to nature and humanity.

[6]http://www.un.org/depts/los/biodiversity/prepcom_files/Supplement.pdf

[7]http://www.un.org/depts/los/biodiversity/prepcom_files/Chair_non_paper.pdf

ACKNOWLEDGEMENTS

This paper also draws upon discussions held at the 2016 IUCN World Conservation Congress, September, Honolulu, Hawaii, USA. The authors acknowledge the contributions of the participants.

DISCLOSURE/CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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How to cite this article: Thiele T, Gerber LR. Innovative financing for the High Seas. *Aquatic Conserv: Mar Freshw Ecosyst*. 2017;27(S1):89–99. https://doi.org/10.1002/aqc.2794