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## Securing a just space for small-scale fisheries in the blue economy

### Abstract

The vast developmental opportunities offered by the world's coasts and oceans have attracted the attention of governments, private enterprises, philanthropic organizations, and international conservation organizations. High-profile dialogue and policy decisions on the future of the ocean are informed largely by economic and ecological research. Key insights from the social sciences raise concerns for food and nutrition security, livelihoods and social justice, but these have yet to gain traction with investors and the policy discourse on transforming ocean governance. The largest group of ocean-users - women and men who service, fish and trade from small-scale fisheries (SSF) - argue that they have been marginalized from the dialogue between international environmental and economic actors that is determining strategies for the future of the ocean. Blue Economy or Blue Growth initiatives see the ocean as the new economic frontier and imply an alignment with social objectives and SSF concerns. Deeper analysis reveals fundamental differences in ideologies, priorities and approaches. We argue that SSF are being subtly and overtly squeezed for geographic, political and economic space by larger scale economic and environmental conservation interests, jeopardizing the substantial benefits SSF provide through the livelihoods of millions of women and men, for the food security of around four billion consumers globally, and in the developing world, as a key source of micro-nutrients and protein for over a billion low-income consumers. Here, we bring insights from social science and SSF to explore how ocean governance might better account for social dimensions of fisheries.

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# Securing a Just Space for Small-Scale Fisheries in the Blue Economy

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The vast developmental opportunities offered by the world's coasts and oceans have attracted the attention of governments, private enterprises, philanthropic organizations, and international conservation organizations. High-profile dialogue and policy decisions on the future of the ocean are informed largely by economic and ecological research. Key insights from the social sciences raise concerns for food and nutrition security, livelihoods and social justice, but these have yet to gain traction with investors and the policy discourse on transforming ocean governance. The largest group of ocean-users – women and men who service, fish and trade from small-scale fisheries (SSF) – argue that they have been marginalized from the dialogue between international environmental and economic actors that is determining strategies for the future of the ocean. Blue Economy or Blue Growth initiatives see the ocean as the new economic frontier and imply an alignment with social objectives and SSF concerns. Deeper analysis reveals fundamental differences in ideologies, priorities and approaches. We argue that SSF are being subtly and overtly squeezed for geographic, political and economic space by larger scale economic and environmental conservation interests, jeopardizing the substantial benefits SSF provide through the livelihoods of millions of women and men, for the food security of around four billion consumers globally, and in the developing world, as a key source of micro-nutrients and protein for over a billion low-income consumers. Here, we bring insights from social science and SSF to explore how ocean governance might better account for social dimensions of fisheries.

**Keywords:** Blue Growth, conservation, economic, development, human-rights, ocean governance

## INTRODUCTION

The world's coasts and oceans offer vast opportunities to support economic development and are increasingly prominent in the discourse on global environmental futures (Lubchenco et al., 2016). A critical challenge for adapting ocean governance for the 21st century is to balance competing interests, to realize economic potential while avoiding irreversible environmental change. Simultaneously, ocean governance transformations must ensure that the human rights of those who depend on the sea for their livelihoods are respected, that benefits of growth are equitably distributed and that human well-being of coastal and marine-resource dependent people is maintained or enhanced (Leach et al., 2012). This is the “safe and just space” that defines the scope for sustainable development more broadly (Dearing et al., 2014). Small-scale fisheries (SSF) provide a powerful example of the way in which contemporary changes to ocean governance are balancing, reconciling and trading off multiple interests and objectives.

In developing countries oceans support 47 million women and men engaged in small-scale fishing and fish-trading (World Bank et al., 2012). However, SSF are increasingly squeezed by industrial fishing fleets and large-scale aquaculture servicing global seafood buyers, the establishment of no-fishing reserves for conservation, coastal development and industrialization of seascapes, and the pursuit of mineral wealth (Bavinck et al., 2017; Said et al., 2017; **Figure 1**). The economic promise of oceans has captured the attention of conservationists, business leaders, funders, governments, and multi-lateral organizations including the United Nations and the World Bank. This is illustrated by an uptick in global ocean-focused conferences that have previously framed conservation as the leading agenda, which now emphasize a focus on the “Blue Economy” (Bennett, 2018). The “Blue Economy” and “Blue Growth” agendas frame the ocean as the new economic frontier. For example, the now annual World Ocean Summit, hosted by *The Economist* (the most recent one took place in Abu Dhabi in March 2019) is attended by business leaders, big international conservation non-government organizations and economists who aim “to deepen engagement with the private sector and particularly private capital's involvement with the ocean” (Project AWARE, 2018) with a vision of “an ocean in robust health and a vital economy.” The Blue Economy aims to tap into the estimated USD 24 trillion in potential goods and services (i.e., energy generation, mining, tourism, maritime transport, aquaculture, and capture fisheries), derived from the world's oceans, and to balance industrialization of oceans with environmental protection (Hoegh-Guldberg et al., 2015; *The Economist*, 2015). Initiatives framed around the Blue Economy or Blue Growth purport that economies, societies and marine environments will all benefit; however, the logic for reaching these win:win:win outcomes through the strategies described has been contested (Silver et al., 2015; Barbesgaard, 2018; Brent Z.W. et al., 2018). It has been argued that these same strategies have not led to environmentally sustainable and equitable outcomes on land (e.g., Clark et al., 2018), so there is little reason to expect them to perform better at sea.

Oceans provide broad-based public goods; the governance strategies and management practices proposed in Blue Economy initiatives may lead to, or accentuate, inequitable capture of these goods to generate private wealth for a relative few (Béné et al., 2010). There are concerns expressed by small-scale fisher groups that the Blue Economy agenda undervalues social objectives, and in doing so threatens the basic imperative of providing both livelihoods and affordable, nutrient dense food for those who need it most (e.g., Pamalakaya-Pilipinas, 2015). To date, considerations of food security and human rights have not been front and center in high-level dialogue around the Blue Economy. Small-scale fishers have been notably underrepresented (e.g., World Ocean Summit held in 2017; Our Oceans Conference held in 2018) considering that SSF employ more women and men than all other ocean economic sectors combined (World Bank et al., 2012; OECD, 2016)<sup>1</sup>. This imbalance has raised considerable concern from small-scale fisher associations, other civil society groups, social scientists and development practitioners (Brent Z.W. et al., 2018). These actors have spear-headed strong resistance to ocean initiatives that were viewed as driving economic reforms (WFFP and WFF, 2013) and more recently those specifically aligned to the Blue Economy agenda (Pamalakaya-Pilipinas, 2015; Brent Z. et al., 2018; World Forum of Fisher Peoples, 2018).

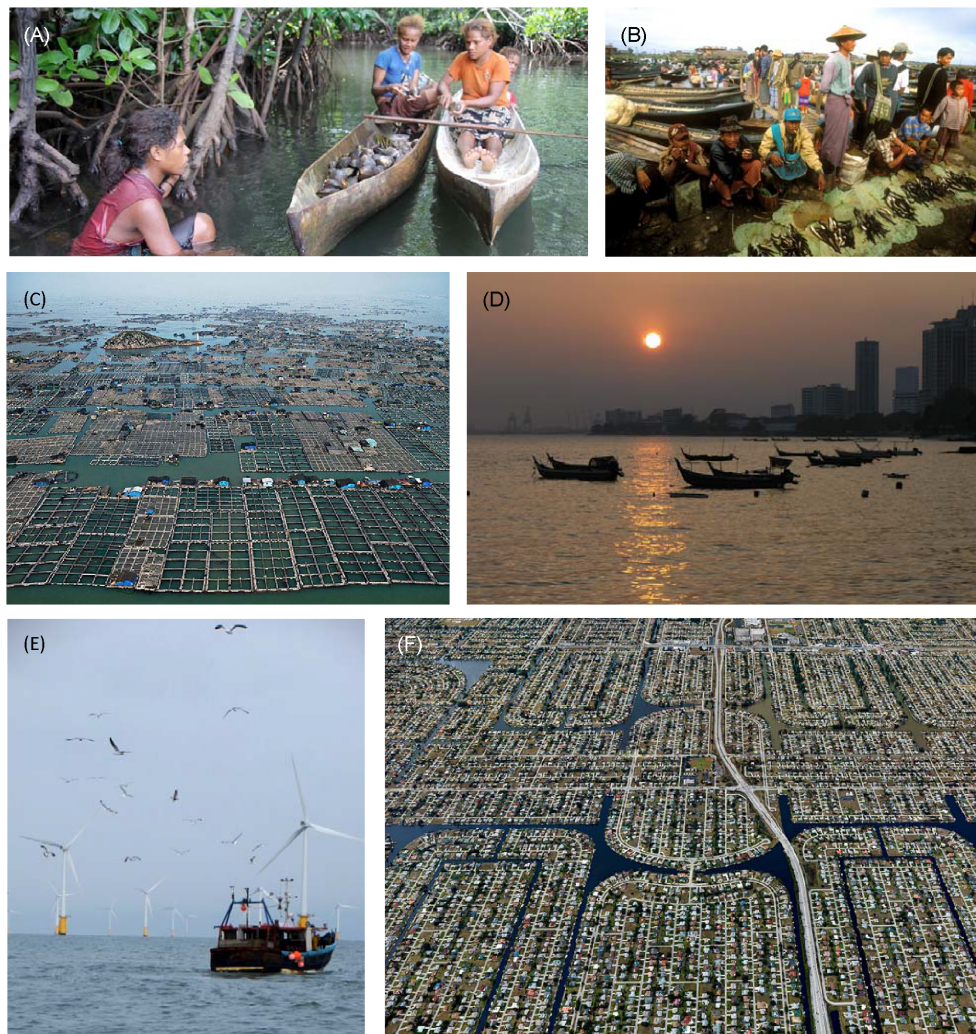
The Blue Economy and other initiatives frame transformation as necessary to “fix” an ocean that is in an environmentally degraded and economically underperforming state. Here, we offer three additional considerations for the Blue Economy, or other initiatives grounded in ‘environmental crisis’ and ‘untapped economic frontier’ narratives. Firstly, we explain why market-based trajectories of change put forward as part of the Blue Economy pose risks to the benefits that SSF provide to society. Second, we emphasize SSF as uniquely placed to produce and distribute food and income to those whose nutritional and financial needs are greatest. Finally, we call for more meaningful uptake of well-developed inclusive governance principles by engaging emergent governance platforms to ensure that the course navigated is one toward sustainable, equitable and just ocean futures.

## BLUE GROWTH TRADE-OFFS

As the use of ocean and coastal resources and space intensifies, and particularly as the idea of Blue Growth and the Blue Economy takes a prominent place in policy discourse, the need to identify and manage tradeoffs becomes increasingly urgent. Governance of the oceans is frequently represented as failing, and SSF are often portrayed as disparate, disorganized and dysfunctional (Cunningham et al., 2009), or as intensely exploitative and environmentally destructive (Vincent and Harris, 2014). Indeed, ocean governance propositions must account for the adverse social and ecological impacts that SSF can have (Johnson, 2006), and poverty and low human well-being that reside within some

<sup>1</sup>There are an estimated 60 million workers engaged in SSF (World Bank et al., 2012) while other sectors combined employ ca. 31 million (OECD, 2016).





**FIGURE 1 |** Small-scale fisheries, amidst contemporary pressures on coastal systems and ocean space. **(A)** In developing countries fish caught by SSF are an important source of protein and essential micro-nutrients – often in these contexts nutritional alternatives are limited. Men, and women, are active in SSF harvesting, post-harvest processing and marketing [Wade Fairley (copyright – used with permission), Malaita Province, Solomon Islands, 2012]. **(B)** Informal fisheries market chains contribute to livelihoods of hundreds of millions of people [Dominyk Lever (copyright – used with permission), Cambodia, 2004]. **(C)** Despite the growth of aquaculture, people in developing countries continue to rely on SSF, and will so for decades to come [Edward Burtynsky (copyright – used with permission), Luoyuan Bay, Fujian Province, China, 2012]. **(D)** In many regions SSF exist within increasingly contested ocean and coastal space [Jamie Oliver (copyright – used with permission), 2008, Penang, Malaysia]. **(E)** SSF can adapt to marine developments [Lorelei Stevens (copyright – used with permission), Commercial Fisheries News, River Thames, United Kingdom, 2013]. **(F)** but also can be squeezed out by expansive development or privatization [Edward Burtynsky (copyright – used with permission), Lee County, FL, United States, 2012].

SSF systems (Béné, 2006). To balance this perspective, small-scale fishers are also considered for their potential as resource stewards (Bennett et al., 2018) and as small-scale entrepreneurs whose aggregate activities have “multiplier” effects in local and regional economies (Bavinck, 2014). In this section we draw attention to the risks that emerge from either “crisis” or “new economic frontier” narratives, and the Blue Economy tactics proposed.

Currently, a dominant policy response to improve governance is marine spatial planning to delineate ocean space and allocate it among different sectors (Jones et al., 2016; Said et al., 2017; Bennett, 2018). Marine spatial planning defines spaces

for industrial development, for fishers, energy, land reclamation for development (Ding et al., 2014), and marine reserves that separate conservation from other uses (Ehler and Douvere, 2009). While marine spatial planning is a practical strategy to manage multiple uses, there are risks in how spatial allocation plays out politically (Kerr et al., 2015; Jones et al., 2016). These risks include marginalization of small-scale fishers from decision processes, and in the allocation of space for tourism and conservation, for example (Segi, 2014; Hill, 2017). Technical or evidence-based approaches are valuable to planning, yet can be misused in ways that, rather than highlighting tradeoffs and identifying winners and losers, promote the appearance of being benign and

apolitical (Li, 2007). Yet, research suggests that marine spatial planning, and the often embedded establishment of marine protected areas, are too frequently implemented through top-down processes underpinned by sectoral objectives, such as biological conservation and promotion of offshore energy (Jones et al., 2016; Flannery et al., 2018). Better use of the collaborative and integrative elements, and data on multiple dimensions of the trade-offs being negotiated, would enable marine spatial planning to be a useful part of a process to navigate toward both *inclusive* and *sustainable* development (Bennett, 2018).

On current trajectories, efforts to delineate ocean and coastal space hold strong parallels with other significant conversions of a public or community-held resource into private goods (such as those that took place through colonization) and risks a similar disenfranchisement of the maritime equivalent of peasant farmers (Araghi, 1995; Bernstein, 2010; Linebaugh, 2014). This trend is known among its critics as “ocean grabbing” or “coastal grabbing,” and attracts similar concerns for food and nutrition security as those expressed regarding contemporary large-scale land acquisitions (Franco et al., 2014; Bennett et al., 2015; Bavinck et al., 2017; Barbesgaard, 2018). Driven by economic interests relating to newer industrial developments such as aquaculture, mining and tourism, as well as conservation of the coasts (e.g., mangrove conservation for blue carbon), this trend contributes to the growing squeeze that small-scale fishers face (Cormier-Salem and Panfili, 2016; Said et al., 2017; Bavinck et al., 2018; Brent Z.W. et al., 2018).

To optimize wealth creation, spatial allocation is often packaged with market-based instruments (Anon, 2014; Holmes et al., 2014), including fostering links to global markets (Sampson et al., 2015), and institutionalizing licenses and taxes to maximize revenue (Hoegh-Guldberg et al., 2015). A convincing argument for some is that replacing or consolidating SSF into larger industrial operations will streamline management, improve productivity, and increase economic return (Cunningham et al., 2009). These are the fundamental building blocks of what are described as rights-based approaches that prefer transferable quotas or purchasable rights. In sum, these approaches are based on assumed economic incentives that come when community or individual rights of ownership or access to a fisheries resource or fishing ground have been clearly defined (Allison et al., 2012). The view that this is the best approach to manage fisheries is influential in ocean governance policy and dialogue (Barner et al., 2015; Barbesgaard, 2018).

A rights-based approach rolled out using individual transferable quotas fundamentally differs in its underpinnings and implementation from a *human-rights* approach; the latter being advocated by small-scale fishers and their supporters (Allison et al., 2012; World Forum of Fisher Peoples et al., 2016) and which stresses alignment to a broader human-rights based approach to international development, adopted by many international development agencies since the late 1990s (Ratner et al., 2014). For those with an eye on human rights and well-being, the implementation of (fishing) rights-based strategies designed strongly toward an economic rationale raise serious concerns that fisheries benefits will largely be captured and controlled by a relatively few powerful entities (Béné et al., 2010;

Cardwell, 2015; Høst, 2015). An additional challenge is that the economic rationale and objectives of powerful actors and well-resourced (economic or environmental, for example) initiatives may not be as transparent as they need to be. Deeper analysis of the different ways in which the terms “Blue Economy” or “rights” are invoked illustrate that fundamental divides remain in ocean governance objectives and the proposed mechanisms through which they will be realized – even where discourses appears, on the surface, to align (Silver et al., 2015; World Forum of Fisher Peoples et al., 2016; Voyer et al., 2018).

Global markets undeniably present opportunities for SSF but pose similar risks as privatization. In servicing global markets, intermediaries who control distribution may capture increasing benefits at the expense of fishers (Purcell et al., 2017), at the same time making fish less accessible to the poor. Breaking the connection between consumers and their local food system introduces new vulnerabilities generated by volatilities in global food markets and distribution channels. There is also strong evidence that gains generated in distant markets, and the income from large scale enterprises and centralized revenue collection rarely trickle down to benefit local producers and those most in need (Wilson and Boncoeur, 2008; Béné et al., 2010; Béné et al., 2016). The governments and funders backing the Blue Economy must weigh fisheries governance models driven by narrow economic rationale, as well as non-fisheries developments, against the risks they bring to local food, nutrition and livelihood systems, and the control that local women and men have within those systems.

## BENEFITS OF SMALL-SCALE FISHERIES

Fish are a source of essential micro-nutrients for more than four billion consumers and provide more than one sixth of the global demand for animal protein (Béné et al., 2015). Growing populations and greater prosperity escalate demands for fish globally (Béné et al., 2015). The Blue Economy is concerned with increasing food production from the sea, but there is little evidence of the consideration given to whether this production will benefit those with the most pressing food and nutritional needs.

Aquaculture is the fastest growing food sector globally and the potential to achieve large increases in production sit well with the Blue Economy agenda (European Commission, 2012). Yet, aquaculture developments can compete for geographic space, fisheries resources, and impact environmentally upon fishing grounds of SSF. The potential for aquaculture to generate income, produce food, and even conserve species and habitats is lauded without explicit recognition of these interactions and tradeoffs (e.g., Froehlich et al., 2017). There are concerns that growth in aquaculture responds to market demand for particular types of fish from those most able to pay, or that farmed fish do not meet, or reach, the nutritional needs of the most nutritionally vulnerable children, women and men (Golden et al., 2016; Bogard et al., 2017). However, where aquaculture does lead to greater supplies of fish in domestic markets of developing nations, to realize optimal social benefits, aquaculture



can indeed *complement* rather than replace fish supplied by SSF (Toufique and Belton, 2014; Belton et al., 2016).

Despite aquaculture expansion in some regions, capture fisheries still produce about half the world's fish, much of which is consumed locally or by those who catch it. Some 97% of the world's fishers live in developing countries, of which 90% are engaged in the small-scale sector (World Bank et al., 2012). Increases in supply from aquaculture and well-managed industrial fishing will help meet increasing global demand, particularly from relatively affluent consumers or where assumptions about redistribution can be met. Yet, poor and marginalized women and men around the world will continue to rely on SSF for food and livelihoods for decades to come – particularly those living in sub Saharan Africa, the mega-deltas of Asia and the small island states of the Pacific (Golden et al., 2017).

Many SSF operate in regions where infrastructure is limited, government accountability and regulations are weak, and in some cases, where conflict disrupts formal trade and food security. A strength of SSF lies in their ability to persist in many of these contexts and continue to generate and distribute food and income where formal markets and global supply chains function poorly. For example, the relatively isolated and rural populations of the Pacific small island developing states exhibit high rates of participation in SSF which provide a foundation of local economies, a principle animal-source protein in diets (Gillett, 2016) and provide a key coping strategy in the face of shocks (Eriksson et al., 2017). Although some SSF may be considered economically dysfunctional and ecologically unsustainable (Cunningham et al., 2009; Vincent and Harris, 2014), the sector continues to generate income and serve the nutritional needs for millions of families worldwide. In some instances, SSF provide routes out of poverty for both men and women, and act as engines of growth at local and national levels (Bavinck, 2014). Furthermore, SSF also have broader non-monetary values, and play an important role in maintaining the identity, culture and the wellbeing of coastal communities (Jentoft and Eide, 2011; Weeratuunge et al., 2014).

Resilient SSF have adapted and modernized, and in many instances are both sophisticated and highly efficient – although not always moving in the direction of improved ecological sustainability. Despite some SSF having long histories and cultural connections, SSF are not necessarily antiquated or outmoded, and cannot be dismissed simplistically as historical relicts of a bygone age. Small-scale fishers in poor countries have been early adopters of technologies such as mobile phones, e-money and global positioning systems (Jensen, 2007), and have responded to demands from new markets, such as the emergence of live reef fish exports from the Philippines to China (Fabinyi et al., 2014). SSF contribute to diversified livelihood systems that enable coastal people to benefit from fluctuating fisheries (e.g., Allison and Ellis, 2001; Cinner and Bodin, 2010), while simultaneously benefitting from opportunities in agriculture, tourism and the urban economies of rapidly changing coastlines (Betcherman and Marschke, 2016; Lowe and Tejada, 2019).

The dynamic nature of SSF has seen them persist despite ever-increasing and diverse pressures. As with every industry that draws on ecosystem services, SSF will need to continue a

trajectory of change to sustain ecological, economic and social outcomes. Where seascapes are rapidly transforming, SSF must also adapt to coexist with potentially competing sectors such as tourism, conservation, offshore energy and industrial fishing. Yet, despite their adaptability, there is a limit to how far SSF can be squeezed without substantial loss of the benefits they provide. A physical, economic and political operating space for SSF must be maintained if they are to continue to deliver nutritious food to those in need, to efficiently distribute economic benefits widely, and remain adaptive and flexible.

We do not know if replacing the food and employment provided by SSF would cost more than the potential economic gains that arise from governance reforms to maximize efficiency. Calculations of the aggregate gains that could be made by optimizing global fisheries toward their maximum economic yield (Srinivasan et al., 2010; Costello et al., 2016) are optimistic, in that they rely heavily on the assumption that gains made will trickle down and will be equitably distributed in such a way that, for example, brings benefit to the poor and malnourished. Further, the cost and delayed rewards of such reform may be beyond the capacity of many poor countries (Béné et al., 2010) and may meet with strong political resistance which would increase social and economic costs.

## OCEAN FUTURES

Sustainable development policy in the anthropocene must navigate the space between the environmental ceiling or “planetary boundaries” (Steffen et al., 2015) and a “social foundation” (Raworth, 2012). To date oceans and coasts have not been well accounted for in the calculation or conceptualization of planetary boundaries; yet data and approaches to integrate marine systems have been laid out (Nash et al., 2017). Governing within planetary boundaries that account for marine systems will require collaborative approaches that may be guided by quantitative and participatory foresight models and scenario development, within which tradeoffs between different objectives and amongst different sets of actors can be explicitly examined and negotiated (Nash et al., 2017). Lack of data exacerbates the low visibility of SSF in ocean policy. The on-going Illuminating Hidden Harvest initiative (WorldFish et al., 2018) will provide the data required to ensure global reviews and foresight studies properly include SSF. With awareness of power differentials between actors and relative priority given to different objectives, addressing this global environmental governance challenge provides an opportunity to more closely examine transformative ocean governance initiatives, such as those within the Blue Economy.

In efforts to ensure that the rights, interests and voices of SSF are respected in this challenge, the Food and Agriculture Organization facilitated the production of the *Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication* (FAO, 2015), incorporating the input of some 4000 fisher, government and community representatives. In 2014 the “SSF Guidelines” were formally adopted by 143 member states. These guidelines propose

principles that are sensitive to food security, and human rights, and that promote empowerment and inclusive decision-making. This is a substantial step forward in ensuring SSF perspectives are addressed and it is encouraging to see the guidelines being referred to not only by fisherfolk organizations, but by conservation non-government organizations and governments (Jentoft et al., 2017; Singleton et al., 2017).

The development and mainstreaming of the SSF Guidelines are a major achievement for SSF – representing their economic, social and ecological objectives. These principles provide timely guidance for governments, international institutions, civil society and industry dialogue around the future of the Blue Economy. A just operating space for SSF within the Blue Economy, in accordance with these guidelines, will help ensure that the production and distribution of nutritious, affordable food from the sea – a public good – is not traded off against the pursuit of exclusive conservation or more concentrated wealth. The challenge now is for states and civil society organizations to lead fisheries governance increasingly toward implementation of these principles (Jentoft, 2014). The implementation challenge will be greater where ocean space and resources represent interests for powerful corporate and state actors external to the fisheries and conservation sectors. A recent global meeting of SSF, their supporters and the research community (Too Big To Ignore, 2018) reported progress on the implementation included the preparation of national plans of action, philanthropic and development investment, growing capacity of civil society organizations, and the emergence of new SSF stakeholder platforms (e.g., newly formed fisher civil society platforms in Africa). These initiatives signal a growing social movement amongst a diverse and numerous set of actors, but also demonstrate that there are organized and legitimate representative bodies with which the proponents of the Blue Economy agenda can hold dialogue to bring better alignment with a social justice agenda.

Small-scale fisheries are diverse, dynamic, and complex. Governance scenarios for ocean futures must accommodate this diversity without overly simplified or “blue print” approaches. The future of the ocean will likely include some forms of rights-based approaches, and where these are embedded within a human-rights approach, alignment with the SSF Guidelines is possible (Song and Soliman, 2019). Ocean governance will however, require an expanded set of management approaches (e.g., adaptive co-management), decision supporting tools (e.g., foresight, scenario and trade-offs), engagement strategies (e.g., multi-stakeholder platforms and governance networks) and accountability and monitoring mechanisms. A safe and just space will rely on there being a good fit between the nature of fishery systems and the institutions that govern (Folke et al., 2007). A range of examples demonstrate that inclusive and interactive governance can successfully manage the tensions between national and regional economic growth, local livelihood resilience, and food and nutritional security for those most in need (Jentoft and Chuenpagdee, 2015). There are examples emerging of where SSF have sustained ecological resources even under relatively high pressure, for example, in coastal areas where local governance institutions persist and are suggested to

contribute to sustained ecosystems (Cinner et al., 2016). Whilst the social, ecological or economic achievements of such examples must still be subject to ongoing critical evaluation, they illustrate some successful pathways to negotiate among societal actors at multiple scales. Research can continue to contribute by offering an enquiry that is sensitive to equity and power, and by making explicit successes, and trade-offs, in changes to ocean governance.

## CONCLUSION

Contemporary ocean governance reforms commonly recognize the potential for economic wealth alongside the risks of ecological sustainability. We argue that it must also account for the potential social impacts that a focused drive toward economic wealth will have. Avoiding these social impacts, and retaining the benefits SSF provide to society, requires improved representation of SSF in international, national and multi-stakeholder policy and investment arenas – this has been a substantial challenge given the sector's dispersed, diverse and dynamic nature. The more recent formations of regional and sub-regional SSF platforms (that engage with and/or nest within existing global groups) now make this a surmountable challenge. More inclusive dialogue may uncover the nature and extent of concerns over the current array of economic reforms and bring forward a broader suite of ocean and fishery governance solutions, including those that maintain traditional systems of communal or common property resource management. Determining and implementing the suite of approaches that consider social objectives alongside wealth generation and conservation, and that are adaptable to the diverse contexts in which SSF operate, will benefit from scrutiny of scenarios through participatory processes. If the Blue Economy is to be a legitimate vision for governing the oceans, then alongside industry and conservationists, the voices, interests and human rights of the largest groups of ocean-users – women and men who service, fish and trade from SSF – must be represented and recognized from the outset of the solution design. These are primary rights holders to whom ocean governance must be accountable.

## AUTHOR CONTRIBUTIONS

PC, EA, NA, JC, LE, MF, LG, SH, CH, TH, SJ, DM, RM, EM, and BR conceived, wrote, and edited the manuscript.

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