

Small-scale fisheries and local food systems: Transformations, threats and opportunities

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Abstract

Fish from marine and inland capture fisheries is an important food that contributes significantly to diets and health, but their contribution is somewhat overlooked in food security and poverty-related policies. Given the current numbers of malnourished people globally, there is a pressing need to consider how to better realize the potential of fish in food systems that can address malnourishment. To do so, we re-examine the fisheries literature from the perspective of food systems. Starting with nutritional needs and considering how these may be met through local food systems reveals an ongoing transformation that has implications for small-scale fisheries, as increasingly become part of globalized food systems. We describe the factors that can change the nature of production, mediate access to fish and the distribution of benefits that can lead to impoverishment. This emphasizes the governance challenges that lie at the heart of complex, contested and increasingly globalized food systems, in which actors interact to shape the systems, determining who benefits and how. We draw attention to critical issues of access, power and the values and norms that underpin efforts to manage and transform fisheries, exposing the unequal struggle to secure access that small-scale fishers and poor people must endure. We suggest a vital challenge for fisheries management is to engage with this struggle and develop policies and management measures that would enable fisheries to make positive contributions to food systems and nutritional security, while meeting global sustainable development objectives.

KEYWORDS

fish, food security, food sovereignty, nutrition, policy, sustainable development

1 | INTRODUCTION

Fish from marine and inland capture fisheries are amongst the most eaten foods and traded commodities in the world and therefore contribute significantly to supporting livelihoods, food security and

health (Béné et al., 2016; Kawarazuka & Béné, 2010; Loring et al., 2019). According to FAO (2020), 120 million people are dependent on fisheries for their livelihoods, almost 97 per cent of those people are in developing countries and more than 90 per cent participate in small-scale fisheries (FAO, 2020; Loring et al., 2019). Most

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of the fish being consumed in the world is wild-caught fish either from marine or inland fisheries (Belton & Thilsted, 2014). More than half the world's fish catch is being produced by small-scale fisheries, with 90–95 per cent of the small-scale catch being consumed locally (FAO, 2020).

Although no single definition of small-scale and large-scale fishing exists, they are often differentiated by the nature of the vessel, the gear types or the distance that they fish from shore (Davies et al., 2018; Gibson & Sumaila, 2017; Smith & Basurto, 2019). Typically, small-scale marine fishing fleets include indigenous, artisanal, subsistence, and small-scale commercial and non-commercial fisheries that consist of small vessels using fixed fishing gears that are usually limited to the inshore areas close to their home ports (Gibson & Sumaila, 2017). Small-scale fishing fleets also differ from their industrial counterparts in that the latter are often supported by significant subsidies (Schuhbauer et al., 2020). As such, fish, and particularly fish from wild capture small-scale fisheries, represent crucial sources of food for developing countries (Srinivasan et al., 2010). Indeed, most countries that are dependent on fish for human nutrition are in the Global South (Golden et al., 2016).

Across African countries, fish provide between 32 per cent and up to 70 per cent of animal protein consumed (Heck et al., 2007). In the Pacific Island countries and territories and the Mekong River Basin, this increases to between 50 and 90 per cent, and 49 and 82 per cent, respectively (Ainsworth et al., 2021; Bell et al., 2015). In addition to protein, fish provides many vitamins, minerals and micronutrients such as calcium, iron, zinc and vitamin A (Hicks et al., 2019; Kawarazuka & Béné, 2010). However, the benefits that local fish consumption may provide are not always realized. For example, Hicks et al., (2019) show that in countries where nutrient intakes are inadequate, the nutrients available from the country's marine capture fisheries exceed the dietary requirements for coastal populations. Similarly, Peruvian anchoveta (*Engraulis ringens*, Engraulidae) represents one of the world's largest fisheries in terms of volume of catch, yet many local coastal communities simultaneously suffer malnutrition and hunger (Fréon et al., 2014).

While fish and fisheries contribute significantly to the world's food and nutritional security, issues of access to this security clearly exist (Arthur, 2020; Bennett, Basurto, et al., 2021; Bennett, Ban, et al., 2021; Scholtens, 2016). The importance of addressing food security is clear. Prior to the COVID-19 pandemic, almost 690 million people, or 8.9 per cent of the global population, were undernourished and two billion people, more than a quarter of the global population, experienced hunger or did not have regular access to nutritious food (FAO, 2020). The world is not on track to achieve the poverty reduction and nutrition targets set in the United Nation's Sustainable Development Goals, and climate change will exacerbate this situation, creating widespread negative impacts on food security by reducing the availability, stability and utilization of food (e.g. Schmidhuber & Tubiello, 2007; Sumaila, Ebrahim, et al., 2019; Sumaila, Tai, et al., 2019). As such, food security, nutrition and food as a fundamental aspect of poverty remain central to global development agendas and poverty reduction strategies.

Table of contents

1.	INTRODUCTION	2
2.	A FOOD SYSTEMS PERSPECTIVE ON SMALL-SCALE FISHERIES	3
2.1.	Small-scale fisheries and local food systems	3
2.2.	The ability to benefit from local food systems	4
2.3.	Culturally relevant products, processing and provisioning	4
2.4.	Challenges within small-scale fisheries and local food systems	5
3.	THE TRANSFORMATION OF FOOD SYSTEMS AND FISHERIES	5
3.1.	Modernization and globalization: a threat to small-scale marine capture fisheries	6
3.2.	Inland fisheries and the rise of freshwater aquaculture	7
4.	DISCUSSION	9
4.1.	The marginalization of small-scale fisheries in food systems policies	9
4.2.	The struggle for recognition and equality	10
4.3.	Policy pathways and indicators	10
5.	CONCLUSION	11
	ACKNOWLEDGEMENTS	11
	DATA AVAILABILITY STATEMENT	11
	REFERENCES	11

That fish is one of the most traded food commodities emphasizes how fish and fisheries are increasingly becoming part of globalized food systems, and how fish become ingredients to other forms of food production. Globalized processes of trade and processing have shaped patterns of production and affect who ultimately consumes fish and in what form. Small-scale fisheries contribute significantly to total fish and food production and the well-being of tens of millions of people working throughout the fish value chain (Teh & Sumaila, 2013). Our interest therefore is in how small-scale fisheries and associated local food systems are being transformed by this process of globalization and the implications these transformations might have for sustainability and equity dimensions of fisheries management and policy. As such, we are responding to calls made by Béné (2003) and Jentoft (2020) to look beyond fish production and towards “life above water,” and to the social relations and processes of change that can affect poverty and vulnerability. In particular, the focus is on the potential of small-scale fisheries to contribute to efforts to reduce poverty and hunger.

Examining these issues requires us to consider the complex and often contested nature of food systems, and for us to draw on political economy analyses that address issues of equity and power, in how such systems are shaped and benefits distributed. Adopting a food systems perspective that explicitly recognizes the

interrelated activities of producing, provisioning and consuming fish, we describe the critical role that small-scale marine and inland capture fisheries can play and their contributions to local food systems, drawing attention to how their absence might undermine such systems. We explain how the ongoing transformation of fisheries through market-based change, fisheries management priorities and the development of alternatives to foods from capture fisheries represent threats to traditional food systems associated with small-scale fisheries. We also offer insights and considerations for fisheries governance and management that consider the ways in which transformation may affect the ability of different groups to benefit (or not) from fish. Finally, we call for greater scrutiny of fisheries policies and development priorities in relation to food security and nutrition in order to deliver a just future for small-scale fisheries and the people that depend upon them for food, nutrition and livelihoods.

2 | A FOOD SYSTEMS PERSPECTIVE ON SMALL-SCALE FISHERIES

Reflecting recent work on food science and policy that have broadened the focus from narrow considerations of production (Ericksen, 2008; HLPE, 2017; Ingram, 2011), we examine the contributions of fisheries to food security and nutrition from a food systems perspective (e.g. Farmery et al., 2020; Hicks et al., 2019; Tezzo et al., 2020). Food systems encompass the entire range of actors and their interconnected activities related to the production, processing, distribution and consumption of food products together with the broader economic, societal and natural environments in which they are embedded (e.g. Ingram, 2011). Importantly, food systems also link the activities associated with the food systems with outcomes related to food security, including access, utilization and availability of food as well as wider social and environmental outcomes that can have feedback to the food system (Figure 1). This perspective draws attention to the wider social and political processes that shape and transform food systems and the subsequent impacts they have

upon the people dependent upon them (McCay, 1978). The food systems approach therefore provides a framework that can be used to examine the nature of the relationships between production and consumption in small-scale fisheries, while also considering how environmental, social and economic dimensions influence health and nutrition outcomes (Béné et al., 2019; Friend et al., 2019). In doing so it potentially also allows for the identification of policy interventions at multiple entry points, rather than simply focusing on fisheries policy (production) or food policy (consumption) in isolation (Doherty et al., 2019; Fanzo et al., 2020).

2.1 | Small-scale fisheries and local food systems

Small-scale fisheries have often traditionally been components of “local food systems,” in that the benefits of the fishery, both in terms of finances and food, often remain local and the consumer and the producer are closely connected (Olson et al., 2014). The ability to benefit from fish on an individual basis, however, is often related to people’s position within these food systems and to the degree of control they have over them. Small-scale fishers will often fish or glean locally, share and exchange fish informally and/or use local markets. Fishing activities have been developed and adapted based on local knowledge to reflect local realities, including aspects such as location, seasonality, edible parts, methods of collection, preparation and preservation. Within certain environments, fishing can be an almost universal activity. For example, Garaway et al., (2013) found that in Lao PDR, more than 90 per cent of aquatic animals consumed were collected by households themselves. These informal mechanisms and low barriers to entry can enhance access by, and availability to, poorer people, enabling them to produce their own food.

Fish obtained by a household’s own fishing efforts can play a critical role, making the difference between food security and food shortages, and between sufficient or lacking nutrition (Béné & Heck, 2005). This includes fishing and gleaning by women that is often overlooked in national statistics and policies (e.g. Harper et al., 2013;

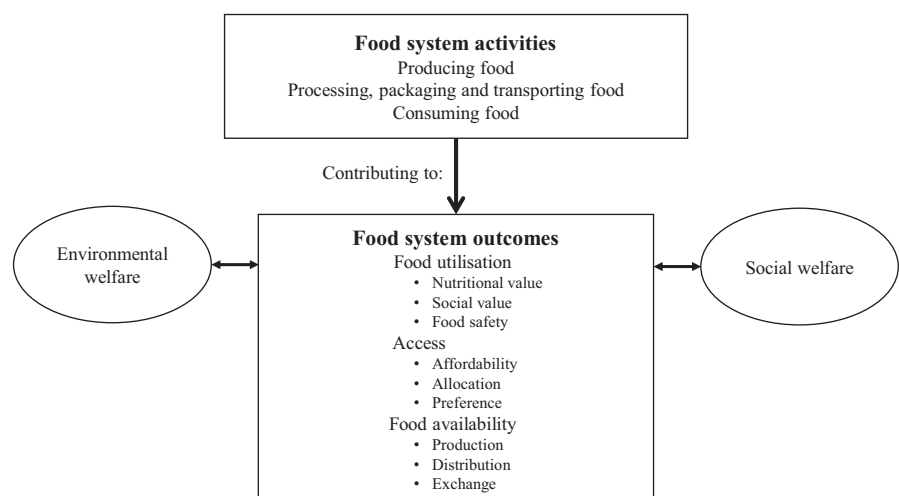


FIGURE 1 Food system activities and outcomes (adapted from Ingram, 2011)

Tilley et al., 2020). Many activities related to small-scale fisheries, including fishing, gear manufacture and processing, are not full-time occupations and people who fish may belong to households with diversified and stretched livelihoods (e.g. Winkels, 2011).

Small-scale fisheries are also often able to react to the availability of particular fish, often due to the seasonality of abundance of certain species. This is an important aspect of small-scale fisheries that they can adjust their fishing approaches and target fish based on seasonality, local abundance and local demands, employing a wide range of fishing gears (e.g. Finkbeiner, 2015; Teh et al., 2012). This degree of flexibility requires a high degree of local ecological and environmental knowledge, but also requires a certain degree of freedom in terms of the fishers access to different resources, in different areas and during different times in order to benefit (Arthur, 2020).

2.2 | The ability to benefit from local food systems

The ability to benefit directly or indirectly from the food systems reflects theories of access in natural resource systems (e.g. Leach et al., 1999; Ribot, 1998; Ribot & Peluso, 2003; Sen, 1983). There are a range of factors that can mediate how food systems activities contribute to outcomes, including social (e.g. exclusion by gender or caste), material or financial (e.g. having the necessary fishing gear or financial loans), or relate to the formal and informal management and governance of the fishery. This definition of access reflects the point made by (Béné, 2003) and theoretical approaches grounded in Sen's (1981) concepts of capabilities and entitlements that being able to catch fish is not sufficient to ensure the contribution of fish to food security. This is particularly relevant when considering outcomes of management rules and norms for poor or marginalized people. The history of food shortages illustrates that people's command over food is frequently the critical issues governing nutrition outcomes (e.g. Sen, 1981), rather than the overall availability of food *per se*. For example, a study of the relationship between food security and access to locally caught seafood in communities in Alaska showed that food security increased with increased participation, especially for those households at the lowest income levels (Loring et al., 2013).

Ensuring access and availability, according to some notion of equity, is often the cornerstone of local management regimes. Reflecting this, local regulation of fisheries is often designed to ensure that people can benefit from fisheries, either directly or through collective welfare systems (e.g. Garaway, 2005). Informal reciprocal exchange and social networks, although they may not be considered informal by those involved in them, can also play important roles enabling those who are themselves unable to fish to also benefit (Arthur et al., 2016; Phimpraphai et al., 2018). At times, fish and fishing can become critical, providing important safety nets that can prevent a descent into poverty (Ngwenya & Mosepele, 2007). Employment in small-scale fisheries and associated activities may provide benefits beyond food. Small-scale fisheries provide employment for an estimated 108 million people, representing 90 per

cent of all fisheries employment (Loring et al., 2019). Fish processing and trading can also provide employment and income in rural areas where there may be few other opportunities (Temesgen et al., 2019).

By enabling participation in fish production activities, traditional fishing management regimes have often been developed that allow needs to be met, and minimizing conflict. Examples include rotational arrangements such as the *padu* in South Asia (Lobe & Berkes, 2004) and the *regime de canoas casadas* (paired canoe regime) in Latin America (Begossi, 2002), and allowing subsistence fishing in otherwise restricted fisheries (Kikiloi et al., 2017; O'Leary et al., 2018). Traditional processing methods and certain restrictions on consumption also help increase equity and contribute to food safety (e.g. the steps for creating fermented fish sauce in Phu Quoc, Vietnam) and consumption regulated through food taboos (Chakona & Shackleton, 2019; Cinner, 2007; Gibson et al., 2020; Henrich & Henrich, 2010). Activities and institutions associated with small-scale fisheries and the local food systems they contribute to are thus often embedded and developed within local environmental and socioeconomic contexts. These local food systems have also been identified as resilient to some external socio-ecological shocks (Cohen et al., 2019; De Schutter, 2014).

2.3 | Culturally relevant products, processing and provisioning

Fisheries in food systems are not just about fish production, but the processing, distribution and consumption activities are also important. Fish can be altered and distributed through provisioning and processing activities. Traditional methods include salting, drying, fermenting and smoking (Adams et al., 1991), and estimated 70–80 per cent of the domestic marine and freshwater catches in sub-Saharan African countries are consumed smoked (Adeyeye & Oyewole, 2016). These methods frequently reflect the local technical, social and economic conditions, and crucially can represent relatively low-cost approaches over which people have control. It has been suggested that 90–95 per cent of the catches from small-scale fisheries are traded and consumed locally (FAO, 2020). These activities increase access and availability for rural populations and low-income groups in urban areas, and particularly people with limited assets or cash flow (Béné et al., 2010; Béné et al., 2010; FAO, 2020). Post-harvest activities also have an important gender dimension, with women often employed in fish selling and processing (Weeratunge et al., 2013). Some forms of processing, such as fermenting, may also increase the nutritional value of the food, for example through enhanced probiotic effects (e.g. Molinos et al., 2016).

Processing can also increase temporal availability by increasing the shelf life of perishable products and permitting storage during lean periods. This can be essential when these lean periods cause transient food shortages and inadequate diets (Arthur et al., 2016; Bennett, Basurto, et al., 2021; Bennett, Ban, et al., 2021; Kawarazuka & Béné, 2010). This was underlined by (Meusch et al., 2003) who identified fisheries as providing important coping

strategies for regular annual agricultural crop production failures but that no coping strategies existed for aquatic resource production failures. Converting fish into ingredients or condiments means it can be bought in small quantities, an important consideration for people with limited purchasing power. Additionally, added to meals, these types of products can effectively diversify and enhance diets. Small fish can also be particularly important. Small and juvenile fish may be caught in small waterbodies, close to shore and in shallow waters they are often accessible for a wider range of people who might not have access to boats or necessary fishing gear to fish larger fish further out from shore. They are also typically sold in small and divisible portions for relatively low prices, increasing access and availability and can be particularly important for nutrition as they are often eaten whole (Bogard et al., 2015; Hossain et al., 2013; Thilsted et al., 2016). Ground-dried small fish also provide a dense source of nutrients, particularly valuable for young children who have limited stomach capacity and eat small meals (Bogard et al., 2015). Critically, the nutritional benefit of consuming even small amounts can be significant (e.g. LeGrand et al., 2020). Again, these benefits depend on these poorer people having control over these elements of local food systems.

While local markets are frequently associated with small-scale fisheries (Kent, 1997), fish can also be part of important regional trade networks. Dried and smoked fish, small fish and fish sauces, are all important commodities in regional food trade networks (e.g. Ayilu et al., 2016). Furthermore, fish may often be the cheapest type of animal protein available (e.g. Ahmad et al., 2016; Obiero et al., 2019). This enables small-scale fisheries to contribute to the food strategies of households far from where the fish was caught. Fish sales represent an important income source, including for those with few alternatives (LeGrand et al., 2020; Samanta et al., 2016), that can be used to purchase other food commodities, including lower-cost staple foods (e.g. Béné et al., 2007; Heck et al., 2007; Roeger et al., 2016; Teh & Pauly, 2018). In contrast with agriculture, fishing often offers the possibility to generate revenues on an almost daily basis helping reduce seasonal vulnerability overall and providing income and food during lean periods (e.g. Kawarazuka & Béné, 2010).

2.4 | Challenges within small-scale fisheries and local food systems

Local food systems reflect local contexts, including environment, culture, needs and opportunities, and are based on extensive local knowledge. There is a large and growing literature that highlights the social, economic and environmental benefits associated with local food systems (Blouin et al., 2009; Connor & Levine, 2008; Nelson & Stroink, 2012). However, small-scale fisheries and local food systems are not without their challenges. There may be barriers that affect how much fish is consumed, the type of fish consumed, when and by whom. Even where an individual has the right and is able to fish, their economic circumstances, societal norms (e.g. related to caste or gender) and customs (e.g. food taboos) may prevent them from

being able to consume fish (Chakona & Shackleton, 2019; Cinner, 2007; Gibson et al., 2020; Henrich & Henrich, 2010). As such, people may not always have the power to determine what is done with the fish that is harvested or purchased.

For poorer households, selling fish can involve purchasing foods of lower nutritional value that could prevent them from obtaining the benefits of eating the fish, or what has been described as “food security at the detriment of nutritional security” (Béné, 2003). There are also important health risks associated with small-scale fisheries food system activities. Producing fish can be a dangerous occupation, with a daily threat of injury or loss of life (Perez-Labajos et al., 2009; Zytoon, 2012, 2013). Due to the nature of the work, fishers and processors can be vulnerable to waterborne and communicable diseases, including high incidence of HIV and AIDS (e.g. Allison & Seeley, 2004). Further risks are associated with exposure to smoke or harmful chemical and biological agents used in the processing and storing of food (Fanzo et al., 2021). Finally, consumption is not always safe. Contamination, such as bio-accumulated metals, insecticides or sulphites, introduced during the production and processing (Ariño et al., 2013) and naturally occurring pests and parasites such as nematodes, ciguatera and liver flukes may negatively impact health when consumed. These risks are often enhanced for small-scale fisheries, when informal and part-time activities may be overlooked by healthcare services and the producers and consumers are frequently outside the reach of safety regulations, insurance and health services (Ben-Yami, 2000).

3 | THE TRANSFORMATION OF FOOD SYSTEMS AND FISHERIES

The challenges associated with local food systems, and concerns about malnutrition and the environmental impacts of small-scale fisheries (e.g. Vincent & Harris, 2014) have contributed to calls to transform food systems and the role of fisheries. For example, in his address to FAO Committee on Fisheries (COFI), the Director-General invited FAO Members to discuss how the production, processing, trade and consumption of aquatic foods can be transformed as part of a broader agri-food systems transformation, making them more sustainable, resilient and inclusive. However, the reality is that many fisheries and the local food systems of which they are a part are already being transformed, becoming more globalized because of commodification and trade and through increased fish production from aquaculture. Local provisioning and consumption are being affected by the movement of fish products around the world and provision for different sets of consumers (e.g. Béné, Lawton, et al., 2010), such that social, cultural and context-specific considerations are often left out altogether (Olson et al., 2014).

Despite growing recognition that these systems are being changed, there is less consideration of how and in whose interests these food systems are being shaped. While these emerging more globalized clearly generate benefits for some, our concern is that the ongoing transformations of local food systems in which fish

plays an important part are frequently associated with a reduction in access for small-scale fishers, processors and traders, and control over the elements of food systems is diminished. Thus, changes in the availability of fish may alter dependency on other foods and food systems. As Hicks et al., (2019) point out, even where fisheries are providing increased yields it does not necessarily translate into greater food and nutrition security for local people and they may become increasingly marginalized as fisheries are incorporated into globalized food systems. As such, transformations of fisheries and local food systems may create conflict or enable powerful and better organized actors to further their own interests at the expense of poorer or more vulnerable people (Crona et al., 2015). In this section, we illustrate how global food system transformations threaten marine and inland small-scale capture fisheries.

3.1 | Modernization and globalization: A threat to small-scale marine capture fisheries

State economic policy has generally regarded the value of fisheries in terms of potential for economic development. Arguments about the potential for economic development and the problem of rent dissipation and inefficiency in small-scale fisheries (Cunningham et al., 2009) have been used to promote policies of modernization through economic development and the commercialization and commodification of the fishery (Carothers & Chambers, 2012; Pinkerton & Davis, 2015; Wright, 2001). Recent studies have indicated that globally the potential benefits of pursuing economic objectives could be in the order of US\$ 53 billion to US\$ 83 billion per year globally in comparison with the status quo (Kelleher et al., 2009; Costello et al., 2016). However, such policies often create opportunities for, and indeed promote, larger, more industrialized and often subsidized forms of fishing, including foreign access fishing agreements, and negatively impact small-scale fisheries and those dependent upon them (Jacquet & Pauly, 2008; Kaczynski & Fluharty, 2002; Le Manach et al., 2013; Schuhbauer et al., 2020; Sumaila, Ebrahim, et al., 2019; Sumaila, Tai, et al., 2019; Wright, 2001). For example, analysis of the Liberian fisheries sector identifies that pursuing a “maximum net benefits policy” would involve reductions of 58 per cent and 26 per cent of the small and large canoe fleets, respectively, and a 75 per cent increase in the industrial fleet (Jueseah et al., 2020).

In many ways, such policy approaches have been successful. Collectively, economic development policies, new technologies and changes in supply chains and markets have seen estimated fish production increase dramatically from around 20 million tonnes in 1950 to 84 million tonnes in 2018 with fisheries becoming increasingly industrialized and globalized (FAO, 2020; McClanahan et al., 2015; McGoodwin, 2020). At the same time, the proportion of fish production exported increase significantly from 25 per cent in the mid-1970s to nearly 40 per cent in 2018 (FAO, 2020). As with many food items, this is associated with a net flow from developing to developed regions (Kent, 1997; Smith et al., 2010; Sumaila et al., 2016). With an increase in global aquaculture and intensification of

livestock production there has been increased demand for fish meal and fish oil (FAO, 2020). Fish destined for fishmeal production includes food-grade fish caught off the coast of countries with large numbers of food insecure and nutrient-deficient people, with the nutritional benefits often accruing to wealthier, distant consumers (Cashion et al., 2017; Pauly, 2019; Tacon & Metian, 2009). Indeed, in 2018 about 12 per cent of all fish produced, including from aquaculture, was used for non-food purposes (FAO, 2020). On the other hand, marine small-scale fisheries produce about 2/3 of all fish caught for direct human consumption (FAO, 2020).

The way that fish is processed transported, and marketed has also changed. Modernization in fisheries is often associated with the introduction of new technologies such as freezing and chilling, common processing methods and fish products in northern developed countries, and the emergence of complex supply chains whereby products may move across national borders several times before final consumption (Sumaila et al., 2016). Changing processing techniques can affect nutrient composition, particularly where parts of the fish are discarded. This effect of change, especially in countries with higher prevalence of micronutrient deficiencies, deserves closer attention (Fanzo et al., 2021).

The changes in marine fisheries have been associated with the emergence of large integrated seafood companies. It is estimated that in 2012, thirteen corporations controlled up to 16 per cent of total global marine catch and 40 per cent of the most valuable catches (Österblom et al., 2015). This small number of corporations operates through a global network of subsidiaries and has come to dominate all parts of seafood production and some are also involved in animal feed production (Österblom et al., 2015). Critically, they are also actively involved in fisheries and aquaculture decision-making and the development of sustainability certification schemes (Österblom et al., 2015), which can fail to recognize local subsets of fisheries and tend to leave out social and cultural considerations altogether (Olson et al., 2014).

The transformation of marine capture fisheries in the post-war period has clearly been successful in increasing the volume and value of fish production (McClanahan et al., 2015). However, the transformation goes beyond levels of production. At a more local level, modernization and globalization are frequently associated with environmental degradation and a loss of access for small-scale fishers, processors traders and consumers as the food system is transformed in this way (e.g. Campling et al., 2012). Small-scale marine fisheries also take place within the context of multiple demands on water resources and aquatic space, in which food production from fisheries is only one. Under the “Blue Economy” or “Blue Growth” framework for example, the ocean is seen a source of new economic opportunities (Bennett et al., 2019). Pursuing these opportunities may “squeeze” small-scale and subsistence fisheries in particular, with negative consequences for food and livelihoods (e.g. Cohen et al., 2019; Scholtens & Bavinck, 2017). For example, the process of planning and establishing marine parks, or marine protected areas, often prioritizes other sectors such as conservation and tourism, while excluding coastal fishing communities, even though they are usually

impacted the most (Flannery et al., 2018; Kamat, 2014; LaVanchy et al., 2020). This is often referred to as “blue-grabbing,” or “ocean grabbing,” where use of, and control over resources are taken from local fishers and communities (e.g. Bennett et al., 2015; Hill, 2017).

Loss of access is often associated with increased marginalization of small-scale fishers, undermining of traditional management practices and reduced incentives for these fishers to invest in managing their local fishery (e.g. Allison et al., 2012). Industrialization of marine fisheries has changed relationships in food systems between the fishers and the environment and within labour relations as it has increasingly required the employment of hired workers and a growing reliance on marginalized migrant workers (Marschke & Vandergeest, 2016; St. Martin, 2007). Fish becomes a commodity to be traded for economic benefits through markets rather than a local food source with interconnected social, economic and ecological implications (HLPE, 2017; Levkoe et al., 2017).

The risk is that increasingly globalized markets promote access to nutritious fish products for the food secure. The role of trade in supporting food security and addressing malnutrition remains unclear and contentious (Béné, Hersoug, et al., 2010; Béné, Lawton, et al., 2010; Edward, 2006; O'Neill et al., 2018). In summary, transformed food systems, economic policies, vertical integration, alternative products and the increased importance of markets for both marine fish and labour can all serve to limit actors' choices, reducing small-scale fishers' control over how they participate and what they consume.

3.2 | Inland fisheries and the rise of freshwater aquaculture

Inland fisheries represented around 12 per cent of total global capture fishery production, providing over 11 million tonnes in 2015 (Funge-Smith, 2018), although the actual harvests may be substantially underestimated (Fluet-Chouinard et al., 2018). Inland fisheries occur in environments ranging from large lakes, reservoirs and river basin–floodplain systems to the diverse and diffuse fisheries in ponds, canals, rice fields and upland streams (Gregory et al., 1996; Welcomme et al., 2010). The most productive capture fisheries are found in the tropical and subtropical latitudes with around 46 per cent of global inland fish production coming from Asia (excluding China). Most inland fish production is from small-scale operations harvesting for household consumption and local trade or barter (Bartley et al., 2015), accounting for almost 90 per cent of total production (Funge-Smith, 2018).

Fish and other aquatic resources from inland fisheries play a crucial role in many food systems and are widely considered to be central to nutrition and food security with estimates, suggesting that 90 per cent of fish from inland capture fisheries is for direct local human consumption (Welcomme et al., 2010). The role and contribution to nutrition for poor people is also reported to be greater than either marine fisheries or aquaculture (McIntyre et al., 2016). There

has long been interest in ways to increase the productivity of inland fisheries through increased human input and control to increase productivity (Welcomme & Bartley, 1998).

Stocking of natural and manmade waterbodies has become a widespread technical intervention with increased inputs and control culminating in the conversion to pond or cage aquaculture. In many countries across Asia, stocking is widely promoted and state policies on capture fisheries across the region has focused on a conservation strategy of minimizing degradation, and efforts to increase production through aquaculture and stocking and opportunities to increase fish production have been presented almost exclusively in terms of aquaculture production (Bush, 2008). As a result, there has been a rise in the production of cultured fish with production dominated by a small number of species from culture-based fisheries and aquaculture systems. With aquaculture increasing and poised to overtake marine fish production, an implication is that consumers may be faced with a more limited diversity of fish to consume.

Policy approaches promoting aquaculture have resulted in institutional changes, including a rise in systems whereby the state or village administrations lease waterbodies to fisher associations or commercial operators to raise fish and generate revenues. Under such arrangements, both the state and the lessee are provided with further incentives to increase productivity and economic efficiency. The focus becomes maximizing the economic performance of inland fisheries through further development and extension of aquaculture.

However, aquaculture and capture fisheries contribute to food systems differently. As Harrison (2003) describes from work in Africa, “... the most, and often the only, significant thing aquaculture and capture fisheries have in common is that they both involve fish.” (p. 245). Cultured fish are not a substitute for wild-caught fish in terms of product, its availability, nutritional content or cultural importance (Bouis, 2000; Kawarazuka & Béné, 2010; Roos et al., 2003, 2007; Thilsted, 2012). As Bush (2008) notes of fish consumption in Lao PDR, aquaculture only marginally reduced the dependence on capture fisheries, providing instead a supplementary source of food. They also report that while inland fisheries reflect the flexible, opportunistic nature of natural resource use dependent on seasonal productivity, culturing fish represents an infrastructure-based production activity akin to agriculture (Bush, 2008). Often it is the local elite and outsiders that are able both to assume the risk and to access the credit, land, knowledge and technologies needed for culturing fish.

The benefits to the poor may also be overstated. While small-scale household fish culture can address household needs and contribute to food security, experiences promoting aquaculture in Bangladesh to increase income and nutrition and address poverty agendas suggested that while fish production was increased, little improvement was made to the access and income of low-income households. The emphasis on culturing fish is reshaping fisheries food systems towards more integrated and controllable production systems. The policies and tenure arrangements are enabling commercial actors to control each stage of the food system. Relationships

within the food system are altered with a greater emphasis on markets, both for the supply of fish and the supply of labour, with small-scale fishers employed as fish harvesters and suppliers to commercial operations. The East Kolkata Wetlands are an example of a peri-urban wetland that initially supported rice cultivation and a subsistence fishery. Increasingly used to manage wastewater from the city, opportunities arose for wastewater-based fish production and has led to a shift from a capture-based subsistence fishery to one dominated by commercial pond aquaculture supplying the urban market (Bhattacharya et al., 2012; Bunting & Lewins, 2006). As with marine fisheries, multinational agribusiness companies are driving production increases. In Thailand, the Charoen Pokphand Group has applied its own commercial food systems business strategy in the contract cage farming of Tilapia (*Oreochromis* spp., Cichlidae) such that by 2011 contract farming represented over 70 per cent of cage cultured Tilapia in parts of northern Thailand (Belton et al., 2009; Lebel et al., 2013).

As well as making use of environmentally degraded waterbodies, aquaculture and culture-based fisheries can also themselves degrade aquatic environments through the interaction of introduced or escaped fish with wild fish, notably the Nile Perch (*Lates niloticus*, Latidae) in Lake Victoria (Aloo et al., 2017), or through the effluents released from culture systems (Naylor et al., 2021). It can also create competition for space and involve the enclosure of coastal and inland waters, resulting in conflict and loss of access for small-scale fishers (Cohen et al., 2019; Nguyen et al., 2019; Stonich & Vandergeest, 2001; Sultana & Thompson, 2011). Furthermore, the share of freshwater fish raised on compound feed, which is made largely from terrestrial and some marine ingredients, has increased over the past two decades (Naylor et al., 2021). Thus, aquaculture development creates new markets for wild-caught fish as an input, diverting fish from direct human consumption.

3.3 | A food systems perspective of ongoing transformations in small-scale fisheries

Commercial development of marine fisheries and freshwater aquaculture and technological innovations are transforming food systems across the Global South. The influence of global food systems on small-scale fisheries and local food systems is intensifying and changing many aspects of production and provisioning, including the technologies used, institutional arrangements and relationships throughout food systems. While the pathways of transformation in marine and inland fisheries may differ, there are common drivers associated with ideologies and institutions, including legal frameworks and markets and technologies, the results that we have identified through our analysis are substantially the same (Table 1).

Viewed at the global level, the transformations occurring in marine and inland fisheries environments have successfully increased the production and supply of fish. In both cases, these transformations are often led by commercial actors, who themselves adopt a food systems perspective in wanting to ensure market control over all dimensions of food systems and to target lucrative markets. The impacts of these transformations are on the small-scale producers, who are both displaced and affected by environmental degradation associated with the more industrial production methods. This is therefore fundamentally a conflict between competing food systems and associated interests and values. What is being lost in these transformational processes are the local food systems that are based on small-scale producers and locally appropriate and low-cost processing. Access by small-scale fishers and processors is being restricted, with implications for their control over food and with the risk that they are themselves transformed from producers of local foods to consumers

TABLE 1 Trends in food systems associated with small-scale marine and inland fisheries

Food system element	Changes resulting from transformations
Activities	
Producing food	Increase in large-scale commercial fish production and the emergence of large integrated seafood companies. Production has increased to 84 million tonnes in 2018 with the top ten species accounting for almost 30% of total marine catches. Some fish is produced for use as inputs for aquaculture and livestock production. Rapid rise in cultured fish production to 82 million tonnes of aquatic animals with production dominated by a small number of species.
Processing and distributing food	Increasing importance of urban and export markets and net flows from the Global South as certain markets are targeted. Processing activities often take place at some distance from where the fish was caught.
Consuming food	Reduced diversity of species consumed and increasingly fish consumed is processed (i.e. not fresh). Consumption is increasingly distant from catch.
Outcomes	
Food availability	Consumers are increasingly reliant on a smaller diversity of fish produced by transformed systems.
Access to food	Reduced ability to participate in fish production and increase in role of markets to mediate access. Smaller diversity leads to less consumer choice. Policies that have facilitated the development of large-scale fishing and commercial aquaculture have also reduced the access of small-scale fishers.
Food utilization	Fish from transformed systems (species, processing method) can have different nutritional and social values. Less choice and knowledge of how fish produced.

of industrialized foods, often foods to which their fisheries have contributed in one way or another.

The loss of these local food systems becomes less of a concern if there are ways to compensate or mitigate it. While redirection of industrial catches or by-catch to local markets (e.g. Hicks et al., 2019; Kabahenda & Hüsken, 2009), aquaculture (e.g. Subasinghe et al., 2009) and increased trade and access to markets (e.g. Jacinto & Pomeroy, 2011) have been promoted, the feasibility of these has also been questioned (e.g. Ainsworth et al., 2021; Funge-Smith, 2018; Golden et al., 2019; Lymer et al., 2015). In addition, it is crucial to consider the social consequences of both the loss of existing contributions and the introduction of alternatives, especially for poorer people who are likely to be both more dependent and less able to adapt (Albert et al., 2014).

There is a need to engage with governance at the scale of wider food systems and the claims and values associated with alternative policy choices. Given the influence of large commercial interests and the marginalization of small-scale producers in policy debates, calls to transform fisheries and food systems can reflect the most powerful voices, obscuring different visions and alternative narratives concerning what future food systems might represent and what they might deliver (Béné et al., 2019). In the context of the global South, transformations of local food systems frequently change both what is produced as well as power relations between actors associated with this process in ways that further displace and marginalize poor and vulnerable groups. Food systems are thus actively shaped by specific actors based on their interests and values, and often at the expense of others (e.g. McMichael, 2005).

4 | DISCUSSION

Our interest lies in how fisheries management and policy can address the challenges associated with food systems transformation and the contributions of small-scale fisheries, in the context of poverty reduction and food security. While gross production from marine and inland waters has increased as part of broader changes in global food systems, the concern is that ongoing transformations might impact food security and nutrition in ways that increase impoverishment and inequality (Moberg et al., 2021). Here, we discuss the implications of threats already identified and identify potential opportunities in three key areas related to the ability of people associated with small-scale fisheries to benefit from food systems.

The first area is the lack of recognition of the critical role small-scale fisheries have in the food system and how that leads to inequality. The second key area discusses how local fishers need to regain agency over their local resources, recognizing the power imbalances that exist and that create an unequal struggle over resources. The third area discusses and highlights potential shifts in how we identify indicators and intervention that could lead to improved policies having food as a central component in fisheries policies.

4.1 | The marginalization of small-scale fisheries in food systems policies

Small-scale fisheries are affected by the reshaping of food systems. As Jentoft and Chuenpagdee (2018) point out, for many politicians, fisheries managers and academics, small-scale fisheries are problematic by their very nature. As such, small-scale fisheries at risk of being perceived as a necessary, if regrettable, loss in the “essential” process of transforming fisheries and food systems or developing a modern “Blue Economy.” Enduring narratives of inevitable decline have shaped pessimism regarding the potential contribution of small-scale fisheries to development objectives and focused attention on alternatives (e.g. Friend et al., 2009). These can be reinforced by representations from within fisheries management science and policy, where concerns are raised about the environmental impacts and sustainability of small-scale fishing (Vincent & Harris, 2014; Wong et al., 2007) without addressing underlying drivers of these threats. A persistent narrative recognizes the importance of small-scale fisheries for poor people, but suggests that people are poor because they depend on small-scale fisheries.

As such a central challenge lies in how policy problems and solutions are framed. Current priorities for pro-poor contributions of fisheries to food systems frequently focus on developing technical solutions and moving people out of fishing and into other activities (e.g. Arthur et al., 2016). Yet, this approach can represent another form of marginalization, legitimizing a form of dispossession. Such policy “solutions” may not meet the interests of the poor and vulnerable and the consequence for small-scale fishers is that they live their lives in the context of reduced access, a declining resource base and, as a result, increased impoverishment (e.g. Marshke & Berkes, 2006). Furthermore, there is often the expectation that displaced small-scale fishers will move into more productive livelihoods and overcome the lost access to fishery food resources by becoming consumers of the products of global food systems. For example, small-scale (often poor) fishers in Bangladesh have been excluded from fisheries as these have become enclosed to facilitate commercial aquaculture production. At the same time, long-term data suggest consumers in all income brackets are becoming more reliant on farmed fish from these transformed systems (Belton et al., 2014).

From this perspective, what is happening in capture fisheries reflects the experiences of other poor and vulnerable peoples. A “slow violence” (Nixon, 2011) is being exerted through the gradual and incremental change in food systems and associated loss of access that is undermining livelihoods and claims over resources, reducing opportunities, degrading environments and politically marginalizing the voices of small-scale producers. This violence is linked to the wider processes of material transformation and power relations associated with changing food systems (Carothers & Chambers, 2012; Peluso & Watts, 2001). In such circumstances, people risk becoming the subject of external interventions and focus of technical solutions aimed at addressing the symptoms of their impoverishment by promoting alternative foods and livelihoods. In the context of

small-scale fisheries, this slow violence undermines poor people's access, redirecting fish to industrial fisheries, which may serve the interests of those in power. Lack of access has an important gender dimension as women typically control fewer resources than those that are required to ensure food and nutrition security for them and their families (Doss et al., 2018). As Béné et al., (2004) argue, fishers who are truly poor are those with limited or no access to, or control over, resources. Removing or reducing access can effectively deprive poorer people of a key means to sustain themselves (e.g. Béné, Hersoug, et al., 2010; Béné, Lawton, et al., 2010; Jentoft et al., 2010; McClanahan et al., 2015). This can leave people with few choices but to degrade their environment and accelerate ecological decline (e.g. Blaikie, 1985; Nolan, 2019).

This is fundamentally a question of what constitutes a good food system, and unavoidably a question of who benefits and how. Greater attention in particular needs to be paid to the assumptions that underpin calls to restrict access and undermine local control of aquatic resources (Arthur, 2020; Friend & Arthur, 2012; Jul-Larsen et al., 2003; Short et al., 2018; Song et al., 2020). It is also important to ensure that those affected play an active role in defining fisheries and food policies. This could help resolve potential inconsistencies such as over the health and ecological impacts of catching small fish (Short et al., 2018; Tietze et al., 2011). Ultimately, this role must be empowering by enhancing local peoples' control over their own food systems so that they can better meet their nutritional needs (Levkoe et al., 2017; Lowitt et al., 2020). This requires approaches that go beyond providing technical solutions and instead focus on rights of small-scale producers, for example to define their own food, agriculture and fisheries policy and have a degree of control over the food system as reflected in food sovereignty movements (Patel, 2012).

4.2 | The struggle for recognition and equality

The marginalization of small-scale fisheries and resultant impoverishment are not inevitable outcomes of food systems but derive from deliberate policies and imbalances of power. As Bavink et al., (2018) point out, "fishers also have other concerns that follow from the manifold struggles they are involved in; such struggles center on the distribution of resources, on political recognition, and on what they see as fairness." (Bavinck et al., 2018). Considering fish and fisheries in terms of a struggle based on differing values reveals deeper conflicting values associated with the nature of development; the imposition of those values by those in power; and the changes occurring in food systems. Thus, the transformation of food systems represents an unequal struggle over valuable resources that produces both winners and losers.

If food security and nutrition are policy priorities, then greater attention should be paid to key elements of this struggle. There is a need to develop the empirical evidence base to construct a new positive narrative around small-scale fisheries and their contributions to sustainable development. This focuses attention on

identifying and elaborating the positive roles that small-scale fisheries play in food systems, to highlight the contexts in which they are situated, the value of local knowledge evident throughout these systems and the central role of women within this. As Scholtens and Bavinck (2017) conclude: "For seafood to matter for the poor, we must develop new narratives that allow for the safeguarding of small-scale fisheries and enhancing the flow of low-price seafood to the poor." p.8

The elements of such a narrative already exist. That small-scale fishers can and do manage natural resources and associated food systems, in ways that promote equitable access and sustain ecosystem functions is well documented (Arthur & Friend, 2011; Duarte et al., 2020). People are capable of organization and resistance, even within limited political space, and may seek to oppose harmful changes being imposed upon them (Armitage et al., 2008; Jentoft & Chuenpagdee, 2015; Gómez & Maynou, 2021). Ultimately therefore, those being marginalized or deliberately excluded need to be empowered to have control over their resources. There are important opportunities for researchers to assist societies to navigate change given that changes in food systems are a matter of societal choices, but that there is also uncertainty and different development priorities amongst stakeholders.

4.3 | Policy pathways and indicators

Fisheries' policies are effectively food policies. Examining small-scale fisheries from a food systems perspective reinforces the interconnected nature of food production and consumption, and that processes of change and transformation are inherently complex and uncertain. Addressing this requires not just collaboration with other sectors, disciplines and experts (Fanzo et al., 2021) but also different knowledge and perspectives. As a result, it is not possible to identify any universal pathways or set of win-win solutions as these processes remain highly context-specific (Béné et al., 2019; McClanahan et al., 2015). Nevertheless, there are positive pathways that can be identified. First, it is important that fisheries policies are aligned with wider social development and health policy priorities, so that these social benefits are at the foreground (Farmery et al., 2020; McClanahan et al., 2015).

While often not a focus of fisheries management, changes in the food security and nutritional condition of poorer or more vulnerable groups are a key indicator of policy success. Policy cannot be considered successful if it does not demonstrate an improvement in food security and nutrition. Food security and nutritional status, such as stunting, wasting or food insecurity, are therefore key development indicators because a well-nourished and healthy population is a key element of social and economic development. Given that food is central to definitions of poverty, measuring change in the food security and nutrition provides an important means of assessing the effectiveness of health or fisheries policies, management measures or even fisheries certification schemes.

5 | CONCLUSION

Addressing malnutrition and food insecurity remains central to global development agendas that are themselves anchored in commitments to eradicating poverty worldwide. While largely overlooked, fish must play an important role in this wider agenda. However, we are witnessing dramatic transformations in food systems that have important implications for small-scale fisheries. These changes are systemic and affect not just the productivity of fisheries but also how they are being incorporated into globalized food systems in which local producers lose control over all aspects of the system (e.g. Friend et al., 2019). Examining small-scale fisheries from a food systems perspective makes clear that we need to view changes occurring in small-scale fisheries as part of wider food systems change. This requires us to address the values associated with alternative food policies; identify what counts as “good” food policy and how decisions that affect food systems are made and by who. This necessitates not just collaboration with other sectors, disciplines and experts (Fanzo et al., 2021) but also that the knowledge and perspectives of those affected by decisions are included. Understanding why groups are poor, hungry or vulnerable, plus their immediate needs, is critical for identifying appropriate policy responses—the groups themselves are often best placed to help answer these questions.

The transformations taking place in global food systems are associated with significant costs and distributional impacts. These come in the form of a loss of access by small-scale producers and a loss of diversity within food systems. The gradual marginalization and impoverishment of small-scale fishers that takes place can be obscured by the apparent success of increasing fish production. Maintaining and enhancing the viability of small-scale fisheries and local food systems therefore have the potential to improve the economic and social well-being of small-scale fishers, providing them with the means to address their individual and communities’ needs and strengthening their adaptive capacity to manage climate, political, social and economic changes and uncertainties.

At the same time, we are not suggesting that small-scale fisheries and local food systems are not in need of improvement, rather we argue that the central question is about what should constitute such improvement. In addition to addressing the environmental impacts of food systems, there is a need for increased attention to health and safety, decent working conditions, reducing occupational hazards, and ensuring healthy and nutritious food products are produced safely and in an environmentally sustainable manner. The contributions of small-scale fisheries to food systems are often based on local experience and knowledge and provide affordable and locally appropriate food products. A key focus for improving food systems and nutrition outcomes should be on existing local food systems, developing interventions that can strengthen the systems in ways that address the challenges inherent within them in ways that are relevant to the people they aim to benefit.

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