



Putting the seafood in sustainable food systems



Julia Olson*, Patricia M. Clay, Patricia Pinto da Silva

NOAA Fisheries, Northeast Fisheries Science Center, Social Sciences Branch, 166 Water Street, Woods Hole, MA 02543, USA

ARTICLE INFO

Article history:

Received 19 March 2013

Received in revised form

2 May 2013

Accepted 3 May 2013

Available online 6 June 2013

Keywords:

Ecolabeling

Food systems

Governance

Local food

Scale

Sustainable seafood

ABSTRACT

Increasing attention by consumers to the social and environmental dimensions of the food they eat has generated many different responses, including certification programs, watch lists and local/slow food movements. This article examines the more recent entry of seafood into these consumer social movements. Although a concern with the family farm—as well as tendency to equate national security with food security—has long connected terrestrial food production with other cultural concerns, fisheries have tended to be regarded more as natural resources. Considering seafood as part of the “food system” would enhance the management of fisheries, while the long engagement in fisheries with co- and adaptive management and the politics of knowledge would enrich the debate in the agri-foods literature. The article also offers suggestions on how fisheries management could better govern for sustainable food systems, and provides further ideas about food, sustainability and governance.

Published by Elsevier Ltd.

1. Introduction: fish, seafood, and sustainability

Consumer movements directed toward food systems have become increasingly prevalent as a way of merging social and environmental concerns. Many people have become increasingly troubled by the social and environmental implications of their food choices, and are trying to make new kinds of commitments through purchases while looking for criteria upon which to make these choices. Such concerns have found expression in a variety of different approaches, from certification programs that verify product standards to local and slow food efforts that reconnect communities with food and local businesses. Local movements, for example, have been seen as a way to reduce the spatial and social distance between producers and consumers, with a host of accompanying changes like fostering trust, enhancing community development and food security, and promoting ecological sustainability [1,2]. Certification programs have likewise sought to create relations of trust over longer distances, and to promote and reward ecologically sound and sustainable methods of production [3].

In fisheries reductions in stock levels and fishing opportunities, in the U.S. and around the globe, have pushed many fisheries to a critical crossroads. With pressure on fishermen¹ and fishing

families to add value to products and find creative ways to sustain their livelihoods, some have started to adopt innovations that have primarily or originally developed in agricultural food systems. Yet at the same time, scholars in the agri-foods literature have begun to raise critical questions about how alternative these alternative food systems truly are [4]. Many lament that the best and brightest of these alternatives lack empowerment, are not participatory, and do not effectively confront systemic problems. Thus it is striking how, despite all the talk in the agri-foods literature of creating new relations, building trust, and embedding economies in communities, there has been no connection made to the literature on co-management and adaptive management that has developed especially in the context of common pool resources, such as fisheries. In this respect, it is especially informative to examine and compare seafood, with its more recent entry into these consumer social movements, with agricultural products. Of particular importance are the varying ideas about sustainability that have inspired these differing movements on the land and on the water. Equally important are different notions of governance, as addressing consumer concerns and producer livelihoods through, for example, eco-labeling, traceability, or slow food/local food, will also entail building new relations and institutions.

The aim of this paper is thus twofold. First, it intends to broaden the more prevalent understandings in fisheries by a comparison with their terrestrial counterparts, and vice versa. In particular, a long engagement in fisheries with co- and adaptive management and the politics of knowledge would enrich the debate over agricultural certification programs, at the same time that attention to fish as food and as part of food systems would deepen discussion in fisheries management. Second, it proposes to

* Corresponding author. Tel.: +1 508 495 2114.

E-mail addresses: julia.olson@noaa.gov (J. Olson),

patricia.m.clay@noaa.gov (P.M. Clay),

patricia.pinto.da.silva@noaa.gov (P. Pinto da Silva).

¹ This paper uses the term “fishermen” rather than “fishers,” since it uses examples primarily from U.S. fisheries, where most men and women fishing commercially prefer to be called fishermen.

distill from these broadened understandings a more specific set of criteria or thinking points about food, sustainability and governance for fisheries. After a brief introduction to the multiple guides that currently advise on what seafood to eat, discussion focuses on some key developments in fishing in the Northeast U.S., reviews issues that have arisen in the agri-food literature, and considers how the adaptive co-management model of fisheries helps incorporate a broader notion of sustainability that includes communities and social relations.

2. Fisheries and certification: learning from agriculture

2.1. Fish as resources

In a span of almost 20 years, numerous guides for seafood have appeared, marking what Roheim [5, p. 301] has called “the inception of the sustainable seafood movement”. As a number of critics have argued, the existence of so many guides, sometimes with contradictory information, has been confusing at best. Oken et al. [6] note the lack of balance between potentially contradictory perspectives on contaminants, nutrition, and sustainability, but suggest as a solution “simple messages.” Roheim [5], on the other hand, argues that guides painting too broad a picture do a disservice to those who fish sustainably, while too-detailed advisories may prove useless if consumers lack access to more information; she suggests instead greater reliance on eco-certification. Jacquet and Pauly [7], in another viewpoint, criticize both seafood guides and certification efforts in the context of global consumers and rogue fishing vessels; they suggest the need for greater global management and less consumption of seafood generally. Fisheries efforts have followed in the wake of agriculture’s much earlier experiments with private governance (such as fair trade and organic labeling). Despite their longer history, however, lessons from agriculture are not clear. Busch [8, p. 351], for example, has called the “bewildering array of standards” in the private governance of agricultural products a “bizarre bazaar,” which has avoided real reform and may increase concentration of ownership and control, at the same time as it transforms consumer choice into a “burden”.

One cause for confusion in fisheries, explored in greater detail below, is the reliance that guides and standards have placed on different evaluative criteria. At the same time, however, seafood guides and standards do share a common tendency to regard fisheries primarily as resources.² At first glance, this may seem quite innocuous, for fish—like water, soil, forests, and air—exist in the natural environment in potentially renewable supply. What is meant is that dominant constructions of fish and fisheries, at least in the U.S., have tended to privilege issues of resource management and construct resource management as primarily biological (see also Refs. [9,10]). At the federal level, discussions of fish as food take place primarily in the context of food safety, health and nutrition, or import/export regulations, not in fisheries management per se; food is rarely mentioned as a guiding goal or objective in Fishery Management Plans or Amendments [11]. When food security is mentioned it is often in an international context³ and/or related to bycatch reduction or aquaculture. Further, food security for fisheries is most commonly discussed

only in relation to maintaining viable stocks of fish [12], or ensuring adequate nutrition [13], without specifically addressing the broader “food system” (with very few exceptions, e.g., a 2012 Community Supported Fisheries Forum co-sponsored by NMFS⁴; [14]). The Magnuson–Stevens Fishery Conservation and Management Act (MSA) and its National Standards, the federal legislation that dictates U.S. fisheries management, contains three references to food supply⁵ and one to food production, as well as several to seafood safety but appears at a casual glance to have little connection to food systems or community food security in the sense that will be discussed here.

Yet, the overarching standard governing fisheries management, National Standard 1, is on closer inspection tightly linked to the much broader idea of a “food system,” one of relations and processes that go beyond growing and harvesting to include other components such as research, transportation and consumption, as well as such institutions related to food, such as markets and communities (see review in Ref. [15]). National Standard 1 states that the primary reason for conservation and management is to “prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.” Overfishing and optimum yield are subsequently tied to biomass stock size and growth rates, though the notion of optimum is also inherently social, defined later in the MSA’s guidelines as “the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems”.⁶ Food is mentioned here first, the benefits of which are in a later paragraph noted as “derived from providing seafood to consumers; maintaining an economically viable fishery together with its attendant contributions to the national, regional, and local economies; and utilizing the capacity of the Nation’s fishery resources to meet nutritional needs”.⁷

Nonetheless, in practice, most subsequent proposed rule-making has focused on preventing overfishing, while fisheries tend to be managed for the health of the wild stock, and to a lesser degree as a source of income for harvesters, and occasionally processors—not for the wider community.⁸ Of course, such issues are essential ingredients for the long-term health of a fishery. The point here is not to dismiss the importance of biological and ecological questions, but rather to redirect attention to other fundamental questions less commonly addressed in fisheries management. While questions of trade-offs may become more prominent with ecosystem-based management,⁹ thinking about fish as food provides a different frame of interpretation, one that does not stop with questions about harvesting of fish but includes

⁴ See http://www.nmfs.noaa.gov/stories/2012/06/06_04_12csf_summit.html [accessed 01.11.12].

⁵ For example: “These fishery resources contribute to the food supply, economy, and health of the Nation and provide recreational opportunities” (16 U.S.C. 1801, Sec. 2(a)(1)).

⁶ See <http://www.gpo.gov/fdsys/pkg/FR-2009-01-16/pdf/E9-636.pdf> [accessed 15.02.13].

⁷ See http://www.nmfs.noaa.gov/msa2007/docs/acl_final_rule.pdf [accessed 11.12.12].

⁸ For example, NMFS defines sustainability as “meeting today’s needs without compromising the ability of future generations to meet their needs; for example, using a resource but leaving some for the future. In terms of seafood, this means catching or farming seafood responsibly, with consideration for the long-term health of the environment and the livelihoods of the people that depend upon the environment”. See http://www.fishwatch.gov/buying_seafood/choosing_sustainable.htm [accessed 11.12.12].

⁹ Food is a key ecosystem service according to the Millennium Assessment (see <http://www.millenniumassessment.org/documents/document.300.aspx.pdf>, accessed 07.02.13) and a societal goal of the Ocean Health Index (see <http://www.oceanhealthindex.org/>, accessed 06.02.13).

² This is of course not true of those guides or warnings that focus on health, including toxicology (such as FDA warnings about mercury consumption in seafood) or nutrition (such as advice to increase omega-12 intake). See Ref. [6] for a review. The focus in this paper, however, is on fisheries management and the desire to achieve sustainable seafood choices to which many standards and guides aim.

³ USAID has a Bureau of Food Security (<http://www.usaid.gov/who-we-are/organization/bureaus/bureau-food-security/>; accessed 05.02.13).

questions of distribution and use. However, though most wild caught fish are used for food [16, p. 5], [17], fisheries managers have hardly begun to talk about fish as food, as obvious as it seems. How one manages fish has implications for regional food systems, but no one is likely to manage fisheries for sustainable food systems if food is not part of the discussion.

In the Northeast U.S., for example, the New England Fishery Management Council is responsible for the management of species such as Atlantic herring (*Clupea harengus*), and sets thresholds on how and where these are caught. Herring is managed with consideration to its role as a forage species as well as for its commercial value, with little thought for use as human food. In the U.S., Atlantic herring is currently sold primarily as bait for the American lobster (*Homarus americanus*) fishery in the Gulf of Maine. However, this is a relatively new use of herring. In the 1900s there were 75 canneries dotting the coastline, employing thousands of people canning herring as a food product that was sold nationally and internationally. In other countries and regions, herring continue to be harvested and sold as food: kippers in Britain or pickled herring in Scandinavia. Such differences of course demonstrate the ways in which rich traditions and strong ethnic identifications with particular foodstuffs attest to their sociocultural importance. There is less demand for herring as a food fish in the U.S. today than there once was (though see [18] on the return of herring as gourmet food). Yet studies of food have also shown clearly the importance of the interplay between consumption and production practices, and material and socio-cultural forces [19]. This is not to say that Atlantic herring should not be used as bait or managed for its importance as a forage species. However, it suggests that by looking at the fishery through the lens of food production, as a component of National Standard 1 and a key ecosystem provisioning service, managers might reconsider what they are managing for.

Fisheries certification programs have also tended to have a biological emphasis; most of these programs primarily use biological criteria in assessing fishery sustainability, even if their ideal is broader. Major metrics for assessing fisheries sustainability include stock abundance, gear impacts, species life history, and bycatch, as well as governance and management aspects to the extent these cover how well biological standards are achieved and enforced. Yet even among the groups emphasizing similar biological factors, there is a tremendous uncertainty behind the underlying science. Programs disagree on what and how to measure. Different groups may rate the same stocks differently, at best singling out particular gears as sustainable (Table 1). Assessments of governance and management are at a national or transnational level, mirroring the “large spatial scales” common to marine studies [20] but again failing to disaggregate regional or local differences. Conversely, some groups do mention social and economic issues as important, but do not integrate such criteria into their assessments.¹⁰ Indeed, major certifiers such as the Marine Stewardship Council (MSC) have been criticized for a bias toward large-scale fisheries in the developed world [21]. The cost

of compliance and certification has been identified as one important factor in this bias [22], as has a critique of northern elitism in creating certification categories [23]. Proposals to increase participation have included tiered certification and more government involvement [24]. The concern in this article, however, is what can be gained by viewing fish as food, and seeing it as part of a broadly defined food system.

2.2. Fisheries as complex systems

Innovations in agriculture, such as certification programs for organics and fair trade and, as discussed in the next section, community supported farms, have provided fishermen and fishing communities much food for thought. But unlike agricultural products, fish is simply not managed as food in the industrial west. The mission statement for the U.S. Department of Agriculture (USDA), for example, cites food first, before agriculture and natural resources. Their strategic plan focuses on market expansion, rural community development, and land conservation,¹¹ unsurprising when a concern with the family farm—as well as tendency to equate national security with food and agricultural security—has, in many places, long connected terrestrial food production with other sociocultural and political concerns. Thinking in terms of food systems more broadly, then, raises the question of the human dimensions of fish and fishing absent from the dominant attempts at certifying sustainable fisheries.

Of course, there are important differences between agriculture and fisheries. In agriculture there is much greater control over quantity and type of inputs, such as seeds or fertilizers. Control of the harvest of wild-caught fish, however, is more limited by regulations and by extant ecological conditions. Farmers in the industrial West are generally sedentary (i.e. non-shifting); yet some fishermen may fish inshore areas close to their home ports, while others range between inshore and offshore areas that span different regions. But similarities are striking too. Governance systems like territorial use rights in fisheries (TURFs), where fishermen can care for their areas like a farm, or at least keep non-owners out, have been linked to more successfully co-managed fisheries [25,26]. Such a shift in identity from being a fisherman to being more like a farmer has been evident in the Atlantic sea scallop (*Placopecten magellanicus*) fishery which, though not a TURF regime, uses area-based controls to increase yield; likewise, resource enhancement figures into some fisheries, such as seeding of shellfish spat to increase yield, activities which can involve complex ideas about property rights and responsibilities [27].

In other words, governance and management systems are linked in complex ways to stewardship, as work on common property systems has long showed. Such complexities are poorly understood and poorly integrated into current seafood buying criteria, limiting the utility of these guides for judging overall sustainability. As mentioned earlier, certification programs usually rate entire stocks, though some may single out particular gears and/or particular regions as sustainable, giving a bird's eye view that fails to truly disaggregate a fishery. But producers trying to harvest more sustainably can disappear from such a simplified overview, limiting their potential contribution to achieving more sustainable outcomes. Likewise, stocks may be classified as sustainably harvested based on national- or regional-level data, but without addressing the global food distribution networks that put those same species harvested less sustainably elsewhere in local

¹⁰ The group Good Catch lists a number of social and economic criteria for sustainability (consumer health, human rights and social justice, buying local, animal welfare, climate change), but they are not actually measured in its reports (http://www.goodcatch.org.uk/site_media/uploads/Good_Catch...the_essentials_FINAL.pdf, accessed 15.10.12). Another, Fair Trade Fish, is primarily concerned with the labor and economic conditions of producers/fishermen with an (undefined) concern for ecological sustainability; they provide no specific criteria as in more formal certification efforts or seafood guides (<http://www.fairtradefish.org/>, accessed 20.11.12). FishWatch references such MSA National Standards as optimum yield, considering economic efficiency, sustaining fishing communities, and safety—as well as preventing overfishing, limiting bycatch, using best science, and minimizing costs—but primarily measures status of the stocks (<http://www.fishwatch.gov/index.htm>, accessed 20.11.12).

¹¹ See <http://www.usda.gov>, accessed 15.10.12. Click on About USDA, then Mission statement. See Strategic Plan Framework, underneath Mission statement.

Table 1
Criteria of and examples from leading certification and seafood watch programs.

Evaluative criteria ^a	Marine Stewardship Council (MSC)	Blue Ocean Institute	Eartheasy	Monterey Bay aquarium seafood watch
Stock levels	x	x	x	x
Gear impact on habitat/ecosystem	x	x	x	x
Governance/management	x	x	x	x
Life history		x		
Bycatch		x	x	x
Gear type			x	
Status of key species in the Northeast U.S. ^b	Marine Stewardship Council (MSC)	Blue Ocean Institute	Eartheasy	Monterey Bay aquarium seafood watch
American lobster (<i>Homarus americanus</i>)	(Maine lobster trap fishery)	Yellow light	Moderate risk	Good alternative (Northeast U.S. trap)
Atlantic cod (<i>Gadus morhua</i>)	Not certified	Yellow light (jig and bottom longline), Red light (bottom trawl and gillnet)	Best to avoid	Good alternative (U.S. Gulf of Maine hook and line)
Atlantic herring (<i>Clupea harengus</i>)	Not certified (An Atlantic Canadian fishery is under consideration)	Green light	Better choice	Good alternative (U.S. Atlantic)
Atlantic deep-sea red crab (<i>Chaceon quinque-dens</i>)	Certified	Not rated	Not rated	Not rated
Golden tilefish (<i>Lopholatilus chamaeleonticeps</i>)	Not certified	Yellow light	Not rated	Avoid (U.S. South Atlantic; U.S. Gulf of Mexico)

^a Sources [accessed 14.02.13]: (<http://www.msc.org/about-us/standards/standards/msc-environmental-standard>); (<http://blueocean.org/documents/2012/07/blue-ocean-updated-ranking-methodology.pdf>); (http://eartheasy.com/eat_sustainable_seafoods.htm).

^b Sources [accessed 14.02.13]: (<http://blueocean.org/seafoods/>); (<http://www.msc.org/track-a-fishery/fisheries-in-the-program>); (http://eartheasy.com/eat_sustainable_seafoods.htm); (http://www.montereybayaquarium.org/cr/SeafoodWatch/web/sfw_factsheet.aspx).

grocery stores.¹² This raises important policy questions that often crystallize around place-based concerns. How do you disaggregate more finely when a stock is managed and fished in multiple ways by multiple groups?

More recently, a new and largely place-based model has sought to answer how and where to buy fish. In the Northeast U.S. and elsewhere, Community Supported Fisheries (CSFs), modeled after Community Supported Agriculture farms (CSAs), have gained in popularity. CSFs are based on a more personal relationship between producers and consumers who are linked largely by proximity (though not all CSFs limit themselves to a single local place). Like a CSA, ‘shareholders’ purchase a stake in the harvest prior to the fishing season and receive a portion of it, usually weekly. Fishermen can market directly, eliminating a middle man, and spread the risk from harvesting unknowns. Thus CSFs help create a support system for producers to improve their economic condition and to maintain locally-based fishing communities and cultures. They also aim to enhance stewardship, directing attention and higher prices to fish caught with sustainable methods [30, pp. 544–45], potentially including not just gear and habitat but also broader impacts not usually considered in certification programs—such as carbon footprint [31]. In these new ventures, many fishermen have come to feel positively valued by and linked to their wider community, while consumers feel more connected to the food they eat as well as to the individuals harvesting it [30].

Moreover, buying a share of the harvest prior to the fish being caught enables fishermen to land and sell a wider range of species than is usually found in the market, diversifying the seafood within the food system. Yet what species are marketed or provided by CSFs depends on many factors: in the Northeast U.S., most CSFs have focused on such traditional species as lobster and groundfish, common on their fishing grounds, including Atlantic cod (*Gadus morhua*), currently considered ‘unsustainable’ by certification programs and

undergoing large catch reductions. Of course, the local fish movement is, among other things, precisely about disaggregating a fishery so that fishermen trying to fish in ecologically sustainable ways can supply customers wanting to support such practices. Northeast CSF cod fishermen who fish within the current catch limits and seek to fish in sustainable ways argue such efforts are worth supporting. Certainly in many fisheries, by adding local variability and social sustainability into the mix, CSFs or similar groups can deliver fish to their shareholders that at a larger scale may be problematic.

However, such connections—whether between consumers and producers, citizens and government, or resource scientists and resource users—depend on the nurturing of trust; more specifically, of trust in the knowledge used to determine what is ecologically and socially sustainable. Here, whose knowledge should count? These issues are also fundamental to co- and adaptive management, balancing the interplay between different scales, sources, and forms of knowledge, in a context structured by ecological and social processes. And trust, after all, is a key part of governance. The next section discusses the issues of trust and of knowledge, both how it has come to be seen as problematic in the agri-foods literature, and the potential contribution that a broader engagement with co- and adaptive management might make to such debates.

3. Food systems and the politics of knowledge: the co-management model

At the same time that increasing interest in eating locally and seasonally has been voiced in both popular culture and press, the agri-foods literature has begun to write more critically about the “local trap” [32], or defensive and regressive localism [33]. Certification has been criticized for lacking “overt opposition” to the current system [34, p. 360], for reinforcing neoliberal subjectivities and practices through individual consumption [35], and for “conventionalization,” the idea that rents generated from specialized niche production attract large producers, who co-opt and squeeze out the original small-scale producers [36,37]. Others have

¹² In a bycatch-related case, Hawaii tuna longliners were closed down to protect turtles. This increased demand for tuna harvested elsewhere (where turtle protections were weaker) and ultimately increased overall turtle deaths [28,29].

questioned whether alternative markets have helped sustain rural producers and communities, changed “North–South dynamics,” or improved ecological relations [38,39]. A key issue emerging from such studies is the lack of a truly participatory, transparent, and accountable framework for producers and workers [3,40,41], or in this case, fishermen.

On the consumer side, surveys about buying certified fish have revealed ambiguous consumer demand, such as reluctance to pay price premiums [42]. Others have noted the unexpected outcome that consumers may become more suspicious and feel less empowered with more information [43]. As Goss [44, p. 246] writes more generally about the gap between beliefs and behaviors: “Consumers are not willing to pay higher prices for ‘cause-related products’, lack adequate information to make effective choices, suffer from ‘care fatigue’, respond more to short-term negative campaigns, and are easily distracted by marketing rhetoric.” Thus consumers also lack a participatory, transparent, and accountable framework. This mismatch between beliefs and behaviors leads Goss [44, p. 246] to ask: how can one turn “privatized consumption into a collective vision of a better society” that builds communities and public spaces? As Allen et al. [45, p. 68] write, this is the difference between emphasizing “the rights of consumers” versus “their rights as citizens”. While certification programs may appear to be simply a response to consumer demand, “stable markets for certified products rarely exist before the programs are begun... Instead, making markets for certified products is part of a larger institution building project” that happens in “an international context of neo-liberalism and free trade” and that depends on the strength of “social movement campaigns” for success [46, pp. 434,435]. Thus scholars have argued for the importance of shifting from a politics of place to a “politics in place” [47] that is more sensitive to the issue of scale [45] and open to the ways that private and public regulation can enhance each other [3, p. 160].

This new emphasis on better understanding the role of consumers is, some have argued, a way of adding “culture” to our understanding of commodity chains, which have up until now concentrated on producers and on larger-scale political economic forces and structures [48, pp. 287–89]. Yet it is equally problematic to view producers simply as those who respond to market signals for particular production methods. Opening the “black box” of producer knowledge and behavior would help incorporate a broader notion of sustainability that can better consider social goals as well as ecological objectives. Most people are unfamiliar with where and how their seafood is caught or about fishing livelihoods and communities [49]. Though consumer demand for certified fish is often ambiguous, recent studies have noted a concern with seafood safety and a strong interest in seeing where fish comes from [42]. In interviews with CSF leaders, one of the more important things they mentioned is the opportunity for face-to-face interaction, where consumers can ask questions and learn about fishing, and fishermen can receive feedback from consumers.

For fisheries then, the long-standing interest in co-management among both fishermen and researchers points in intriguing directions. Essential to the success of co-management regimes has been the facilitation of knowledge sharing and the building of trust between different participants (e.g. [26,50]). Without this dialogue, one risks ethnocentrism or paternalism, not to mention the real complexities presented by locally differing conceptions of, for example, fairness [see also [45, p. 62]. Grappling with such differences productively, though, yields the “promise of a more broadly understood and widely applicable set of principles” [51, p. 193]. The notion of civic agriculture, for example, has arisen precisely to capture the view that alternative markets “will always include public deliberation and that the vitality and growth of these markets will always depend upon democratic engagement [...] trust and solidarity

are important to the maintenance of participation in alternative markets” [52, p. 46].

Likewise, the regional and global scale of issues “that are rarely contained within a single fishery” alone points to the importance of public intervention [22, p. 659]. But as Iles [53] has written, seafood sustainability campaigns that seek conservation through consumption have tended to create passive consumers rather than active community-builders. These campaigns often look only at consumers and fishermen, forgetting other actors in the supply chain, including holding buyers and distributors accountable to local fishermen and communities. If co-management can serve as a model, however, one can imagine co-operative associations of fishermen who agree to certain practices that have already been constructed through meetings and dialogues between themselves and community representatives or boards of interested citizens, along with scientists and managers.¹³ Certainly the importance of community involvement in developing regulations has long been recognized in fisheries [55–63]. Such associations may find even more institutional support with the further development of ecosystem-based management approaches, in which community-based participatory approaches in conjunction with the scientific method and “adaptive learning” are key to managing and making socially desirable trade-offs [64–68]. And they may provide a new way to build trust in the development and implementation of standards, and governance, that have been increasingly subject to serious challenge (e.g. [69]).

A number of emerging fisheries initiatives are working toward building some of these connections. In the Northeast U.S., the Northwest Atlantic Marine Alliance (NAMA) has been heavily involved in promoting and providing institutional support for CSFs, and collaborative efforts to represent the social–ecological dimensions of small-scale fishing in the Northeast. This has included holding educational forums such as “seafood throw-downs,” giving cooking lessons about unfamiliar species or showing consumers how to gut whole fish, all ways to re-instill the kinds of knowledge that people used to have about procuring and preparing their dinner, as well as hosting forums to discuss why “Who Fishes Matters.”¹⁴ The Gulf of Maine Research Institute (GMRI) has begun a “sustainable seafood initiative” that seeks to connect fishermen with area restaurant owners and chefs; develops markets for unfamiliar species through those partnerships; and facilitates traceability of seafood through a branding program and retail collaboration.¹⁵ In California, the Vivid Picture Project promotes a sustainable food system that includes seafood; its work has also centered on the importance of creating connections between producers and consumers through knowledgeable dealers and merchants [70]. The National Panel on the Community Dimensions of Fisheries Catch Share Programs [71] has urged the regional fisheries management councils to “develop programs that ensure thriving fishing communities and sustainable fisheries” and build upon existing federal food policies. Nationwide, emerging collaborations include the Chefs Collaborative and Trace and Trust, both of which seek to create connections between users and producers to support local fishermen and to enhance traceability of products.¹⁶

¹³ The closest in the agri-foods literature are “participatory guarantee systems” (PGS), though these are locally-based without state involvement. PGS “are ‘locally focused quality assurance systems [that] verify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange’” (see http://www.ifoam.org/about_ifoam/standards/PGS-Brochure-Dec2011_Web.pdf, accessed 06.12.12). See also [54].

¹⁴ See <http://namanet.org/our-work> [accessed 06.12.12].

¹⁵ See <http://www.gmri.org/mini/index.asp?ID=33&p=85> [accessed 05.12.12].

¹⁶ See <http://nrm.com/seafood-trends/chef-makes-most-trash-fish> and <http://traceandtrust.com/> [accessed 11.12.12].

From such dialogues on social and cultural criteria for fair seafood and healthy livelihoods and communities might arise more specific criteria which the more global certification programs can learn from and adopt: a way of “jumping scales” between local systems and global certification (cf. [72]). This is key, for in the U.S. and many other places, most seafood consumed is imported [73, p. 4],¹⁷ and even for fishermen who participate in CSFs, local food systems may not be able to absorb all of their catch. But as Reynolds et al. [3, p. 160] have written, “For private initiatives to have the greatest impact they should raise the bar—proving that more socially and environmentally sustainable production is possible and desirable. In short, there is a strong complementary and dynamic relationship between public and private regulation in promoting social justice and ecological concerns in global markets.” Thus the impact of local or participatory innovations is felt when these are scaled to more global or public efforts, especially if they include a model that other communities can follow, even those without a history of collaboration.

Beyond this, fisheries managers could be asking how to better govern for sustainable food systems. In the groundfish industry in the Northeast, the sector/catch share program—the combination of quota allocations with the requirement to form groups—has provided a situation ripe for community-based marketing innovations such as CSFs or branding. These new forms of marketing have emerged out of a period of economic difficulty for many fishermen in the Northeast. But could management have gone farther in managing for sustainable communities and food systems had they encouraged a place-based element to group formation or in some way ensured that communities could also benefit from sectors?¹⁸ What would happen if issues such as anti-trust concerns, among other things, could be better resolved to create a more enabling environment for collective creativity to emerge?¹⁹ Finding ways to add value to reduced stocks through innovation and working together, after all, requires building new relations and institutions. But until fish is seen as food, managers, consumers, and researchers will never truly understand fishermen or even begin to manage fish as part of sustainable food systems.

4. Conclusion: fish and food systems

Consumers are beginning to influence how seafood is harvested and marketed. But the information available at a national or global scale for consumers to make decisions is often conflicting, misleading, and one-dimensional. A particular weakness of global certification programs is the lack of disaggregation beyond, at most, stock and gear. This can fail to recognize local sub-sets of those fisheries that are sustainably managed or individual fishermen who fish in more ecologically friendly ways. As discussed, key issues for these different and emerging institutions in fisheries revolve around questions of scale and of knowledge: certification programs and local food initiatives each offer something the other cannot. Certification programs promise something universal and global—universal standards based on expert knowledge that can

be applied anywhere in the world, for global consumers who may be nowhere near an ocean source of food. These programs generally have not challenged us to think about fish as food. Yet not only do most certification programs tend to leave out social and cultural questions altogether, it is difficult (not to mention potentially ethnocentric) to devise such standards without dialogue with those concerned and consideration of context. Local food systems, on the other hand, are about reconnecting producers and consumers together at a smaller, bottom-up scale (sometimes even virtual community connections). Yet the local variability of resources may leave biological and ecological questions unsatisfactorily answered.

These issues of scale and knowledge are also intrinsic to co- and adaptive management, where they are frequently a source of creativity and collaboration. The same is true for food systems, for community is more than just interested resource users or fisheries stakeholders, and centering the topic on food rather than resources may be a far more effective way of building community in a broader sense. Better connecting consumers to producers would improve knowledge and interest in fishery food systems, with the potential to create broader criteria and raise new questions for certification programs to consider, such as the difference that seeing fish as food and part of greater food systems makes to notions of sustainability. These then become part of a larger dialogue on “fair trade” fisheries that build on and create broader movements for “civic fisheries” and new kinds of relations.

In ending, the authors would like to offer a simple series of metrics, *FLoWS*. Based on the ongoing discussion with area food and fishery activists, these metrics can be used to think about what kinds of seafood we should be eating. *FLoWS* emphasizes choosing Fresh, Local, Wild, and Small seafood as a way of thinking about supporting local economies and communities through fish (and shellfish) fed on natural systems and lower on the food chain. Does what you eat help local fishermen or local communities? Is it good for you or the ecosystem? Many bottom-up initiatives are beginning to emerge in fisheries, but they have not reached a crescendo loud enough to impact the more dominant certification and seafood guides. Bringing these different pieces and players together should be the goal of sustainable food systems.

Acknowledgments

We would especially like to thank Niaz Dorry and the staff at the Northwest Atlantic Marine Alliance for many productive conversations about fish as food and the local fishermen who provide it. We would also like to thank Matt McPherson and Fred Serchuk for suggested improvements, and the journal reviewers for their helpful thoughts and comments.

References

- [1] Askegaard S, Kjeldgaard D. Here, there, and everywhere: place branding and gastronomic globalization in a macromarketing perspective. *Journal of Macromarketing* 2007;27(2):138–47.
- [2] McIlvaine-Newsad H, Merrett CD, Maakestad W, McLaughlin P. Slow food lessons in the fast food Midwest. *Southern Rural Sociology* 2008;23(1):72–93.
- [3] Reynolds LT, Murray D, Heller A. Regulating sustainability in the coffee sector: a comparative analysis of third-party environmental and social certification initiatives. *Agriculture and Human Values* 2007;24(2):147–63.
- [4] Wilk R, editor. *Fast food/slow food: the cultural economy of the global food system*. Lanham, MD: Altamira Press; 2006.
- [5] Roheim CA. An evaluation of sustainable seafood guides: implications for environmental groups and the seafood industry. *Marine Resource Economics* 2009;24(3):301–10.
- [6] Oken E, Choi AL, Karagas MR, Mariën K, Rheinberger CM, Schoeny R, Sunderland E, Korrick S. Which fish should I eat? Perspectives influencing fish consumption choices *Environmental Health Perspectives* 2012;120(6):790–8.

¹⁷ In the U.S., 86% of all seafood consumed is imported (http://www.fishwatch.gov/wild_seafood/outside_the_us.htm, accessed 03.02.13).

¹⁸ US catch share systems that meet the criteria of being a Limited Access Privilege Program (LAPP) do offer the opportunity for allocations to regional or community associations (MSA sec. 303A; 16 U.S.C. 1853a), though these provisions have not yet been used. See discussion documents from the NMFS 2011 Workshop on Catch Shares and Commercial Fishing Communities at ([http://fishcommunity.webexone.com/default.asp?link="](http://fishcommunity.webexone.com/default.asp?link=); accessed 15.02.13)

¹⁹ The Fishermen's Collective Marketing Act (FCMA) of 1934 specifically facilitates the creation of harvest cooperatives through language that limits anti-trust concerns, though attempts to use it have not always been successful ([74]; but see also [75]).

- [7] Jacquet JL, Pauly D. The rise of seafood awareness campaigns in an era of collapsing fisheries. *Marine Policy* 2007;31(3):308–13.
- [8] Busch L. The private governance of food: equitable exchange or bizarre bazaar? *Agriculture and Human Values* 2011;28(3):345–52.
- [9] Holm P. Fisheries management and the domestication of nature. *Sociologia Ruralis* 1996;36(2):177–88.
- [10] Pålsson G. The virtual aquarium: commodity fiction and cod fishing. *Ecological Economics* 1998;24(2–3):275–88.
- [11] Pinto da Silva P, Lapointe G, Baker A. Measuring success of regional fisheries management goals and objectives—a retrospective analysis of stated goals and objectives. Poster presented at *Managing Our Nation's Fisheries 2013*;3 Washington, DC, May 7–9.
- [12] Pauly D, Watson R, Alder J. Global trends in world fisheries: impacts on marine ecosystems and food security. *Philosophical Transactions of the Royal Society B* 2005;360:5–12.
- [13] National Research Council (NRC). *Measuring food insecurity and hunger: phase 1. Report panel to review U.S. Department of Agriculture's measurement of food insecurity and hunger*; Washington DC: National Academies Press; 2005.
- [14] Lowitt K. A community food security assessment of the Bonne Bay region. Prepared for Community-University Research for Recovery Alliance (CURRA), Memorial University of Newfoundland; 2009.
- [15] Sobal J, Khan LK, Bisogni C. A conceptual model of the food and nutrition system. *Social Science & Medicine* 1998;47(7):853–63.
- [16] National Marine Fisheries Service (NMFS). *Fisheries of the United States, 2010*. Available from: (<http://www.st.nmfs.noaa.gov/st1/fus/fus10/index.html>) [accessed 09.01.13].
- [17] FAO. *Utilization and trade*. Rome: FAO Fisheries and Aquaculture Department; 2001. Available from: (<http://www.fao.org/fishery/topic/2888/en>) [accessed 14.02.13].
- [18] Nathan J. A starring role for the little humble herring. *New York Times*, December 13; 2011. Available from: (http://www.nytimes.com/2011/12/14/dining/the-little-herring-gets-a-big-role.html?_r&_r=1&) [accessed 06.02.13].
- [19] Heath D, Meneley A. *Techne, technoscience, and the circulation of comestible commodities: an introduction*. *American Anthropologist* 2007;109(4):593–602.
- [20] Johnson AF, Jenkins SR, Hiddink JG, Hinz H. Linking temperate demersal fish species to habitat: scales, patterns and future directions. *Fish and Fisheries* 2012. <http://dx.doi.org/10.1111/j.1467-2979.2012.00466.x>.
- [21] Jacquet J, Pauly D, Ainley D, Holt S, Dayton P, Jackson J. Seafood stewardship in crisis. *Nature* 2010;467(7311):28–9.
- [22] Gulbrandsen LH. The emergence and effectiveness of the Marine Stewardship Council. *Marine Policy* 2009;33(4):654–60.
- [23] Constance DH, Bonanno A. Regulating the global fisheries: the World Wildlife Fund, Unilever, and the Marine Stewardship Council. *Agriculture and Human Values* 2000;17(2):125–39.
- [24] Kaiser MJ, Edwards-Jones G. The role of ecolabeling in fisheries management and conservation. *Conservation Biology* 2006;20(2):392–8.
- [25] González J, Stotz W, Garrido J, Orensanz JM, Parma AM, Tapia C, Zuleta A. The Chilean TURF system: how is it performing in the case of the loco fishery? *Bulletin of Marine Science* 2006;78(3):499–527.
- [26] Gutiérrez NL, Hilborn R, Defeo O. Leadership, social capital and incentives promote successful fisheries. *Nature* 2011;470(7334):386–9.
- [27] Olson J. Seeding nature, ceding culture: redefining the boundaries of the marine commons through spatial management and GIS. *Geoforum* 2010;41(2):293–303.
- [28] Chan HL, Pan M. Spillover effects of environmental regulation for sea turtle protection: the case of the Hawaii shallow-set longline fishery. U.S. Department of Commerce NOAA Technical Memorandum, NOAA-TM-NMFS-PIFSC-30; 2012.
- [29] Rausser GC, Hamilton SF, Kovach M, Stifter R. Unintended consequences: the spillover effects of common property regulations. *Marine Policy* 2009;33(1):24–39.
- [30] Brinson A, Lee M, Rountree B. Direct marketing strategies: the rise of community supported fishery programs. *Marine Policy* 2011;35(4):542–8.
- [31] Thrane M, Ziegler F, Sonesson U. Eco-labelling of wild-caught seafood products. *Journal of Cleaner Production* 2009;17(3):416–23.
- [32] Born B, Purcell M. Avoiding the local trap: scale and food systems in planning research. *Journal of Planning Education and Research* 2006;26(2):195–207.
- [33] Hinrichs CC. The practice and politics of food system localization. *Journal of Rural Studies* 2003;19(1):33–45.
- [34] Roff RJ. No alternative? The politics and history of non-GMO certification. *Agriculture and Human Values* 2009;26(4):351–63.
- [35] McCarthy J. Rural geography: alternative rural economies—the search for alterity in forests, fisheries, food, and fair trade. *Progress in Human Geography* 2006;30(6):803–11.
- [36] Guthman J. Fast food/organic food: reflexive tastes and the making of 'yuppie chow'. *Social and Cultural Geography* 2003;4(1):45–58.
- [37] Guthman J. The Polanyian way? Voluntary food labels as neoliberal governance. *Antipode* 2007;39(3):456–78.
- [38] Getz C, Shreck A. What organic and fair trade labels do not tell us: towards a place-based understanding of certification. *International Journal of Consumer Studies* 2006;30(5):490–501.
- [39] Goodman D. Rural Europe redux? Reflections on alternative agro-food networks and paradigm change. *Sociologia Ruralis* 2004;44(1):3–16.
- [40] Fuchs D, Kalfagianni A, Havinga T. Actors in private food governance: the legitimacy of retail standards and multistakeholder initiatives with civil society participation. *Agriculture and Human Values* 2010;28(3):353–67.
- [41] Lyon S. Evaluating fair trade consumption: politics, defetishization and producer participation. *International Journal of Consumer Studies* 2006;30(5):452–64.
- [42] Goyert W, Sagarin R, Annala J. The promise and pitfalls of Marine Stewardship Council certification: Maine lobster as a case study. *Marine Policy* 2010;34(5):1103–9.
- [43] Eden S, Bear C, Walker G. Understanding and (dis)trusting food assurance schemes: consumer confidence and the 'knowledge fix'. *Journal of Rural Studies* 2008;24(1):1–14.
- [44] Goss J. Geographies of consumption: the work of consumption. *Progress in Human Geography* 2006;30(2):237–49.
- [45] Allen P, FitzSimmons M, Goodman M, Warner K. Shifting plates in the agrifood landscape: the tectonics of alternative agrifood initiatives in California. *Journal of Rural Studies* 2003;19(1):61–75.
- [46] Bartley T. Certifying forests and factories: states, social movements, and the rise of private regulation in the apparel and forest products fields. *Politics & Society* 2003;31(3):433–64.
- [47] DuPuis EM, Goodman D. Should we go 'home' to eat? Toward a reflexive politics of localism. *Journal of Rural Studies* 2005;21(3):359–71.
- [48] DuPuis EM. Not in my body: rBGH and the rise of organic milk. *Agriculture and Human Values* 2000;17(3):285–95.
- [49] Pinto da Silva P, Fulcher C. Human dimensions of marine fisheries: using GIS to illustrate land-sea connections in the Northeast U.S. herring, *Clupea harengus*, fishery. *Marine Fisheries Review* 2005;67(4):19–25.
- [50] Berkes F. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. *Journal of Environmental Management* 2009;90(5):1692–702.
- [51] Jaffee D, Kloppenburg JR, Monroy MB. Bringing the "moral charge" home: fair trade within the North and within the South. *Rural Sociology* 2004;69(2):169–96.
- [52] DuPuis EM, Gillon S. Alternative modes of governance: organic as civic engagement. *Agriculture and Human Values* 2009;26(1–2):43–56.
- [53] Iles A. Making seafood sustainable: merging consumption and citizenship in the United States. *Science and Public Policy* 2004;31(2):127–38.
- [54] Nelson E, Tovar LG, Rindermann RS, M&C Cruz. Participatory organic certification in Mexico: an alternative approach to maintaining the integrity of the organic label. *Agriculture and Human Values* 2010;27(2):227–37.
- [55] Kottak CP. When people don't come first: some sociological lessons from completed projects. In: Cernea MM, editor. *Putting people first: sociological variables in rural development*. New York: Oxford University Press; 1985.
- [56] Bennett JW. *Anthropology and development: the ambiguous engagement*. In: Bennett JW, Bowen JR, editors. *Production and autonomy: anthropological studies and critiques of development*. Lanham, MD: University Press of America; 1988.
- [57] Pinkerton E, editor. *Cooperative management of local fisheries: new directions for improved management and community development*. Vancouver: University of British Columbia Press; 1989.
- [58] Hinchcliffe F, Guijt I, Pretty JN, Shah P. *New horizons: the economic, social and environmental impacts of participatory watershed development*. London: International Institute for Environment and Development; 1995. Available from: (<http://pubs.iied.org/pdfs/6064IIE.pdf>) [accessed 11.01.13].
- [59] Jentoft S, McCay B. User participation in fisheries management: lessons drawn from international experiences. *Marine Policy* 1995;19(3):227–46.
- [60] Wichterman D. *Sustaining the vision: lessons for USAID's move toward sustainability and sustainable development*. Document no. PN-ABU-374. Washington DC: USAID; 1995. Available from: (http://pdf.usaid.gov/pdf_docs/PNABU374.pdf) [accessed 11.01.13].
- [61] Acheson JM. *Capturing the commons: devising institutions to manage the Maine lobster industry*. Hanover, NH: University Press of New England; 2003.
- [62] St. Martin K, McCay BJ, Murray GD, Johnson TR, Oles B. Communities, knowledge and fisheries of the future. *International Journal of Global Environmental Issues* 2007;7(2/3):221–39.
- [63] Pinkerton E, John L. Creating local management legitimacy. *Marine Policy* 2008;32(4):680–91.
- [64] Wiber M, Berkes F, Charles A, Kearney J. Participatory research supporting community-based fishery management. *Marine Policy* 2004;28(6):459–68.
- [65] Folke C, Hahn T, Olsson P, Norberg J. Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources* 2005;30:441–73.
- [66] Reed MS, Fraser EDG, Dougill AJ. An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics* 2006;59(4):406–18.
- [67] Arkema KK, Abramson SC, Dewsbury BM. Marine ecosystem-based management: from characterization to implementation. *Frontiers in Ecology and the Environment* 2006;4(10):525–32.
- [68] Armitage DR, Plummer R, Berkes F, Arthur RI, Charles AT, Davidson-Hunt IJ, Diduck AP, Doubleday NC, Johnson DS, Marschke M, McConney P, Pinkerton EW, Wollenberg EK. Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment* 2009;7(2):95–102.
- [69] Christian C, Ainley D, Bailey M, Dayton P, Hocesvar J, LeVine M, Nikoloyuk J, Nouvian C, Velarde E, Werner R, Jacquet J. A review of formal objections to Marine Stewardship Council fisheries certifications. *Biological Conservation* 2013;161:10–7.

- [70] Springmeyer D, Mertens M. Marine food resources in the California food system in 2030, produced by Ecotrust and the Roots of Change council; 2005. Available from: (http://www.vividpicture.net/documents/22_Marine_Food_Resources.pdf) [accessed 05.12.12].
- [71] National Panel on the Community Dimensions of Fisheries Catch Share Programs (NPCDFCSP). Community dimensions of fisheries catch share programs: integrating economy, equity, and environment. Ecotrust; 2011. Available from: (http://www.ecotrust.org/fisheries/NPCDFCSP_paper_031511.pdf) [accessed 11.01.13].
- [72] Smith N. Homeless/global: scaling places. In: Bird J, Curtis B, Putnam T, Robertson G, Tickner L, editors. Mapping the futures: local cultures, global change. London: Routledge; 1993. p. 87–119.
- [73] FAO. The state of world fisheries and aquaculture 2012. Rome: FAO Fisheries and Aquaculture Department; 2012.
- [74] Kitts AW, Edwards SF. Cooperatives in US fisheries: realizing the potential of the Fishermen's Collective Marketing Act. *Marine Policy* 2003;27(5):357–66.
- [75] Sullivan JM. Harvesting cooperatives and US antitrust law: recent developments and implications. In: Johnston RS, editor. Microbehavior and macro-results: proceedings of the tenth biennial conference of the International Institute of Fisheries Economics and Trade, July 10–14, 2000, Corvallis, Oregon, USA; 2001. Available from: (<http://www.osu.orst.edu/dept/IIFET/2000/papers/sullivan.pdf>) [accessed 07.02.13].