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Shaping the aquaculture sustainability assemblage: Revealing the rule-making behind the rules

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ABSTRACT

Certification programs yield global assemblages of producers, consumers, investors, markets, and certifiers that are built around rules that define sustainability. In studying the dynamics and impacts of certification, scholars often refer to "the rules" underlying certification in a manner that makes them seem like immutable mobiles: permanent and unchanging objects that are produced by technical, expert-driven processes and that can be applied in diverse places and contexts. In this paper, we turn attention to the rules and rule-making processes underlying certification to demonstrate the unstable, changeable and contested underpinnings of sustainability assemblages. We explore the World Wildlife Fund (WWF)-sponsored multi-stakeholder Aquaculture Dialogues, an unusually open and participatory experiment in "green" rule-making. Our analysis reveals that rules are never final. Instead, intersections between rule-making bodies and the structure of rule-making procedures create critical debate and contestation over the definition of "sustainability" that structures the aquaculture sustainability assemblage, and over who can and should be empowered to do the defining. This approach enables scholars of certification to rethink the ontology of certification rules as part of, rather than an external ordering principle for, the dynamic and contested nature of sustainability assemblages.

Introduction

Over two decades, certification programs designed to govern and encourage sustainable products and production practices have proliferated, making certification a prominent feature of the contemporary economy. Broadly, certification programs aim to provide economic and reputational incentives for companies and producers (Cashore et al., 2004), reflecting a now common emphasis on the market as a regulatory mechanism for addressing environmental issues (Klooster, 2010). Certification programs create rules that specify what sustainable production entails and what practices producers must follow to qualify to affix a "sustainable" certification to their product. Now ubiquitous, certification governs a range of products from foods to alternative energy resources. Many institutional and corporate buyers have made commitments to purchase specified products that have successfully navigated certification processes.

Certification programs aim to link production and consumption practices, and many span national and global scales. In doing so, they generate what we refer to in this paper as a "sustainability assemblage": relationships and connections among producers, consumers, investors, markets, and certifiers built around the pursuit of sustainability. The rules underlying such assemblages aim to define which producers and practices are and are not sustainable, to enroll people and production sites within their assemblage, and to discipline those that do not conform (Busch, 2000). Rules convey desired behavior, and when deployed by various participants in the assemblage (e.g. retailers or farmers), they structure actors in diverse places and contexts into a particular regime. A rule is powerful because it creates an evaluative framework and intended universal application, but also because of its seeming immutability and permanence. As a result, a rule can gain enduring authority as an apolitical scientific and technical artifact that is applied throughout an assemblage (Busch, 2000). Taken this way, rules can be seen as what Latour (1987) calls "immutable mobiles": objects that are transferred across communities of practice and which have transformative effects without apparently being transformed themselves (for an example of this usage, see Dunn, 2008). In this vein, much analytical attention has focused on the uses of the "final" rule itself, leaving the rule as an intrinsically static component that contributes to the dynamism and

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changeability of the rest of the sustainability assemblage. Little attention has been paid to the processes through which the rules themselves emerge, leaving rule-making outside of our understanding of how sustainability assemblages are constructed.

Rather than deploying an assemblage approach to trace the range of connections from rule-making to implementation or to explore the content of the rules themselves, the objective of this paper is to turn attention to rule-making processes and structures. We seek to show the heterogeneity of actors, interests and methods that are simultaneously defining the terms and conditions that are to structure sustainability assemblages. This approach enables scholars of certification to rethink the ontology of certification rules as part of, rather than an external ordering principle for, the dynamic and contested nature of sustainability assemblages. It identifies "rule-making" as a contested site where sustainability is both constituted and enacted, and a highly significant one because the emergent rules (and their continuous revisions and upgrades) become practiced across the assemblage from point of production through to point of retail. Exploring how (and by whom) processes of making rules are structured, and how a melee of rule-makers engage with ongoing rule-making processes, reveals that the rules themselves are never "finalized" into immutable mobiles. Instead, rule-making contributes to the dynamic and unstable nature of the sustainability assemblage as a whole, making a case for their further integration into studies of sustainability assemblages and for calling into question what rules actually signify in relation to production practices and sustainability claims.

In what follows, we analyze the nexus of rule-making procedures and bodies developing sustainability certifications for aquaculture. Aquaculture is a fast growing, global sector that poses many environmental and social challenges. When sustainability rules are "finalized" and taken up by certification bodies, fish farmers and retailers, they can influence the material practices of farming and consumption. As such, we assert that rule-making processes and the emergent rules must be considered as a central component of the aquaculture sustainability assemblage specifically, and more generally of the growing number of assemblages that are organized around certification processes. Our research investigating a single rule-making process, the World Wildlife Fund (WWF)-sponsored multi-stakeholder Aquaculture Dialogues, reveals that the rules are formulated through evolving relationships among at least three rule-making sites. These are sites of struggle over what rules should say, which groups and organizations are most qualified to set and implement rules and how they will shape productive relationships in the assemblage. Each rule-making site contains critical discussion of what sustainability means, is subject by the others to critique and transformation, and faces important decisions about the level to which the rule should be distinguishable from or harmonizable with the others (cf. Mutersbaugh, 2005a,b).

In our case, the first rule-making site is the competition between rule-making bodies to enter and gain influence in the aquaculture sustainability assemblage by creating certification standards. In this contest, the Global Aquaculture Alliance moved first, making rules through a tightly controlled and industry-led rule-making process that was rapidly taken up by large retailers. WWF has sought to offer an alternative set of rules, distinguishable by the participatory, multi-stakeholder rule-making procedures through which they were formed. WWF's choice in rule-making structure created a second site, the Aquaculture Dialogues, where interest groups from across the larger assemblage entered and jostled for influence over substantive content, but eventually came under pressure to conclude rule-making expeditiously so that the rules could be put into practice. WWF's choice to separate rule-making (the Dialogues) from the body that would eventually "hold" and implement the final rules created a third rule-making site – the new Aquaculture Stewardship Council (ASC) – which continues to modify rules into an audit-ready, profit generating form. In doing so, the ASC is concealing and replacing the participatory nature of the Dialogues rule-making process with its own rule-making procedures.

In section two, we review the ways that rules and rule-making have been understood in certification studies. This review helps to draw out that rules and rule-making procedures deserve scholarly attention because they themselves are site of contestation and because their outcomes structure power relationship among rule-makers, producers and consumers. In section three, we turn to aquaculture. We review debates over sustainability in aquaculture before exploring the way that rule-making moves within and among three intersecting sites. We conclude with thoughts on the significance of conceptualizing rules as constituted through dynamic and contested sites in which sustainability, and related production and consumption practices, are defined.

We collected data aimed at understanding the structures and politics of rule-making processes. Between 2009 and 2013 we reviewed WWF Dialogue process documents and background papers, as well as media coverage on the process, creation and implementation of the final rules. We conducted semi-structured interviews with nine Dialogue participants (one from industry, six from NGOs, two scientists/consultants). These interviews focused on the rule-making process and individuals' rationale for and experience participating in a multi-stakeholder rule making process. Of these, we contacted two participants for follow up interviews. We also conducted interviews and email communication with two representatives from the Aquaculture Stewardship Council to understand the relationships between this organization and the WWF Dialogue process. These data enabled us to analyze the structures of rule-making and point to its relation and significance to the broader aquaculture sustainability assemblage, an effort that we argue helps to explain why the assemblage as a whole is not reducible to a single logic.

Situating rules in the sustainability assemblage

Rule-making processes are situated in social, economic, and institutional relationships that define and produce "sustainability" as an empirical and measurable construct. Studies of certification standards highlight how rules mediate relationships between producers and consumers and in doing so create and shape spatial configurations of labor relations, land use, and production-consumption dynamics (e.g. Mutersbaugh, 2005b; Vandergeest, 2007). Far less attention has been paid to the rule-making processes that structure these changing practices. We propose that rule-making is a site or set of interacting sites of change within a global sustainability assemblage. Framing this study with an assemblage lens recognizes that rules are developed in the context of often unruly, ill-bounded, mobile, and changing character of a complex set of actors, institutions, and phenomena (e.g., technological systems, regimes of value, circuits of exchange) that are not simply local or global (Collier and Ong, 2008; Hollander, 2010). These actors and elements come together through rule-making processes in highly contingent, situated ways.

Our focus is not on delineating the formation and nature of assemblages, or on mapping how knowledge may constitute an assemblage or the specific tradeoffs and content of the sustainability rules, but on how rule-making processes operate and are part of sustainability assemblages. Within an assemblage, expert systems that make scientific and technical knowledge produce global forms like "universal" guidelines for sustainable production practices. Such global forms can be de- and re-contextualized to move across diverse social and cultural situations (Collier, 2006; Collier and

Ong, 2008).[1] In the case of eco-certification, definitions that emerge from rule-making processes, as well as the groups that develop them, gain legibility and functionality when they are adopted in heterogeneous domains. For example, a single rule might be applied both in an industrialized country retail market when a firm makes procurement decisions around a particular eco-label, and at an aquaculture farm in a developing country that restructures production to secure certification and access to retail markets. Most studies of the role of rules in sustainability assemblages have focused on how "a rule" moves through and structures productive and social relations across the chain.

For example, Dunn (2008) identifies food safety standards developed by the International Standards Organization (ISO) as a global form designed to produce functionally comparable results in disparate domains. Her work elaborates that as actors commit to global forms, they define new material, collective and discursive relationships. In her case, the European Union's commitment to ISO food safety rules comes to bear on the ways that meat is produced and consumed in post-socialist Poland, and by whom. As in much research on the impacts of certification standards on social and environmental relations of production (e.g. Bacon, 2005; Foley, 2012; Ponte, 2008), though Dunn (2008) finds that the outcomes and consequences of implementing the rule are heterogeneous, the rule itself is not. Dunn portrays the standard as an immutable form that structures (though in surprisingly unruly ways) the assemblage of meat production. The immutability of the standard is notable because the literature on assemblages argues that global forms are not static, rather, they are unstable and constantly under negotiation (Collier and Ong, 2008). The instability of the global form helps to explain why the assemblage is not reducible to a single logic, but rather is structured through critical reflection, debate and contestation (Collier, 2006). This then raises the question and the problem of how to understand the dynamic nature of the rule itself.

Insight comes from research highlighting three moving parts associated with eco-certification standards: the rule-making process itself, the dissemination and application of rules, and the relations between distinct but related rule-making bodies. First, a voluminous body of literature on private environmental governance has addressed how the structure of green rule-making bodies – including the ways they draw upon science, which actors are included in rule-making, and institutional design – influences their legitimacy, credibility and authority (Bernstein and Cashore, 2007; Busch, 2000; Cashore, 2002; Green, 2013; Hatanaka, 2010). As institutional design has garnered attention, state and non-state actors alike have adopted participatory, multi-stakeholder rule-making procedures (e.g. Bostrom and Hallstrom, 2010, 2013; Brosi and Biber, 2012; Brosius et al., 1998; Dingwerth and Pattberg, 2009). The logic that participatory rule-making increases knowledge and expertise exchange, the legitimacy and acceptance of resulting rules and the range of sustainability issues up for negotiation underwrites this shift (Cheyns, 2011; Ponte, 2014). Further, a participatory structure promises to reduce power asymmetries between the rule-maker and rule-taker, creating an even playing field in which all voices will be incorporated into rules. However, in practice, politics, economics and notions of environmental expertise inside of the rule-making process shape the emergent green rules (Campling and Havice, 2013), even in formats dedicated to open, inclusive and participatory rule-making (Ponte, 2014). Analyses of rule-making structures demonstrate dynamic configurations *inside* individual rule-making processes.

Second, green rules are malleable and respond to the heterogeneous environments through which they operate and move. For example, (Baird and Quastel, 2011) investigate the dynamics associated with implementing the US-formulated dolphin-safe tuna standards – an immutable mobile designed to uniformly manage the environmental impacts of tuna production processes around the world – into production sites in Thailand. Applying a single rule into multiple sites is critical to the maintenance of the dolphin-safe assemblage. Thailand is the world's largest tuna processing nation (by volume and value); thus, producers operating there must be in compliance in order for the rule to be meaningful. However, concerns specific to the Thai context required the dolphin-safe certification to include a broader array of issues – such as local social justice struggles – than were included in the original formulation of the rule. To gain relevance beyond the US context, the rule had to be modified to conditions in the location in which it was applied, thus demonstrating that the rule is malleable, not immutable.

Third, distinct eco-certification standards and rule-making bodies interact. Such interactions can shape the rules and create multiple, at times conflicting, approaches to sustainability within a single assemblage. A few examples are illustrative: Mutersbaugh (2005a) illuminates that the neoliberal emphasis on regulatory harmonization has increased the importance of multilateral standards (such as WTO rules and ISO standards) to the exclusion of network-specific, localized standards. Gulbrandsen (2010) notes that in the process of designing rule-making structures, the Marine Stewardship Council (MSC), the non-state body creating standards for sustainable capture fisheries, looked to its predecessor, the Forest Stewardship Council (FSC) for lessons. The MSC reduced the number of stakeholders in rule-making to move the process quickly and reduce contestation that FSC experienced in its rule-making exercise. Overdevest (2010) shows that competition between, and public comparison of, the Forest Stewardship Council and rival industry-sponsored schemes contributed to an upgrading of industry standards. Miller and Bush (in press) compare the credibility and authority of two competing standards that apply to sustainability measures of the Western and Central Pacific tuna fishery. Their analysis shows that the introduction of an MSC scheme for sustainable tuna has called into question the credibility of the once-dominant global form of sustainability in the region – the Earth Island Institute's dolphin-safe regulation. These examples demonstrate that distinct rule-making bodies compete, challenge, and learn from each other, which in turn impacts the ways that sustainability assemblages are structured and restructured.

We draw on these contributions to gain analytical insight into the nexus of rule-making processes that underlie the aquaculture sustainability assemblage. We contest the notion that rules are immutable objects by examining how actors in multiple sites engage in rule-making and, in the process, critically reflect on and potentially redefine certification standards. Rule-making involves observers in diverse settings weighing in on the definition of sustainability, and the best approaches to developing this definition. Approaching rule-making in this way reveals a fundamental tension in the global sustainability assemblage specifically, and in market environmentalism more broadly: on one hand, rules are an effort to standardize and universalize; on the other, the global form that is to order the pieces of the assemblage toward a unified vision of sustainability is itself unstable. We approach rule-making as a site of inquiry, exploring the multiple and overlapping sites in which the rules that govern sustainable aquaculture are formulated.

[1] The global assemblages framework builds from Deluze and Guattari (1986), for whom assemblages are contingent and shifting interrelations among 'segments' – institutions, powers, practices, desires – that constantly, simultaneously construct, entrench and disaggregate their own constraints and oppressions.

Rule-making for the sustainable aquaculture assemblage

Sustainability narratives are often grounded in scientific and discursive practices that identify a problem, its global significance, and possible solutions (Corson and MacDonald, 2012). The drive to define sustainable aquaculture practices stem from NGO, industry and international institutions' efforts to frame acute sustainability challenges across seafood sectors, beginning with wild-caught fisheries. By 2002, the Food and Agricultural Organization (FAO) had categorized more than three quarters of all capture fisheries as fully or over-exploited, the result of decades of intensifying industrial fishing and expanding consumer demand (FAO, 2002). Amidst these deteriorating conditions, some firms, advocacy groups, and scientists proposed aquaculture as an alternative with the potential to meeting growing seafood demand while relieving pressure on marine fish populations. For example, industry association Global Aquaculture Alliance asserts that "Aquaculture is the *only* sustainable means of increasing seafood supply to meet the food needs of the world's growing population" (emphasis added).[2]

In 1980, farmed fish provided nine percent of global seafood consumption; by 2012, this share had grown to over 50 percent. As aquaculture production proliferated, so too have concerns over the impacts of the sector (for an early account, see: Primavera, 1991). By the mid-1990s, scientists and advocacy groups were systematically identifying ecological and social problems associated with fish farming. Meanwhile, advocates organized consumer boycotts of farmed shrimp (Lohmann, 1995), piquing the interest of retailers who began considering how sustainability issues might impact business. Since this time, numerous studies have exposed environmental and social problems, raising the question of whether the aquaculture sector can grow without imperiling the environment (Boyd et al., 2005; Goldburg and Triplett, 1997; Naylor et al., 2000, 2009; Primavera, 1998; Stonich and Bailey, 2000; Stonich and Vandergeest, 2001; Varela, 2001). Examples of highlighted problems include:

(1) *Habitat modification:* fish farms generate land use changes and habitat destruction as coastal ecosystems, especially mangroves and wetlands, are converted into production sites.
(2) *Biological, organic and chemical pollution:* farm escapees may alter the genetic makeup of native fish populations, introduce competing species into ecosystems, or spread pathogens to wild stocks. Intensive farming methods contaminate rivers and coastal waters with fish waste and antibiotics which can cause eutrophication and concern about antibiotic resistance.
(3) *Fish feed:* some farms use wild-caught fish as feed for cultured species, a practice that can exacerbate pressure on capture fisheries. At times more fish protein is used to feed the farmed species than the aquaculture process provides.
(4) *Social concerns:* fish farms may displace local communities and create conflicts over access to marine and freshwater fishes; some large farms and processing facilities are under scrutiny over labor conditions, human trafficking and slavery.

States are often blamed for enabling environmentally harmful aquaculture practices and accused of being unable or unwilling to create and enforce protective regulations (Vandergeest and Unno, 2012). As such, voluntary, non-state, market-based approaches, including certification, have emerged to fill a perceived regulatory gap and meet growing demand for legible accounts of sustainability. Eco-certification was first used in the seafood sector in the mid-1990s with the dolphin-safe tuna label (Baird and Quastel, 2011). In 1998, WWF and Unilever (at the time the world's largest purchaser of seafood products) co-founded the Marine Stewardship Council (MSC), now the dominant certification body for wild-caught seafood (Gulbrandsen, 2010). However, the MSC declined to make an aquaculture certification, leaving a gap in this emerging aquaculture sustainability assemblage that other actors have rushed to populate. While at least ten global aquaculture certification standards had emerged by 2013, the volume of certified product has lagged far behind, with only 4.6 percent of total aquaculture production certified by the available schemes (Bush et al., 2013).

The combination of sustainability problems and private certification has turned the definition of "sustainable aquaculture" into a valuable commodity (alongside the fish) that multiple groups seek to lay claim to and contest. Value can emerge in financial, reputational or market access, among other forms, all of which are linked to the relationship between the emergent rules and their uptake in the aquaculture sustainability assemblage. For example, rule-making organizations can earn revenues by charging royalty fees for the use of their logo on certified products, which fund their operations and generate profit. Retailers and catering firms procure eco-labeled seafood to depict themselves as "green", change supply chain practices to secure long-term supply, and in some cases to charge sustainability price premiums. Industry and environmental organizations sponsoring certification programs gain recognition as leaders in sustainability. Meanwhile, demand for the services of auditing firms creates a new sector within the industry. Fish farmers use certification to enter new markets and improve their reputation in national and local contexts; those who cannot comply with new sustainability rules may be excluded from markets. As a result, the aquaculture sustainability assemblage includes a wide range of players including corporations, fish farms, competing certification schemes, international institutions, among other actors and elements (cf. Hollander, 2010, examining the formation of an ethanol assemblage).

Within the aquaculture sustainability assemblage, we suggest rule-making processes not only play a central role in structuring relationships throughout the specific assemblages, but also generate multiple sites for creating and contesting the rules that define sustainability. There are at least three important rule-making sites informing the aquaculture sustainability assemblage: (1) the certification market; (2) the rule negotiation process; and (3) the process of making a certification scheme operational. Our data collection focused on the structure of and relationships among these sites, rather than the specific content of rules or the aquaculture sustainability assemblage as a whole.

Site 1: Entering the certification market

Three species-specific certification schemes dominate the aquaculture certification landscape: The Global Aquaculture Alliance Best Aquaculture Practices (GAA-BAP), the WWF-formed Aquaculture Stewardship Council (ASC), and GLOBALG.A.P, each of which has spawned its own rules and rule-making structures for defining how an aquaculture sustainability assemblage should be structured.[3] Here we focus on GAA-BAP and the ASC schemes, both of which create an eco-label and third-party certification process; we do not address GLOBALG.A.P., which is a business-to-business scheme.

[2] http://www.gaalliance.org, accessed 12 July 2013.

[3] GAA-BAP, ASC and GLOBALG.A.P. certify 23.3 percent, 4.7 percent and 72 percent of total volume of certified product, respectively. Roughly 2.7 million tonnes of aquaculture product were certified annually between 2011 and 2013, and volume of certified product is growing rapidly as ASC rules are taken up (Bush et al., 2013).

In 1997, aquaculture industry interests created the Global Aquaculture Alliance (GAA), an industry association with membership of corporate farmers, processing companies, and major buyers such as Darden Restaurants and Lyons Seafood and a mission to advance environmentally and socially responsible aquaculture. Recognizing that environmental advocacy campaigns around shrimp endangered their industry, GAA developed certification standards that retailers could use to verify sustainability. The first entrant into aquaculture eco-certification, in 1999, GAA introduced the Code of Practice for Responsible Shrimp Farming which the group refined into "Best Aquaculture Practices" (BAP) between 1999 and 2005. It then founded the Aquaculture Certification Council (ACC), an ostensibly separate organization that certifies fish farm compliance with the Best Aquaculture Practice guidelines.

GAA was the first organization to develop a globally applicable, third party, aquaculture sustainability standard. To do so, it tightly managed an expert-driven rule-making process, informing decision-making with analyses and data from industry and consultants. GAA did not elicit input or feedback from the public and had limited engagement with NGOs. It aimed to produce concrete rules (immutable mobiles) that could be applied globally. The resulting certification serves multiple purposes for the industry association and its members. Producers pay for the certification auditing process and a royalty for use of the label; revenues fund the industry association's activities, including lobbying on behalf of its membership. Further, by supplying its own definition of sustainability, the certification protects GAA's members from alternative certifications (that might have more arduous requirements or auditing procedures) and efforts to strengthen government oversight of industry.

In 2005, seafood buyers Wal-Mart, Darden, and Lyons Seafood announced that they would require their shrimp suppliers to adopt GAA rules. GAA then expanded into developing Best Aquaculture Practices for fin fish, targeting the largest and most lucrative markets. In capture fisheries, the wave of retailer commitments to MSC certified products was already restructuring the capture industry as fishers changed production practices to comply with buyer demands (Vandergeest, 2007). GAA was similarly poised to influence the definition of sustainability in aquaculture, as well as the related on-the-ground restructuring. In 2013, using GAA-BAP standards, the ACC certified 640,000 mt of aquaculture product (Bush et al., 2013), up from 212,000 mt in 2011 (Jonell et al., 2013), making it the largest third-party certifier for the aquaculture sector.

Amidst rapid uptake, GAA's rules came under scrutiny from academic and advocacy groups. Studies, including one commissioned by WWF, concluded that GAA and other aquaculture standards focused on production *practices*, rather than measurable environmental *impacts*, and as a result would not yield quantifiable improvements in environmental conditions. They criticized GAA and other aquaculture certification schemes for ignoring wider ecosystem, social, and economic processes, partly attributing these shortcomings to GAA's closed-door rule-making procedure (Lazard et al., 2010; WWF, 2007a). To bolster the legitimacy of its rules vis-à-vis these criticisms, GAA altered the structure of its rule-making process, mirroring dynamics in the forestry sector where an industry-led certification scheme had to upgrade its standards and procedures to remain competitive against other schemes (Overdevest, 2010). It reformulated its Standards Oversight Committee and Technical Committee membership to include equal representation from industry, NGO, and academic/regulatory interests; it also shifted to a step-wise rule-making process that included posting draft standards online for public comment periods.

As GAA began to control the definition of sustainable aquaculture, particularly in North America, WWF considered how to build on its leadership in market-based sustainability to influence aquaculture. It explored and rejected the possibility of joining forces with GAA to build a single sustainable shrimp standard, believing the two organizations' respective views of sustainability and methods for setting standards were fundamentally incompatible. According to one WWF representative, "[GAA] didn't want to relinquish final say on standards so there was never any way that we could collaborate."[4]

In 2004, WWF decided to develop rules that could compete with, and provide an alternative to, GAA's definition of sustainability. It initiated the Aquaculture Dialogues, a series of species-specific, multi-stakeholder standard-setting processes. To launch the dialogues, WWF staff contracted scientists and industry experts to identify environmental and social challenges in aquaculture. WWF reiterated sustainability problems and argued that existing certification efforts lacked legitimacy and stringency (e.g. Boyd et al., 2005; WWF, 2007a). Recognizing that it was already lagging well behind the GAA, the organization made two moves designed to bolster its significance in the aquaculture sustainability assemblage. First, WWF indicated it would generate performance-based (rather than practice-based) rules to emphasize outcomes, rather than procedures. Second, the rules would be developed in an open forum with the goal of using participation to generate rigorous requirements and incorporate criteria and perspectives excluded from GAA's industry-developed standard. "Participation" was a key rationale for WWF's decision to enter into the certification market and compete with GAA. According to WWF, its standards are "created by a diverse and balanced group of stakeholders. More than 1500 people are participating in the Dialogues because they want something different – more sustainable – than what is out there. They have a stake in the outcomes."[5] In short, WWF asserted that the Aquaculture Dialogues would yield alternative rules that would more legitimately define sustainability.

At the time of writing, competition between the GAA and WWF rules had emerged as retailers and producers were choosing which rule they would adopt to demonstrate their sustainability, while ensuring quantity of supply. In practice, which rule producers adopt is affected by a range of factors, with many producers and retailers considering adopting both schemes. For example, in early 2014, Loblaw, Canada's largest grocer and biggest seafood buyer and seller, announced plans to sell salmon certified with rules from the WWF process, in which it participated. In contrast, Cooke Aquaculture of New Brunswick, a major Atlantic salmon producer, chose to certify its salmon with the GAA guideline. Though Cooke too was involved in the WWF process, the firm could not wait for the slow-moving WWF rules to be implemented. While Cooke indicated that its customers, including Loblaw, are pleased with the GAA rule, the GAA rule has been criticized as not being an independent third party certification. A Cooke representative said that the firm would consider adopting WWF rules if the market demands it, and that Loblaw is using the WWF process to distinguish itself in the marketplace (Erskine, 2014). This example illustrates considerable jockeying around adoption of the various certification schemes, where producers and buyers are illustrating which features of the certification are most important to their business model and role in the aquaculture sustainability assemblage.

The GAA's early move and WWF's response demonstrate that multiple actors are competing for influence in the sustainability assemblage. Within this process, rule-makers invoke rule-making procedures to establish or dispute a standard's legitimacy. Reiterating claims that certification schemes can gain legitimacy through transparent decision-making procedures (e.g. Dingwerth and Pattberg, 2009; Gulbrandsen, 2010), WWF turned to an open, multi-stakeholder negotiation that would distinguish its rule from that of the GAA. WWF moved into the certification market by ini-

[4] Personal communication, NGO 2, June 2013.

[5] http://www.worldwildlife.org/what/globalmarkets/aquaculture/dialogueues-faqs.html#14, accessed 12 July 2012.

tiating a process in which it ceded control over rule content in favor of prioritizing the rule-making procedure. WWF's choice created a new site in which a range of industry, NGO, and scientist actors were able to asserted their interests as participants *inside* the rule-making process.

Site 2: Negotiating sustainability rules

Many aquaculture certification schemes are designed to target sustainability on a species by species basis. In keeping with this practice, beginning in 2004, WWF initiated eight species-specific rule-making roundtables: abalone, bivalves, cobia-seriola, freshwater trout, pangasius, salmon, shrimp, and tilapia. As of 2014, all but one Dialogue had generated final standards. In this section, we investigate a second site in which the definitions of sustainable aquaculture production are dynamically constructed and contested: rule-making inside a Dialogue. We begin with an overview of the rule-making structure, and WWF's role within, before turning to the dynamics of negotiations among participants. We consider examples from the Tilapia Aquaculture Dialogue because it was the first Dialogue to conclude with a final standard.

To guide the Dialogue process, WWF employed the ISEAL code of practice for setting social and environmental standards to create an institutional structure for coordinating participation.[6] In each Dialogue, participants chose one of three governance structures: (1) a *Global Steering Committee* model, in which a centralized group of participants decides on goals, objectives, and rules, and seeks feedback and approval from a larger Dialogue group; (2) a model in which *Regional Steering Committees* draft content with approval from the larger dialogue and a Global Steering Committee consolidates regional drafts and finalizes the rules; or (3) a model where a *Process Facilitation Group* guides rule-making but has no decision-making power. This flexibility differentiated the WWF process from the GAA: participation was open to all, and participants decided how rule-making would occur. To make participation open for those unable to attend the meetings, WWF posted documents and meeting reports on its website and draft standards were available for public comment periods.

Nonetheless, WWF had difficulty recruiting and retaining the mix of participants needed to fulfill its multi-stakeholder promise. The number and diversity of participants in the species-based roundtables varied greatly, reflecting the characteristics of the species and industry structure in question. Participation in the Tilapia Dialogue, for example, was significantly lower than for shrimp and salmon, the latter being higher profile and value species with contentious environmental and social records. More than 600 participants were involved in each of the salmon and shrimp rule-making processes, while 200 people engaged in the tilapia rule-making process. In some Dialogues, WWF faced difficulties in ensuring a representative range of participants from developing countries – a key gap since much aquaculture production takes place in the global south. NGO participants tended to be aquariums and environmental groups based in the US and Europe.

Dialogues for lower-profile species, like tilapia and bivalves, were less populated because NGOs strategically invested in high profile species. Early on, WWF offered funding to enable NGOs to participate in Dialogues with sparse attendance, but ended the practice to avoid being seen as influencing the negotiation process. By contrast, industry actors focused on species that they produced or marketed. As a result, compared with NGOs targeting multiple Dialogues, sometimes with the same small staff, industry actors focused on a single Dialogue.[7]

Participants self-selected and committed to negotiating a globally applicable sustainability standard for each species. As a result, those who reject market-based certification as a mechanism for governing aquaculture did not internally influence the process. Despite the claim of an inclusive and open process, actors needed substantial resources to participate in the long-running process, meaning that engagement was easier for powerful NGOs or firms. Small farmers or NGOs that did not have resources to participate were largely absent, a key critique of WWF's inclusivity claim (Belton et al., 2009). Those who did participate cited "Dialogue fatigue": over time, the demanding multi-year processes steadily thinned the pool of regular participants.

The Tilapia Aquaculture Dialogue (TAD) was negotiated between 2005 and 2009 (Table 1) (see Belton et al., 2009, 2010). The TAD held a total of six open meetings. The Dialogue produced a draft standard released for public comment in 2008 and a revised draft circulated for a second round of public feedback in early 2009. After revisions, the Dialogue released final standards in December 2009. The five key TAD negotiating areas were fish feed, water pollution, habitat damage, fish escapes, and social conditions. A major difficulty was developing rules applicable to the diversity of production practices – from large scale industrial methods to simple pond production – used to grow fish. While large scale farming companies from Ecuador and Central America played a central role in negotiations, WWF was unable to consistently attract participation from producers from Asian countries or advocacy groups from developing countries. Small scale farmers in general were absent (Belton et al., 2009). This was even though WWF aimed to create globally applicable standards and recognized that 80 percent of the world's tilapia is produced in China alone (WWF, 2007b). Across the Tilapia Dialogue process, total stakeholder participation was 33% NGOs, 27% farmers, 22% researchers and 11% retail and allied business interests.[8] There are no available data detailing the consistency of participation among the ~200 individuals who participated at some point throughout the process.

Negotiating dynamics inside the rule-making process shaped the emergent definition of sustainability. Based on the multi-stakeholder certification literature, we initially hypothesized that in the TAD, participating groups (e.g., aquariums, fish farmers, academic researchers, and NGOs) would represent their own interests and contest other participants' definitions of sustainability, as well as WWF's authority over rule-making. Interviews revealed that participants originally entered into the negotiations with this approach; each wanted the rule to meet his or her institution's needs.[9] Industry participants, for example, recognized that retailers would continue to demand eco-labeled products, and that WWF was situating itself to change the certification market. They participated to fend-off over-idealism, make the TAD standards "realistic" from a production standpoint, or have their own progressive efforts to improve sustainability ratified. Some industry actors wanted standards to codify what they were already doing so that they would not have to alter their practices. Companies found that they could achieve strategic benefits from participating: for example, they could gather information about competitors' production methods.

In turn, some NGOs cited the emergence of the GAA and the rapid movement in retailer commitments to certified products as incentive for participation. Some NGOs wanted to use the TAD to

[6] Participatory rule-making is now so common that the International Social and Environmental Accreditation and Labeling Alliance (ISEAL) has formed and released a code of practice for multi-stakeholer negotiations. The code emphasizes that participation should be representative and meaningful (Djama et al., 2011). ISEAL's existence highlights an aspect of the sustainability assemblage developing specifically around rules and rule-making procedures.

[7] Personal communication, NGO1, September 2011.

[8] WWF data compiled into a document entitled 'Stakeholder participation in the TAD (percentage by individuals)', no date provided.

[9] Personal communication: Industry1 December 2011; NGO 1 September 2011; NGO 5 November 2011; NGO 6 November 2011; Scientist 2 November 2011.

Table 1
Tilapia aquaculture dialogue timeline.

WWF TAD Dialog 1	27–28 August 2005 (WWF Offices, Washington DC, USA)
WWF TAD Dialog 2	17 February 2006 (Las Vegas, NV, USA)
WWF TAD Dialog 3	14 November 2006 (Miami, FL, USA)
WWF TAD Dialog 4	26–27 August 2007 (Kuala Lumpur, Malaysia)
WWF TAD Dialog 5	27 February 2008 (Boston, MA, USA)
Draft Standards 1.0	27 September 2008
Comment Period 1 of 2	29 September–3 December 2008
WWF TAD Dialog 6	15–16 December 2008 (Washington DC, USA)
ASC launched by WWF	27 January 2009
Draft Standards 2.0	May 2009
Comment Period 2 of 2	27 July–27 September 2009
Final Standards	17 December 2009
TAD auditor manual	29 December 2010
Tilapia standard handed over to ASC	May 3, 2011
First ASC & tilapia certified farm	20 August 2012 Regal Springs, Indonesia
First certified tilapia farm in the Americas	14 November 2012 Aquamar, Ecuador

raise the bar set by industry-led GAA certification. Other NGOs saw the WWF process as consistent with their theories of improvement in aquaculture: a move to link sustainability to universal, measurable metrics of improvement. For one NGO, it presented the opportunity to overcome the stalemate between industry and NGOs. For another, the dialogue presented incremental change and gradual movement toward production practices and markets that create no environmental harms. NGOs also derived practical benefits from the negotiations: they could build relationships and develop partnerships with producers, retailers, and seafood vendors. One NGO sought to increase uptake of its own sustainable purchasing guidelines; another positioned itself to field-test the audit manual upon conclusion of the Dialogue (SFP, 2011).

The TAD fish feed debate offers an example of the give and take among participants, as well as the technical nature of negotiations (WWF, 2006, 2007c, 2008a,b). WWF did not highlight feed in its framing documents, but TAD participants identified feed as the second most important sustainability concern, after water quality. Two feed-related issues emerged. First, negotiators sought to address the use of wild-caught fish in feed to ensure that aquaculture production would not deplete wild stocks. Debate centered on which requirements would govern feed sourcing. Industry wanted to use Fishsource (a private, non-audited scheme) as a proxy for sustainable inputs, while NGO negotiators proposed that only MSC certified fisheries could be used for feed. The final rule is a compromise: within five years of getting certified, farmers must use feed only from an ISEAL-compliant certified source. In addition, fishmeal must not include any fish from the IUCN's Red List or the CITES list.

Second, negotiators sought to address "fishmeal conversion efficiency" to limit the volume of feed used in production and related pollution, waste, and economic losses. Debate centered on how to measure conversion efficiency, and how demanding the target should be. The TAD resolved these debates with a highly technical rule that addresses both. The TAD Fish Feed Equivalency Ratio (FFER) requires that the volume of fish used in meal should not exceed tilapia output and defines an "efficient" feed to product ratio. Some industry negotiators urged that the bar be set at a FFER of 0.8, whereas other industry and NGO negotiators wanted a 0.5 ratio. In the end, participants agreed on the 0.8 efficiency ratio.

Interviews and meeting reports revealed multiple ways that "participation" was filtered through the negotiation process to come to such resolutions, including through: controlling information and science, asserting (or denying) particular expertise, and raising normative arguments (e.g., that wildlife habitat should not be harmed). For example, at the start of negotiations, NGO participants identified specific sustainability issues and proposed solutions. A participant explained that "the NGOs tell us the problem that we have to solve. . . . NGOs say, 'this is the issue, this is the impact, this is what we think we know'. . . . In a properly functioning Dialogue, industry says ok, that's interesting, here's what we *do*, here's what we *could* do. Industry acknowledges an impact. Then the NGO pushes back and asks: *what else* could you do?".[10]

Industry participants used their knowledge of production data to counter NGO authority. When it came to reviewing environmental problems and industry practices to set standards, it became evident that the few larger-scale industry actors participating in the negotiation were prime information brokers. A member of the Steering Committee from industry explained: "Industry is the only actor that measures impacts. Researchers measured controlled experiments. Industry data was a lot more valuable. . . . NGOs have never been questioned to the level of detail that we got into in the Dialogue, so it was hard for them to maintain their righteousness because at some point, they were humbled."[11] Since industry could provide data on industrial farming, they gained particular influence in negotiating sustainability. However, industry, NGOs, and academic researchers all lacked complete knowledge on the diversity of non-industrial tilapia production practices, particularly in Asia, making it impossible for the group to create rules that could encompass global production, as was the initial ambition (see also, Belton et al., 2010). In response, the Dialogue group limited its scope to industrial production that would supply North American and European markets, confining the extent of the Dialogue's influence.

While these dynamics were consistent with our initial hypothesis, two unexpected findings complicated the process through which power was exerted in negotiations and by whom. First, over time, participants learned about each other, developed shared theories of change, and became dedicated to completing negotiations. As a result, a core negotiating group formed and committed to cooperatively advancing rule-making. Second, upon conclusion of the Dialogues, the need to translate technical rules into an audit-ready certification scheme created a third rule-making site in which the definition of sustainability continued to be adapted (see Section 'Site 3: Making certification schemes operational' below).

On the former, the extensive time and resources that participants committed over the five years of TAD rule-making gradually narrowed participation to a core group of negotiators and a six-person Steering Committee comprised of three NGO members (the New England Aquarium, Sustainable Fisheries Partnership, and WWF) and three tilapia company representatives (Aquamar, Rain Forest Aquaculture, and Regal Springs Trading Company) (TAD, 2009). Notably, two of these firms were among the first to

[10] Personal communication, NGO 4 November 2011.
[11] Personal communication, Industry1, December 2011.

earn a certification based on the rules they helped make, demonstrating a direct link between the rule making process and production practices. While individual interests remained important throughout, the negotiating dynamic led to the formation of a group identity, rather than a contest among atomized interests. One NGO participant recalled, "People learned a lot by sitting at the table and having to hash things out ... You start to deal with people as people: they're not their sector, they're people".[12] The core participants built an iterative trust that they were all working for the common goal of contributing to a larger, longer term process of change and improvement – not necessarily eradication – of negative environmental and social outcomes in the tilapia sector.

As the Dialogue proceeded, decision-making centralized in the self-selected Steering Committee, which commissioned technical experts, drafted rule content, and decided which feedback to include in draft standards. In contrast to the fluctuating Dialogue membership, the Steering Committee provided the process memory that moved negotiations forward. This group became the clear leader of the process. According to one NGO participant, "WWF would like to say 1000 people showed up, but showing up and saying nothing isn't participating, it's just showing up. I would suggest that the solid participation was from Steering Committee members who were responsible for doing the work".[13] Another NGO negotiator said, "Participation in the Dialogue was mainly from the Steering Committee because the process and facilitators realized that public meetings were a waste of time ... every time we had another public meeting and relied on the meeting to feed content into the rules, we had to start all over again – explaining all of the issues, explaining the compromises that had already been made. We need to have indoctrination ... for success."[14]

Members of the Steering Committee recognized the contradiction of a participatory, multi-stakeholder process being controlled primarily by a small group. They argued that while the Steering Committee called for input from a larger set of participants, engagement among all participants in the Full Dialogue was not practical. For example, new entrants would drop into the dialogs through the five year process, at times raising issues that the Dialogue had already resolved. Regular participants saw new entrants as disrupting progress and felt justified in determining which "new" perspectives to ignore and which to incorporate. Likewise, WWF asserted that the 48 public comments on the two draft standards represented broad participation. Yet, the Steering Committee ultimately "put the cap on the bottle"[15] to manage public input that was inconsistent with the definition of sustainability emerging in the full Dialogue and the Steering Committee. A member of the TAD Steering Committee commented on sifting through public comments: "[The two public comment] processes were difficult: some comments were off the wall. ... Some things you could ignore."[16] In this way, commitment to sustained participation in the rule making process, rather than technical expertise or conviction about issues, influenced the definition of sustainability.

The choice of a multi-stakeholder negotiation process and the choice of rule-making procedures enabled participants to insert their interests, and many did so in hopes of influencing the link between rules and practices across the aquaculture sustainability assemblage. However, despite WWF's claims of inclusivity, participation was limited by the interests of those groups able to sustain participation, resource availability and eventually, the need to "conclude" negotiations. Participation moved from being widely open to focused around a core group of negotiators. Over time, this core group began to see their rule-making work as one piece of a larger process of change; they conceptualized the Dialogue as one of many sites and processes that are in flux as rules are implemented, evaluated, and intersect with competing rules, production realities and market processes.

Site 3: Making certification schemes operational

Rule-making did not end with the Dialogue's "final" standards. Once the Dialogue participants agreed on the rules, WWF's institutional choice for operationalizing them created a third site that continues to formulate the definition of sustainability. In this section, we assess how Dialogue rules are converted into an operational, deployable structure to certify "sustainable" practices and verify a secure chain of custody across the assemblage from farm to market.[17] We pay particular attention to how the priorities of the organization that implements the rules relate to the outcome of the Dialogue rule-making process. Our analysis reveals that the organization responsible for "holding" the rules and translating them into the certification process becomes a rule-making venue in its own right.

WWF began the Dialogue process before determining how it planned to use the standards that would emerge from it. As a result, the TAD and all Dialogues began their negotiations without a specific target certification scheme, though with the idea that the resulting standard would be used for a third party certification scheme. Initially, WWF hoped MSC would use the Dialogue rules to expand into aquaculture.[18] After MSC announced that it would not pursue aquaculture, WWF partnered with the Netherlands-based Sustainable Trade Initiative, a multi-stakeholder organization with a mission to catalyze sustainable trade. In January 2009, they launched the Aquaculture Stewardship Council (ASC), an independent organization responsible for "holding" the Dialogue rules and supporting third party certification and audits of fish farms. The separation between rule-making and rule-holding was designed to increase the legitimacy of the ASC scheme, unlike the MSC which both creates rules and facilitates the certification process. As with the MSC, WWF sought to separate the rule-making process from the audit process to enhance credibility. In practice, the body holding the rules in between rule-making and auditing has emerged as a site for contesting and modifying rules.

When WWF created the ASC, it promised ASC-certified product to organizations funding the long Dialogue process and retailers waiting to sell sustainable aquaculture products. As a result, the Dialogues encountered pressure to end negotiations so that rules could be transferred to the ASC which would begin to catch up with GAA and GLOBALG.A.P. schemes. WWF intensified pressure on those Dialogues with stalemated negotiations, in particular the Salmon Dialogue, representing an important market segment by volume and value. In the Tilapia Dialogue, a WWF representative recalled that there was "an economic feel in the backdrop"; to be viable, the tilapia rule needed to go quickly to the ASC so that significant quantities of certified fish could enter the market.[19] Despite this, the first tilapia farms were not certified until August 2012, three and half years after the ASC announcement and the completion of the TAD rules, and a full five years after the GAA tilapia standard was finalized.[20]

[12] Personal communication, NGO1, November 2011.
[13] Personal communication, NGO4, November 2011.
[14] Personal communication, NGO4, November 2011.
[15] Personal communication, NGO6, November 2011.
[16] Personal communication, Industry1 December 2011.

[17] Farm auditing is an important sites through which the sustainability assemblage takes form; though beyond the scope of this paper, auditing bodies are worthy of further research.
[18] Personal Communication, NGO2, June 2013.
[19] Personal Communication, NGO2, June 2013.
[20] As of March 2014, 24 tilapia farms had been certified with two more in process. There were 144 certified tilapia products with all but one sold in Europe. Source: www.asc-aqua.com.

The delay in making ASC product available was due to further rule-making work, this time in the ASC. Translating the Dialogue rules into an "audit ready" format proved time-consuming and raised technical issues about the Dialogue rules. Devising TAD metrics on water quality is one example. According to a member of the TAD Steering Committee, the TAD agreed on a water quality measurement: a minimum depth at which a secchi disk (an 8 inch black and white plate that is lowered into water on a dowel or by rope) is visible in the farm's water column. According to the Steering Committee member, "It seems innocuous on how that transfers to the ASC, but then when you put it into practice, it becomes a mess. You have to look at times of day, whether it is measured by averages and if those are daily or monthly averages."[21] As a result, the ASC established a process for defining metrics to verify water quality, which required interpreting and modifying Dialogue rules.

To facilitate the transition to the ASC, WWF obliged each Dialogue to produce a draft audit manual in addition to the final standard. The nascent ASC partnered with GLOBALG.A.P. to test the manuals at fish farms (ASC, 2010). ASC edited the audit manuals according to the pilots and then proposed changes to the Dialogue rules to accommodate realistic evaluation practices. It formed a Technical Advisory Committee (TAC) comprised of one NGO and one industry representative from each of the Dialogues, and turned to this body for approval for such changes. Notably, this Technical Advisory Committee structure closely resembles the structure of the GAA rule-making process. According to one member of the ASC technical advisory committee (who was also, by design, a Dialogue negotiator), "There were times that [the ASC] said that they came to me alone [for advice on altering the audit manual] because they didn't have time to ask all of the TAC members. [The ASC is] moving so fast. They're moving so fast because it's a business and they need to show cash flow. GAA did the same thing. They made initial decisions as a business case, and they decided to worry about increasing and improving the standards later. For ASC, it's the same."[22] The ASC's interpretation and adaptation of the rules is revising the Dialogue's compromises.

The ASC recognizes that it needs to establish a procedure for updating standards over time, but at the time of writing had not yet determined whether it would make such changes through a participatory process, in keeping with the Dialogue structure.[23] In the meantime, the ASC has already demonstrated the malleability between rule-making and rules. In moving from the Dialogues, the ASC re-framed the rules as yielding "responsible aquaculture" rather than as "sustainable aquaculture". Reflecting this transition, the new ASC logo says "farmed responsibly", a choice that WWF-ASC made to clarify that their performance standards reduce the risk of using unsustainable practices.

Finally, the ASC has begun to evolve into a rule-making site in its own right by drawing on Dialogue rules to make universal standards that will apply across species categories. For example, Dialogue standards each contain guidelines for sustainable feed. According to an ASC representative, the organization has drawn on these specifications to develop an ASC-branded feed standard.[24] Notably, GAA and GLOBALG.A.P. are contributing expertise to this effort with the aim of developing a single global feed standard. The three groups are also in discussions to develop auditing efficiencies across their standards. According to GLOBALG.A.P., "We will not stop our efforts until we have published a single set of criteria and language that can be used to demonstrate compliance with all elements addressing the same aspects in the three standards" (ASC, 2014).

[21] Personal Communication, NGO6, June 2013.
[22] Personal Communication, NGO6 June 2013.
[23] Personal Communication, NGO7 June 2013.
[24] Personal Communication, NGO7, June 2013.

As a result of WWF's organizational choice to separate rule-making from certification, the process of translating Dialogue rules into audit-ready certification procedures has emerged as a third site in which definitions of sustainability are constructed and contested. The newly formed ASC relies upon the multi-stakeholder Dialogue processes as a foundation, but is focused on creating economically efficient, profitable rules that can compete with existing certification bodies as well as introducing new, harmonized certification products into the aquaculture sustainability assemblage. This requires refining the definitions of sustainability created in the Dialogues, developing a range of certification products that connect the ASC with assurances of "responsible" production, as well as collaborating with competing certification schemes. ASC modifications and new certifications are not subject to the participatory process that defined, and justified, the Dialogues that preceded them. In fact, at the time of writing, many signs of the participatory process had disappeared from ASC and WWF informational materials. This development erases years of debate over sustainability definitions, as well as the participatory logic that was the rationale for creating something different from the GAA standard in the first place.

Conclusions

Scholarship on certification has turned attention to the material, social and spatial effects of introducing rules into production systems. In this context, scholars often refer to "the rules" underlying certification in a manner that makes them seem like immutable mobiles: a rigid object that gains its authority as a closed, apolitical, scientific, or technical artifact that restructures production-consumption relations, but itself is not subject to transformation. In contrast, to draw attention to the role of rules and rule-making as a part of the changeable and dynamic nature of sustainability assemblages, we have demonstrated that in the case of certification, rules are subject to ongoing negotiation, and can reflect debate and harmonizing influences within and between rule-making processes in play within a larger sustainability assemblage. Rules are a dynamic and unstable global form around which multiple approaches to creating definitions of sustainability as an empirical and measurable construct emerge and intersect. Looking closely at the structures and processes of rule-making can help to illuminate the origins and implications of this dynamics. Rule-making processes are situated in sets of relationships that operate within and between multiple sites and with a range of logics (e.g. capitalist interests, conservation objectives). Each site is subject to critique and transformation, and the intersections between sites make the definition of sustainability a moving target rather than an immutable object. Thinking of rule-making in this way enables scholars of certification to rethink the ontology of certification rules as part of, rather than an external ordering principle for, the dynamic and contested nature of sustainability assemblages.

This approach reveals an important tension in the global sustainability assemblage specifically, and in market environmentalism more broadly. On one hand, rules are an effort to standardize and universalize; on the other, the global form that is to order the many pieces of the assemblage toward a unified vision of sustainability is itself unstable. A melee of actors and groups, operating in distinct but intersecting parts of the aquaculture sector, use rule-making as a mechanism for establishing the sustainability assemblage and their place within it. Several observations emerge from our aquaculture certification case.

First, organizations' choice to enter the aquaculture sustainability assemblage as a "rule-maker" sets in play struggles over the meaning of sustainability and which actors should be responsible for defining it. Whereas the GAA emphasized "usable" standards made rapidly and in collaboration with industry, WWF chose to

emphasize diverse participation and the critical reflection among multiple stakeholders. ASC became a rule maker as it translated Dialogue rules into audit ready format and began creating its own standards for "responsible" feed products branded with the ASC logo. The approach and outcome of rule-making in each of these sites is subject to critique, competition and collaborative interest from the others. These dynamics render "sustainability" (or "responsible production") a moving target. The instability of the global form – the rules – helps to explain why the larger sustainability assemblage, which is organized around these rules, is not reducible to a single logic, but rather is structured through critical reflection, debate and contestation. While our study focused on the broad structures of rule-making and the intersections among them, in the future, scholars of certification could lend further insights by tracing the movements of specific issues through and across negotiating processes to explain why certain ideas gain traction and others are abandoned.

Second, looking inside an individual rule-making process further de-centers the notion that sustainability rules are immutable mobiles. In the case of the Dialogues, "participation" is presented as a mechanism for creating "better" rules than those made in processes that are tightly controlled, dominated by industry, and/or lacking transparency. The WWF open rule-making experiment enabled detailed exchanges between a group of participants with a diversity of interests in the Tilapia Dialogue, but in the end, the dominant participants were those powerful actors that could commit resources and time to the multi-year process. Decision-making fell to those who were able to remain engaged throughout and was guided by practical considerations: the need to finalize rules in a format that could be translated into a certification scheme.

The complicated relationships among the Dialogue multi-stakeholder process, GAA, the bundling of several Dialogue rules under a single ASC brand, and ASC's ambitions to generate harmonized standards, calls the ontological nature of the final rules into question. One Dialogue participant asked, "Because the standards are written differently and formed differently, does the ASC certification of tilapia mean the same thing as the salmon certification? Do they mean the same thing in terms of sustainability? What does the ASC certification represent?"[25] These questions destabilize the significance of the participatory underpinning of the ASC rules, which has now been almost entirely erased in ASC materials in favor of descriptions of rules made through technical rigor and uniform measure. Across the three intersecting sites identified in this paper, "rule-making" is contested process where sustainability is both constituted and enacted; this process is highly significant not least because the emergent rules (and their continuous revisions and upgrades) become practiced across the assemblage from point of production through to point of retail. As such, rule-making is worthy of careful attention in studies of the form and implications of sustainability assemblages.

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