Examining the 'cultural sustainability' of two different ways of governing fishing practices

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Examining the 'cultural sustainability' of two different ways of governing fishing practices

Abstract

Research has suggested there is a need for an increased attention to the socio-cultural lifeworlds of fishers and fisheries and its importance for fisheries management. An emerging response to this call has been to examine the social and cultural contexts of 'good fishing' – an idea which, drawing on the work of Pierre Bourdieu, has sought to move the discussion beyond simply the economic aspects of fishing to also understand the importance of other forms of capital. Utilising these concepts together with the conceptual idea of 'knowledge cultures', the following paper examines the 'cultural sustainability' of different ways of governing fishing practices – in particular Marine Conservation Zones and voluntary lobster v-notching using a case study approach to the small-scale fishery of Llŷn peninsula, North Wales (UK). The paper observes that those approaches that allow fishers to demonstrate skills and recognises the temporal contingency of fishing lives can be considered more culturally sustainable than others. This paper also notes that culturally acceptable changes to fishing practices can be supported by fishing regulations and, the paper suggests, such innovations are more likely to be taken up by fishers in their everyday fishing practices. The paper recommends that policies seeking to alter fishing practices consider: i) the importance fishers hold in demonstrating their skills; ii)how social relations are as important as economic aspects to fishers long-term uptake of new practices; and iii)the past and the future (such as if a successor is present) holds significance for fishers actions in the present.

Key words: 'goodfisher', 'knowledge cultures', 'symbolic capital', 'cultural sustainability', 'Marine Conservation Zones', 'lobster v-notching'

1 Introducing the study on fishing cultures and fisheries sustainability

> "Our ocean's fishing grounds, once full of life are dwindling. In fact, over 75% of our fish stocks are overexploited. Still, too many huge vessels chase too few fish. Meanwhile, small scale fishermen, who have fished responsibly for generations, are in real danger of losing their jobs and way of life. This threatens the future of our fish and our seas, and the communities that rely on them" [1].

How to achieve fisheries sustainability h as been widely debated within the fisheries management and governance literature [2Đ5]. Fisheries sustainability has broadly been defined as composing of three dimensions: economic, environmental and social. However, recent research has noted that social aspects of fishing sustainability have been under-represented which, it is argued, has had consequences for the fishing way of life that fishers tend to value highly [6,7 also highlighted by the quote above]. Impacts from fishing policies have ranged from changes to fishers' identities [8] through to impacts on fishing family members as well as breaks in intergener ational succession of the fishing occupation and transmission of knowledge [9]. Alongside this, fishing policies have largely focused on bio-economics underpinned by assumptions of fishers acting in line with economic rationalities [10Đ12] However, it has been noted that such assumptions Đ which fail to fully understand the social and cultural contexts in which fishers operate Đ are likely to limit what can be achieved by fishing policy [13]. Recent critiques from socially-inflected research has also cautioned against an overly-myopic focus on the economic issues and called for a greater recognition of how these are nested in, and informed by, wider social and cultural contexts [12]. In light of these shortcomings , there has been a call for a greater application of insights from social science to the discussion of fishing and the fishing industry [7].

The current research adds another dimension to the discussion of fisheries sustainability Đ that is the extent to which they can be 'culturally sustainableÕ [14].[1] In the fisheries management literature it has been frequently suggested there is a need to move beyond Ôtop-downÕ decision

[1] Previous studies have focused on the idea of 'social sustainabilityÕ [70,71] however, it has been described as a "concept in chaos" [72] as it takes on many different meanings. The difference between social and cultural sustainability is not sharp, and indeed the ideas are interrelated, but relates to the differences between how the words social and cultural are commonly understood. McGoodwin [73] writes in his seminal work on fishing cultures that social Đ or Đ *society* "implies a collection of individuals or groups who interact with one another on a more or less ongoing basis, and among whom there are established patterns of interaction. The members of a society may or may not be members of the same culture". On the other hand, according to McGoodwin [73], culture is more to do with human kn owledge, beliefs and values which are open to change and reworking.

making to ‘bottom-up approaches’ to management through means such as participatory governance and decentralisation of decision-making [see ,15]. Others have argued that there needs to be co-management of fisheries where local groups and governments collaborate to reach objectives [see ,16]. However, there is a need for research seeking to understand how external agencies can work with, and within, fishing cultures to enable and encourage change to fisher’s attitudes and practices. Pretty [17] has previously suggested that it is important to enable cultural change in order to achieve conservation objectives as: “Without change in social norms, people often revert to old ways when incentives end or regulations are no longer enforced, and so long-term protection may be compromised”. A novel approach to explore the interface between policy and community is through the idea of capital and the recently evolving literature on the ‘good fisher’ [18,19]. The aim of this paper is to explore how externally induced changes to fishing practices can be embedded (or not) within the fishing culture and the extent to which these may be seen as (or become) culturally (un)sustainable. This paper will explore opportunities for fishing policies to attend to the socio-cultural contexts of fishing and fishers highlighted by the literature on the ‘good fisher’ . This will be done by contrasting two different approaches: i) highly protected Marine Conservation Zones (MCZ)[2], and ii) voluntary v-notching of lobsters, taken to change fishing practices for better environmental sustainability on the Llŷn peninsula small-scale fishery in northwest Wales, UK.

2 Conceptualising the study

2.1 Fisher’s knowledge research and new conceptualfrontiers

Studies of fisheries have had a longstanding interest in the theme of knowledge [20]. One of the main ways in which studies on fisheries have been interested in understanding the knowledge of fishers is through their ‘local ecological knowledge’ or ‘traditional ecological knowledge’ [20–22]. However, Hind [23] argues that fishers’ knowledges are more than *ecological* knowledge. In support of this, different forms of knowledges have been documented in the literature. Research has suggested that some fishers, especially skippers, have institutionalised knowledge required

[2] Whilst the marine governance approach of MCZ is primarily focusing on enabling marine conservation, the focus of this paper is on the ways in which fishers experience these policies – from their perspective. As such, although MCZ is not strictly a fishing policy, the current paper highlights the perspective fishers have on these policies – which often relate to the ways in which they seek to alter fishing practices.

for them to obtain licenses whilst other types of knowledges are more traditional, learned by experience, and passed down through generations [19,24,25]. Fisher's ecological knowledge has been thought of as both generic and tied to place as the specific knowledge is sometimes associated with the fishing grounds in which individuals have learned to fish [26]. Furthermore, it has been suggested that fishers increasingly need advanced technological knowledge in order to use modern fishing equipment such as radars [26]. In other words, there is a wide-spread recognition that fishers knowledge can be formalised as well as embodied or tacit [26Ð28]. Usefully, Hind [27] defines fishers' knowledge as:

> "a heterogeneous socio-ecological construct built from an individual fisher's experiences in his or her lifeworld. The knowledge can be qualitative (i.e. anecdotal/narrative) or quantitative (i.e. information) as well as conscious (i.e. overt) or unconscious (i.e. tacit)".

More recently it has been argued that the knowledge and skills needed to be a successful fisher have changed in line with changes in fishing technologies, markets and policies in the global north [29Ð3 1]. In relation to this, Murray et al. [32] argue that fishers' knowledge has become increasingly global Ð by which they mean increasingly rationalised and standardised in line with the knowledge system of fisheries management, economics and science.

In relation to fisheries management, Berkes [33] suggest there are two important avenues in which fisher's knowledge can be useful: i) in reducing the need for expensive scientific data and ii) to achieve consensus regarding management actions. However, viewing fisher's knowledge in these terms arguably understands knowledge as objective 'information' rather than as a subjective, plural, situated and partial [34,35] way of knowing the world. In this paper, conceptual impetus is taken from the literature within the wider social sciences which has a longstanding interest in understanding how knowledge can be plural, relational and partial . In their paper on the constructed and contextualised nature of knowledge production in farming Tsouvalis et al. [36] introduce the concept of 'knowledge-cultures' which seeks to "to go beyond essentialist conceptions of knowledge as indicated by the prefixes 'expert', 'lay', or 'local' and lay bare the complex processes and power relations that give rise to differential knowledge production". The concept of knowledge cultures moves beyond seeing different 'forms' of knowledge (as is often the case in research on fishers' knowledge) towards understanding its relationality. This, they suggest, is achieved by attending to the context in "within which

meaningful, symbolic actions and knowledges are shaped" [36]. Once we view knowledge(s) this way, we can start to examine what Morris [37], in her discussion of farming, refers to as 'policy knowledge cultures' which embodies those knowledges legitimately within policy discourses. Following this lead, several authors focusing on agriculture have traced the way that differences may arise from partial perspectives, expe riences and positions. Riley [38], for example, has explored the different ways that farmers and policy makers come to know the environment. With the former commonly relying on tacit and context-specific experiential knowledge which is often anchored to a particular place, whilst the latter rely on more abstract and codified understandings which they attempt to apply to different geographical contexts. Extending on from this, authors such as Burton and Paragahawewa [14] and Riley [39] have accordingly examined how policies, in addition to their environmental goals, may face the fate of being 'culturally unsustainable'. That is, they do not fit with wider lifeworlds[3] and knowledge cultures of farmers. At one level this cultural unsustainability is born out of a rejection of the decontextualized, placeless and codified knowledge that policies embody, and at a second level this relates to the extent to which the policies enable them to demonstrate facets (or aspects of cultural capital) that are associated with good farming Đ such as skills (embodied cultural capital) and autonomy [e.g. ,40Đ42].

2.2 The 'goodfisher'

Taken inspiration from previous research in agriculture [e.g. ,40Đ42], this paper utilises the conceptual framing of the 'good fisher' [18]. This framing is informed by Bourdieu's [36,43Đ45] notion of capital, field and habitus which provides a useful conceptual apparatus for attempting to understand the socio-cultural contexts of fishing and fishers as well as the temporal dimension of fishing lives. This literature goes beyond the commonly recognised economic capital in examining the importance of symbolic capital in fishing Đ that is, social capital (coming from, and reaffirmed by, social contacts) and cultural capital (knowledge, skills, and dispositions which may be developed by socialisation or education). Bourdieu [46] further breaks down cultural capital into three categories: institutional, objectified and embodied. Research found that symbolic value in fishing is particularly associated with fishers embodied cultural capital [18]. Examining this more in-depth, previous research found that for fishers to live up to the 'good

[3] Siriwardane-de Zoysa and Hornidge [74] explain: "An individual's "lifeworld" guides perceptions, the attachment of meaning and in sum, the interpretation of reality in everyday life" and suggest scholars need to pay more attention to this within the context of the sea.

fisher' ideal they needed to, i) display 'good fishing' skills and ii) comply with unwritten reciprocal agreements [18]. Gustavsson et al. [18] found that good fishers embody and perform three types of embodied cultural capital: motoric (such as lifting lobster pots effectively), mechanical (such as having the skill to handle machinery [e.g. boats and fishing gear] and being able to do maintenance work) and managerial abilities (such as being responsive to and adapting to the tides and changing weather) - often underpinning fishers ability to work *with* the sea. Such capitals, whilst to some extent underpinning the development of economic capital for the specific fisher, took on an additional symbolic meaning, which underlined fishers' status as 'good fishers'. Gustavsson et al. [18] further found that fishing activities had to be visible (or accessible) to other fishers for them to be able to make judgements around their good fishing abilities. The ways in which this was done was for example through activities such as fishers' placing of buoys in the lobster fishery and the appearance of their boats and fishing gear onshore. The second way in which fishers become 'good fishers' is through complying with the unwritten 'rules of the game' (Bourdieu 1990) in fishing. Such 'rules' were based around fishers' fishing territories and gear and, in particular, showing 'respect' towards these were found to be important. Gustavsson et al. [18] noted that in adhering to these 'rules of the game' and performing the fishing habitus in this area, fishers were able to develop social capital, which in turn offered, for example, respect for the boundaries of their fishing territories. Perhaps the most important part of this social capital development was that it offered fishers security whilst in the dangerous sea, with fishers offering support to other good fishers such as towing them to shore, sharing tools and equipment. In breaking open the notion of the 'good fisher' further, Gustavsson and Riley [19] have examined the intricate ways that fishers develop their social, cultural and economic capital. Taking a lifecourse perspective they investigated how, from different positions in the fishing field (including being sons of fishers, to having no previous fishing lineage) fishers developed their cultural and social capital and noted how associated knowledge was shared and transmitted across generations. Gustavsson and Riley [19] also found that whilst fishers learn from previous generations it was important for them to experiment and continuously learn new knowledges through their individual experiences at sea [19].

3 Materials and methods

This paper is drawn from an in-depth qualitative research project exploring the socio-cultural contexts of fishing lives conducted in 2014/15. The study focused on the Llŷn peninsula small-scale fishery of northwest Wales, UK . The area was, in 2012 , subject to an attempt to introduce highly protected Marine Conservation Zones (MCZ), which after public opposition was scrapped. The site thus offered an opportunity to examine the opposition to these plans from the perspective of fishers alongside an examination of their socio-cultural contexts. The Llŷn peninsula fishery is as a multi-species, multi-gear inshore coastal fishery and fishers fish for lobster, scallops, crab, whelks and sea bass as some of their target species. Fishers in this area are a combination of part-time and full-time fishers and amongst those interviewed, all can be classified as lobster fishers who, to varying degrees, target other species of fish and shellfish using supplementary fishing gear. This study draws on 48 interviews with 35 different participants linked to 16 fishing vessels. The study utilised repeat interviews [47], individual interviews, joint interviews [48] as well as couple interviews [49] and included current fishers (F) and members of fishing families. The age of participants ranged from 18 to 75. The interview participants predominantly spoke Welsh but were interviewed in English.

[Fig 1 here]

Fig. 1. – Map of the Llŷn peninsula, Wales, UK.

Initial contacts were established with two local fisheries associations which enabled access to research participants. Using chain -referral sampling [50] helped to identify additional fishers. The research deployed qualitative semi -structured interviews to gain an understanding of fishers' knowledges, identities and social relations. The interviews were between 45 minutes and 2 hours, were recorded, and later on transcribed verbatim. The transcripts were analysed manually using inductive thematic coding in which themes were allowed to emerge from the fishers narratives [51].

4 Analysing fishing policies in relation to the socio-cultural contexts of fishing

4.1 Marine Conservation Zones (MCZs)

The environmental policy of Marine Conservation Zones (hereafter referred to as MCZs) is part of an increasing trend towards spatial marine management measures. Presently, EU countries are obliged to reach 'good environmental status' in the marine environment by 2020 through the Marine Strategy Framework Directive (MSFD). Within the MSFD, MCZs have been used as a tool to fulfil the aim of 'protecting the environment' [52] although the ideas and use of such marine protected areas precedes the MSFD by many years . Whilst the remit of MCZ extends its focus on fishing into other stakeholder groups as well as wider goals (such as conservation), this paper focuses solely on the experiences of fishers of MCZs as a means to alter (or stop) certain fishing practices. The Llŷn peninsula was in 2012 subject to the Welsh governmentÕs plans to introduce *highly protected* MCZs which would have resulted in several no-fishing areas in the inshore waters (see Figure 2). The Welsh government consultation document stated the following about the reasons for proposing these zones:

> "The intention is to allow sites to function as naturally as possible in order to maximize the contribution they make to ecosystem recovery and resilience. The best way of achieving this is to afford the sites a high level of protection where they are protected from the extraction and deposition of living and non -living resources plus all other damaging or disturbing activities to support as natural an ecological state as possible" [53].

To achieve this, six[4] Ôno extraction' zones were proposed on the Llŷn peninsula and all of them were areas in which local fishers have fished, both historically and in the present. After public consultation and resistance from the local communities the plans were, however, dropped. The research reported on in this paper sought to understand the socio-cultural reasons for the resistance to the MCZ, in addition to the more commonly reported concerns for the potential loss of economic capital to fishers and wider communities [54].

[4] Whilst six areas were proposed in the initial consultation phase only four areas were planned to be selected.

[Fig 2 here]

Fig. 2. Map over the different potential areas of highly protected Marine Conservation Zones shown in green. (Quality as in original) [53]

Most commonly reported on in interviews were the contestations around (informal) fishing territories and how this social organisation of fishing opportunities was incompatible with the MCZ plans. The following response from a fisher interviewed during the research highlights this aspect:

> "Say if they closed this area and I decided to put all my gear from that area to another area, I would then be treading another fisherman's feet. [...] And then that would have affected his business. And then you would have all sorts of disagreements.... Potentially disastrous for the communities on the Llŷn. You know people falling out...." (F-10)

Whilst fishing territories were not legally binding they were, nonetheless, the principal way in which fishing activities were shared and divided amongst fishers around the Llŷn peninsula and these were sometimes inherited and passed down through generations of fishers. However, the existence of fishing territories was largely undocumented and their importance for fishing identities, practices and social relations poorly understood. In addition to the relatively fixed nature of fishers' territories acting as a barrier to the introduction of these new spatial arrangement, the interviews also revealed that fishers' cultural capital were tied to place:

> Interviewer: "What is it that makes you want to fish?"
> Fisher: "Trying different places is my draw. You have got places that you want to try next year already sort of in my head" (F-16).

In Fisher 16's case he had accumulated cultural capital through his long-standing experience and presence in those places (including his plans for future exploration of new places). Such observations are important to the cultural sustainability of these policies on three fronts. First, it posed a threat to fishers' cultural capital development. As the interviews suggested, fishers built up very intricate understandings (cultural capital) related to the specific locations that they had explored and fished in the past (and that their predecessors had often fished too). Fishing, the interviews revealed, was far less simple than being able to move into new territories. Second, and interrelated, fishers' associated skill demonstration and accumulation of social capital was

spatially-specific. It took time for fishers to develop their knowledge of particular coves and tracts of sea and to demonstrate their good fishing abilities to others around them. Moving into other areas not only posed the challenge of infringing on others' territories, but also run the risk of fishers having insufficient social capital to afford them safety at sea backed up by their respective social capital. Thirdly, MCZs posed threats to the intergenerational processes which have historically been central to the continuance of the industry and good fishing in the region:

> "And once you stop people fishing there, you know, you would break that relationship. Would they then turn around in 20 years' time? 'Actually this doesn't work.' [...] Who would come back then? Who would be left to fish there? You know. You would have affected the community so much. [...] That link with it. It would be lost for ever I think" (F-22).

As Fisher 22's response reveals, fishing territories are often passed down through generations. Whilst these territories are not legally binding, they are closely tied to fishers fishing status over several generations. One subsequent consequence of the introduction of MCZs would therefore be that younger fishers would not be offered the chance to follow their fathers into the fishing occupation. This was because the cultural and social capital associated with familial presence in specific fishing areas over time would have diminished – both within and outside 'no-extraction zones' following the substantial changes to fishing territories foreseen by the fishers spoken to. This is in line with observations by Gustavsson and Riley [19] who highlight the importance of the presence of social capital which enable sons of fishers to develop their own fishing capitals in becoming good fishers themselves.

In addition to the structural and social challenges outlines above, the interviews also revealed the contestations which arose around the 'policy knowledge culture' which the fishers thought the MCZs were embodying, as revealed by the following interview extract:

> "And from evidence coming from Lundy [another area], the [MCZ] idea was that if we close an area it would then sort of help restore and replenish other parts with spill over theory. This was complete nonsense cause we all know that lobsters are territorial. [É] We know that from our experience fishing. The [policymakers] totally disregarded our views – even the scientific views. [A report] showed us that the only species that had grown on Lundy was lobster. All other species had deteriorated in number – severely declined in some cases. [É] Now what is happening is that the lobsters are too big in their territories and they are killing other lobsters, so [É] the lobster

> population peaked and now it is starting to go down. Cause you will end up with one big lobster marking territory and killing everything inside" (F- 10).

In contrast to the MCZ proposals, the fishers interviewed argued their knowledges were more contextual and place-specific. Following this, the research found that the fishers' knowledge culture – drawing on experiential and contextual knowledge – was at odds with the placelessness and decontextualized science of the MCZ proposal – similar to what Burgess et al. [55] has observed in the case of agriculture. The fishers spoken to used what Bourdieu [44] refers to as 'cultural competence' (that is knowledge which "yields profits of distinction for its owner") to draw the distinction between their way of understanding MCZ and the policy knowledge culture of the MCZ proposals. In addition to the more often-cited contestation between 'expert' and 'lay' knowledge [see ,56] the above interview extract also revealed that fishers drew on scientific knowledge to offer challenge to MCZs. Such observations are important for our broader understanding of fishers and fishing policy as they serve to highlight that fishers' understandings cannot be reified as a form of non-scientific traditional ecological knowledge , but instead illustrate how fishers take on, rework and utilise scientific understandings in developing their own knowledge cultures. Assimilating these multi-faceted and plural forms of knowledge, the research found, was part of being a good fisher.

4.2 Voluntary v-notching of lobsters

In expanding the points above further, the case of voluntarily 'v-notching' of berried lobsters (female lobsters with eggs) presents another example of policy that the Welsh government tried to introduce to fishers in the region. Between 1951 and 1966 the landing of berried lobsters was prohibited by law in the UK but the law was repealed because of difficulties in enforcement [57,cited in ,58]. Woolmer et al. [58] reports that the former South Wales Sea Fisheries Committee was the first managing body to introduce the statutory protection of v-notched lobsters in 1996. The North Western and North Wales Sea Fisheries Committee (NWNWSFC) [5] later developed a similar byelaw [59,cited in ,60] before the prohibitio n of landing v-notched lobsters became adopted on a national level in Wales in 2000 [61]. In 2003, the NWNWSFC received £196,020 in EC FIFG grant to implement a "lobster conservation programme" in North Wales (including the Llŷn peninsula). Fishers taking part in the programme received full market

[5] The Sea Fisheries Committees were abolished under the Marine and Coastal Access Act although some of its byelaws – including the byelaw 31 - were transferred to this new governance regime.

price for each notched lobster that was returned to the sea [62]. The fact that local fishers were paid for v-notching at the beginning of the programme is confirmed by the fishers spoken to:

> Fisher 8: "We were paid [to v-notch] to start with. We used to land all v-notched lobsters and the fishery officer used to weigh them. They paid us the growing rate and then we used to release them to the sea. That stopped a few years ago but we carried on putting notches in [the berried lobsters] [É] voluntary".
>
> Interviewer: "Why did you continue after the government stopped paying you?"
> Fisher 8: "Conservation, looking after your own future really. [É] We just decided [to do it] individually".
>
> Fisher 27: "But that means that if there is a notch on [the lobster] nobody can take it".
> Fisher 8: "If you v-notch a lobster and throw it back and another fisherman catch it they are not allowed to bring that in. They have got to throw it back again" (F-8 and F-27).

As the fishers spoken to explain, to v-notch a lobster they make a v-shaped cut in the lobster tail which indicate that the lobster has been caught and released. Fishers who were to re-catch a v-notched lobster are not allowed to land or sell that lobster [63] and as such, whilst the practice is voluntary there are laws in place supporting its compliance. Whilst fishers often referred to the time when payments started, it seems that the prohibition of landing v-notched lobster was in place some years before the payments started. This suggests that the economic incentives were important to encourage the initial uptake of the practice. However, after a while the incentives stopped but many fishers continued to v-notch berried lobsters in their fishing areas. The following quotes represents some of the fishers' views on the practice of v -notching :

> "We think it is a good idea. [É] Most of the fishermen are really positive. It is a good idea. Short term gain is no good" (F-22).
>
> "I think it makes sense" (F-19).
>
> "No, the v-notching isn't compulsory. You can still bring in berried lobster at the moment. [É But] I think it is silly keeping a berried lobster. [É] That is our future stock isn't it? So, every berried lobster we catch we notch it in the back. Because you are not allowed to bring in a lobster with the v-notch you see. So even when the eggs are gone, the v-notch stay there for at least a year. So that lobster will maybe breed twice. [É] It makes sense to me" (F-8).

Interview extracts like these reveal the embeddedness of v-notching practices within the fishing

culture and to what it means to be a good fisher. For our wider understanding, two key observations are highlighted by such responses. First, good fishers reflect on the broader sustainability of their practices as it is linked to the survival of their occupation. Second, there is permeability in the boundary between fishers' knowledge culture and the policy knowledge culture. The latter means that these knowledge cultures overlap and that one can learn from the other.

At a level below fishers' general acceptance and uptake of fishing policies is the important to recognise the social contexts in which these schemes have been introduced and taken up (or not) by fishers. Important for this discussion is the notion of the 'lifecourse' and the social meanings ascribed to age:

> "I do it because of [my son]. [É] If I was fishing by myself maybe it wouldn't be worth throwing them back because I wouldn't benefit. I would be retired in ten years' time probably. So the older men usually keep [the berried lobsters] you see" (F-8).

Such responses highlight the notion of 'linked lives' [19] of fishers across generations and how the future – in particular the presence of successors – shapes fishing practices in the present. The interviews further revealed that fishers – in particular the younger once – were generally positive towards the practice of v-notching as it was suggested it would help support their future in the local fishery. At another level, fishers spoke of the flexibility which the voluntary design of v-notching afforded in responding to context-specific situations of different fishing areas:

> "Say that you get a female lobster with eggs on it. Say that it's only got one claw, or no claw [at all]. You would v-notch it. And then obviously the claw grows back. Then you are not allowed to land that lobster until the v-notch has grown out" (F-28).

> "Say in one day I get two berried, one I keep, one goes back. I think that has been a really successful measure [É] And it is proper science behind this" (F-22).

Responses such as these have a two-fold importance to its relative cultural sustainability. A first observation stems from findings of previous research, that being a good fisher meant that fishers practiced a level of individuality and resiliency, allowing fishers to be the "master of your own destiny" [18]. In line with this, Fisher 28's quote above illustrates how v-notching allow fishers this aspect of being a good fisher by highlighting how he regularly v-notch lobsters with only one

claw – and letting it grow for it to be caught and sold at a higher price in the future. Implicit in responses like these is that fishers make strategic decisions about which lobster they v-notch depending on the amount of current breeding stock and the economic success of their fishing trip . This highlights that fishers can use their own skills, knowledges and managerial abilities and, as such, v-notching presented an opportunity for fishers to demonstrate their cultural capital and the skill of 'working with the sea'. Observations like these reveal that v-notching practices – being voluntary – allowed fishers to take on the role as 'managers' of their own resource as fishers could adapt their use of these practices to their local micro-context. As such, voluntary v-notching is sensitive to variations in micro-geographies. As a second observation , the research suggests that engaging in v-notching might be considered an 'unwritten' rule of the game [after ,18]. Although the fishers spoken to never pointed to any formalised discussions, the narration of v-notching as a 'good' practice, practiced by those 'good fishers' who managed the local fishery in a way which would sustain it for the future, suggested that social capital could be developed through engaging in this activity. Whilst the research found that not all fishers v-notched (which participating fishers often attributed to those fishers of older age discussed above) the younger fishers would emphasise that "we all do it" (F -27) emphasising their commitment to the future of the industry[6]. In studying the case of farming, Burton and Paragahawewa [14] suggest it is important for environmental policies to allow for development of cultural and social capital, which is found to be the case for lobster v-notching.

Although the discussions above have focused on the cultural dimension and fisher uptake of v-notching, there were cases of where v-notching also presents some institutional challenges and opportunities. First, fishers reported that v-notching offered some practical advantages from the point of view of policymakers, as explained in the following quote:

> "If you want to make it illegal to land berried lobsters what used to happen is that people used to scrub t he eggs of the berried lobsters [É] and then [they would] land them. So, they have [developed] legitimacy tests to see if [fishers] had scrubbed [the lobsters] or not. But [the amount of] manpower [needed] to check this lobster and that [lobster]... [makes it unviable]" (F- 10).

[6] This future oriented commitment could simultaneously be interpreted as a display of managerial abilities (cultural capital) as well as trustworthiness leading to development of social capital.

As highlighted by Fisher 10's response, in line with the long-standing reported issue that it is difficult to enforce rules at sea [64,65], the fishers emphasise the v-notching scheme requires little "manpower" and is, as such, cost-effective. However, the fishers spoken to also identified issues to do with the effectiveness of the v-notching practices:

> "The problem we were getting was that we would put the v-notch in. And then the tourists were coming and they just take anything anyway. [É] I used to v-notch lobster. It is a good thing. [É But] there is no point in implementing rules when there is nobody here to police it" (F-28).

Interviews like these highlight the importance of an enabling institutional environment in supporting fishers to self-manage for sustainability. Fishers often reported issues around tourists[7] – or other fishers that were 'flag-hunters' – who did not comply with the unwritten 'rules of the game' in this area [18]. As the literature that often come under the label of 'co-management' suggests, the government's involvement in the management of fisheries is also important [see ,16]. The current paper also suggest that the institutional contexts are important for sustainable fisheries management, but external agencies also have to interact with fishers in a way which is acceptable and culturally sustainable for the fishers themselves.

5 Cultural (un)sustainability? And need for future research

This paper has contributed to understanding the policy-fisher nexus by comparing the different ways in which the fishing industry is currently being managed for increased 'sustainability' on the Llŷn peninsula. Through examining how MCZs and voluntary v-notching challenge or enable fishers to remain 'good fishers' the paper unpack some important aspects of how fishing policies can potentially be 'culturally (un)sustainable' [after ,14]. Four key findings emerge from this research: first, the concept of 'knowledge culture' helps us move beyond a simple dichotomy of the knowledge of fishers versus policymakers or fishers versus scientists – towards understanding that there is interchange and interaction between these knowledge cultures. Second, the paper has highlighted the importance of demonstrating skills (cultural capital) and to allow fishers to be 'good fishe rs' for fishing policies to be culturally sustainable (and possibly more successful in achieving environmental objectives). The MCZ proposals would have stopped fishers from

[7] In particular those fishers fishing out of fishing coves which were popular destinations for tourists in the summer.

operating in designated areas – hence, inhibiting their demonstration of context-specific skills[8].

By contrast, beyond the observation that voluntary v-notching allowed fishers to continue to fish, the research found that the performance of v-notching allowed fishers to demonstrate skill and, as such, v-notching did not reduce fishers cultural and social capital. Instead, it presents an example of when a conservation practice can also be conceived of as a skill with high symbolic value in the fishing community. The findings of this paper suggest that this ability to maintain, generate and develop symbolic capital is key to why fishers generally spoke positively of, and took up, the practice of v-notching whilst fiercely resisting MCZs. For the wider significance for fisheries management, the flexibility of voluntary v-notching offered fishers the opportunity to develop and demonstrate skills and, hence, it was more likely to be taken up by fishers (than, for example, MCZs). Taking this together, voluntary v-notching can be considered as more 'culturally sustainable'.

Third, the observation that there is overlap between knowledge cultures and that they inform each other, offer some important implications for how fishing policies could potentially be co-created, co-managed and co-developed for a more holistic account of 'fisheries sustainability'. Taking inspiration from this study, there is much to learn from the example of voluntary v-notching in developing new and innovative fishing practices. As v-notching was not originally designed by the fishers themselves, the findings suggest that it is not an example of self-organisation [cf ,66]. Indeed it could be argued that the economic incentives for participating in the v-notching programme[9] encouraged the initial uptake of v-notching. Nonetheless, fishers continued v-notching after the incentives ended. These findings highlight it is important for policymakers and fishing professionals to take serious the social relations [10] – or the socio-cultural context and fishers development, embodiment and display of capitals to achieve successful co-production of knowledge and innovation. As a fourth key finding, the paper stresses the importance of recognising the temporally-layered nature of cultural sustainability. In the case of MCZs the

[8] Whilst the study reported on here is focusing on one area, there are evidence to suggest that fishers 'buy in' to the idea of MCZ in other places were a different approach to its introduction have been used [see ,75 for the case of Lyme Bay].

[9] It should be noted that there were no economic incentives when MCZs were introduced. However, this paper suggests that economic compensations might not have been as successful in the case of MCZs as these zones threatened not only fishers' development of economic capital (which could potentially have been compensated for) but also their social and cultural capital (which would have been much more complicated).

historical context of fishing activities was disregarded. On the other hand, the paper found that older fishers increasingly used v-notching if a successor to their business was present. As such, there is a need to recognise that policies seeking to promote change to fishing activities is not just a present-centred issues – that is, the past and the future holds significance for fishers actions in the present. This implies we need to look back to the fishing histories which have shaped the current situations, and also recognise that fishers' actions are also often future-orientated.

The current paper is arguing for new research frontiers which focus on fishers' uptake and (co)development of innovative fishing practices that can work towards achieving environmental as well as socio-cultural objectives. This can be achieved through focusing future research on a number of areas. The first avenue of research suggested here related to how change to fisher's knowledge cultures can emerge. The current research found that fishers do take onboard scientific knowledge and integrate it into their own knowledge culture – as demonstrated by the adoption of v-notching schemes and the ways fishers used scientific knowledge to argue their case against the Marine Conservation Zones. Another route in which fishers take onboard knowledges and practices was through their horizontal networks. Similar to Gustavsson and Riley's [19] observation, Halim [67] noted that learning and adopting new fishing practices – in their case illegal cyanide fishing – is a process of learning from others as well as developing experiential knowledge through practicing the specific way of fishing. Future research on fishing could focus on how to work with fishers through engaging with their own learning styles . Interrelated to this, Gustavsson et al. [18] have observed fishers embody different levels of social and cultural capital. Future research could usefully consider the advantages of working with fishers with high levels of capital – and promoting their adoption of environmentally friendly fishing practices – and if this offers potential for wider acceptance of these practices within the fishing community through their horizontal networks [see ,39 for similar suggestions for the case of farming]. Future studies on these aspects is needed to understand how fisher's practices and knowledges become mobile and adopted within networks of fishers (fisher-to-fisher learning) as well as understanding successful uptake of innovative fishing practices. Research on this could fruitfully consider studying other existing innovative fishing practices projects such as 'gated traps' currently trialled in Kenya [see ,68], and seal-proof fishing gear introduced in the Baltic Sea, Sweden [see ,69]. Interrelated to this, more research is needed on how to engage fishers in (co)education in innovation as well as in response to environmental change such as climate

change [19]. As a final comment, future research could also consider how changes to the 'rules of the game' can result in re-shaping the fishing habitus and what it means to be a good fisher.

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