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"Adaptation strategies of small-scale fisheries within changing market and regulatory conditions in the EU"

Paolo Prosperi[1]*, James Kirwan[2]*, Damian Maye[2], Fabio Bartolini[1], Daniele Vergamini[1], Gianluca Brunori[1]

[1]Department of Agriculture, Food and Environment (DISAAA-a), University of Pisa. Via del Borghetto, 80 – 56124, Italy
[1]Countryside and Community Research Institute (CCRI), University of Gloucestershire, Oxstalls Lane, Longlevens, Gloucester, GL2 9HW, UK
** P. Prosperi and J. Kirwan are first authors.*

Corresponding author:
Paolo Prosperi – email: paolo.prosperi@agr.unipi.it1 ; paolo.prosperi@yahoo.it2
Department of Agriculture, Food and Environment (DISAAA-a), University of Pisa
Via del Borghetto, 80 – 56124 Pisa - Italy

Co-author details:
Dr. James Kirwan: jkirwan@glos.ac.uk
Dr. Damian Maye: dmaye@glos.ac.uk
Prof. Fabio Bartolini: fabio.bartolini@unipi.it
Dr. Daniele Vergamini: daniele.vergamini@agr.unipi.it
Prof. Gianluca Brunori: gianluca.brunori@unipi.it

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Abstract

This paper presents an analysis of the diversification and non-productivist practices and strategies deployed by European small-scale fishers vis-à-vis contextual regulatory and market factors. Building on resilience thinking – combined with a qualitative case study approach involving primary producers and associated stakeholders – the strategies of primary producers in two specific contexts are examined: inshore fisheries in Cornwall (UK) and coastal fisheries in Tuscany (Italy). In so doing, the analysis identifies possible adaptation strategies that can help support the sustainability of the fisheries involved. The strategies adopted by fishers include, for example, investing in innovation, reorganising the supply chain, multifunctionality and diversification, and implementing environmentally friendly activities.

Keywords: Small-scale fisheries; Primary producers; Sustainable management; Decision-making; Resilience; Non-productivism

1. Introduction

European fisheries have undergone major structural change over the last 20 years. Processes of modernisation, concentration and technological development, for example, have reduced fishing employment by almost 50% (Symes and Phillipson, 2009). In this respect, policy has been oriented towards the development of large-scale, high-tech and intensive fisheries, rather than the small-scale artisanal sector, notwithstanding that the former are considered to be the main cause of the current fisheries crisis (Urquhart and Acott, 2013). Interventions by the Common Fisheries Policy (CFP) to help restrict overfishing in EU waters (such as through limitations of fleet capacity, quota management, and technical measures regulating fishing areas, gears and catches) represent another set of pressures for fishers (Symes and Phillipson, 2009). Furthermore, interventions against overfishing have led to considerable social and employment-related issues for fishing communities, especially those that rely on small-scale fisheries (Reed et al., 2011).

In general, small-scale fisheries are characterised by low-capitalisation and labour-intensive management, and relatively little power over the marketing of their catch. They use multiple types of gear to target manifold fish species, deploy diverse and

flexible livelihood strategies, and adapt their targets to the seasonal species available (Allison & Ellis, 2001).

Given the uncertain conditions small-scale fishers are confronted with, there is a need for further research to provide policy makers with information on the complexity of strategies implemented by inshore fisheries. Drawing on lessons from two case studies (Cornwall, UK, and Tuscany, Italy)[1,2], this paper aims at identifying and exploring particular diversification practices and strategies deployed by European small-scale fishers. It analyses the strategies adopted by fishers, providing relevant insights for small-scale fisheries' governance, thereby helping to ensure their long-term sustainability.

The next section of the paper explains the relevance of adopting a resilience perspective, together with the notion of 'non-productivism', to explore small-scale fishers' adaptation strategies to market and regulatory pressures. Section 2 describes the methodological approach taken, before section 3 reports the findings of the research and discusses their implications in terms of the long-term sustainability of the fisheries concerned. The paper concludes by reflecting on the notion of 'non-productivism' as a way to interpret fishers' behavioural responses to external pressures and by extension enabling policies that can help to ensure a more resilient and viable long-term future for the small-scale fisheries sector in Europe.

1.2 Understanding small-scale fishers' adaptive capacities

In order to ensure the long-term viability of small-scale fisheries it is becoming evident that there is a need to address the social and cultural aspects of fisheries management (Symes and Phillipson, 2009; Carrà et al., 2014; Urquhart et al., 2011). There is also a call for new frameworks to explore management strategies on resource, community and market conditions oriented to preserve fish stocks and guarantee the socioeconomic performance of communities (Anderson et al., 2015). Various constraints now confront small-scale fisheries, including: pressures on their income, rising production costs, volatile fuel prices, recruitment issues,

[1] Inshore fisheries in Cornwall and small-case fisheries in Tuscany are case studies of the "Name of the project" Horizon 2020 project under the responsibility of the English (Name of the research institution) and the Italian (Name of the research institution) research groups respectively.

[2] According to the European Parliament (2012) small-scale fishing comprises "*artisanal fishing and some types of coastal/inshore fishing […] and has specific problems that set it apart from large-scale fishing"*; in this paper we deal with small-scale fishing in Cornwall and Tuscany, therefore we use the English terms of "inshore fisheries" and "small-scale fisheries" respectively as they best correspond to the common and general definitions of small-scale fishing used in each case study region.

declining fish stocks and marine habitat degradation. The combination of these pressures is leading European small-scale fishers in several cases to adopt a "*post-productivist*" model of activity (Urquhart and Acott, 2013; Salmi, 2015). Similar to what happened in European agricultural contexts, in which there has been an EU policy-driven shift from a productivist, concentrated and specialised model to more extensive, dispersed and diversified patterns of activity, the diversification of productive activities can help achieve long-term economic sustainability for fisheries businesses in coastal areas. Such functional diversification can be implemented with the aim of increasing business income, engaging in environmental protection as well as enhancing producer reputation, while at the same time maintaining the fishers' original occupational status (Roussel et al., 2011). In particular, for fishing activities, the concept of multifunctionality refers to four main functions: food production, environmental, territorial and social capital (Malorgio et al., 2017; Ropars-Collet et al. 2017).

Building on a number of previous studies, Evans et al. (2002, p. 317) define five categories of 'post-productivism', namely: "*the shift from quantity to quality in food production; the growth of on-farm diversification and off-farm employment (pluriactivity); extensification and the promotion of sustainable farming through agri-environmental policy; dispersion of production patterns; and environmental regulation and restructuring of government support for agriculture*"[3]. However, as they note, the term is increasingly problematic and has been much debated (see: Wilson and Burton, 2015; Rannikko and Salmi, 2017). Wilson and Burton (2015) suggest the term 'post-productivism' – rarely used in fisheries contexts (Rannikko and Salmi, 2017) – is misleading since it does not capture the intermediary transitions that producers can experience, or implement, when they shift from mainly productivist activities or even when they evolve and further differentiate their activity back towards productivism (see, for example, the 'actor-oriented spatio-temporal' approach developed by Wilson and Burton, 2015; fig. 1, p. 54). On the other hand, the term 'neo-productivism' suggests the rediscovery of a productivist approach for producers who had previously shifted from a productivist towards a non-productivist model before returning to a productivist strategy, albeit through a different value proposition and creation (Brunori et al., 2012). Indeed, Wilson and Burton (2015) argue that 'non-productivism' is a term better able to nuance and conceptualise the complex spatial and temporal changes in modern rural activities. 'Post-productivism', for example, is a linear term, based on a time variable that only implies something following on temporally from productivism without leaving space to revert to productivism or 'neo-productivism'. 'Non-

[3] For a comprehensive review of the post-productivism discourse, post-productive activities and connections with multifunctionality see Almstedt et al. (2014).

productivism' is a more neutral concept in this regard, that allows reflecting a non-definitive trend towards less productivity and more quality and multifunctionality (as initially described by 'post-productivism'). In other words, it allows for a conceptualisation that favours hybrid, parallel and simultaneous productivist and non-productivist pathways. As such, the term 'non-productivism' is preferred in this paper, used in this context to denote that fishers engaged in 'non-productivist' activities are still engaged in catching (producing) fish, but that the emphasis on quantity is reduced and there is a greater focus on the qualities of the fish being caught. These qualities may be in terms of the intrinsic quality of the fish involved, or the social, environmental or cultural context within which the fish was caught.

Analysing the practices and strategies of small-scale fisheries through a non-productivist framework can also help improve understanding of their *resilience* and thereby sustainability. It can help overcome previous research analyses that tended to consider fishers as "*myopic and short-run profit maximizers*" (Sønvisen 2014; p.194), overlooking the "*dynamicity*" as well as the functional diversity and complexity of fishers' behavioural strategies (Gustavsson et al., 2017; p. 104).

Resilience thinking originates from the work of Holling (1973) on natural ecosystems and has subsequently been adopted in the social sciences by a number of authors (e.g. Adger, 2000; Berkes et al., 2003) to analyse the interactions in coupled human-environment systems. According to Walker et al. (2004), resilience is "*the capacity of a system to absorb disturbances, to be changed and reorganised*" and can be understood as a crucial dimension of long-term sustainability (Almås and Campbell, 2012).

More recently, the resilience concept has been adapted in fisheries studies by several authors, specifically in relation to fisheries management and governance (e.g. Symes, 2014; Doeksen and Symes, 2015; Salmi, 2015). Salmi (2015), for example, mobilised the resilience concept to study small-scale fisheries' dynamicity within social-ecological systems, referring particularly to "adaptability" and "transformability" processes. In this context, adaptability "*reflects the capacity of actors in the system to influence resilience*" while transformability "*is the capacity to create a fundamentally new system when ecological, economic or social structures make the existing system untenable*" (Salmi, 2015; p. 260).

In providing information to feed into the decision process on sustainability (Prosperi et al., 2016), resilience thinking can contribute to a better analysis of the adaptation strategies implemented by small-scale fishers in response to the various challenges confronting their business (Salmi, 2015). For instance, diversified rural activities - that detach economic gain from primary production (Marsden and Sonnino, 2008) and contribute to the management of landscape and natural

resources, as well as to the socio-economic viability of rural areas (Renting et al., 2009), can be considered as multifunctional practices that bring adaptation capacity to fisheries in the form of non-productivist patterns of activities.

Following Mather et al. (2006), in our analysis of non-productive fisheries-related activities, non-productivism can be considered as "*a shift in emphasis, and not as an absolute change from material production to service provision*" (p. 451). Indeed, such transition and adaptation choice can imply crucial trade-offs for fishers' activities and community well being. For instance, Cunningham et al. (2012) argue that shifting from whale hunting activity to related adaptive activities, such as whale watching (as a recreational eco-touristic activity), provides many more opportunities to get beneficial social-economic effects for coastal communities. On the other hand, Lloret et al. (2018) showed how the adaptive strategy of small-scale fishers to target valuable and non-restricted fish species can have important negative impacts on marine ecosystems and biodiversity. As such, investigating small-scale fisheries' adaptation strategies and the impact of non-productivism in local contexts can provide information to feed discourse and policy formation (Almstedt et al., 2014). In fact, while a number of policy-driven strategies are implemented through the EU's CFP, fishers still need to autonomously adapt strategies to cope with both static and dynamic conditions. Adaptation strategies can include: investing in technological innovation, regulating the fishing capacity of fleets, training, reorganising and shortening the supply chain, generational succession, pluriactivity, multifunctionality and income diversification, and transforming and processing catches in order to add value (Damalas et al., 2015). In this context, a number of recent studies in the EU have addressed the resilience and adaptive capacities of fishing households and businesses against a background of interconnected uncertainty and environmental, economic, social and regulatory instability (Phillipson et al., 2015). Salmi (2015), for example, analysed the post-productivist transformation of fisheries in Finland with the development of different activities for integrating and extending fishers' income sources, such as tourism. The key insight was the need to develop vertical governance interactions and horizontal collaborations to enhance sectoral integration (tourism and environment) and participatory management. Coulthard and Britton (2015) examined adaptive strategies emerging in Northern Ireland's fisheries. They found that there is a need to foster community relationships as mechanisms to influence adaptation and resilience in the fisheries sector. Meanwhile, Symes et al. (2015) surmise that the diversity of responses to uncertainties in the EU fisheries is crucial for the resilience and sustainability of coastal communities, calling for further interaction within social-ecological management.

Building on this conceptual approach, this paper presents a comparative analysis of adaptive strategies within two fisheries in two different EU countries, aiming to improve understanding and knowledge of the diversity of strategic responses of small-scale fisheries under the same general EU regulatory framework. Therefore, our case-study analysis aims at examining the adaptive capacity and strategies of fishers - implemented through non-productivist schemes that include diversification and multifunctional activities – as ways to enhance the long-term resilience of small-scale fisheries.

2. Methods

This paper applies a qualitative case study approach. In each case study region this involved: i) a context-specific literature review in relation to fisheries; ii) a media analysis covering national, regional and specialised media from 2005 to 2016; iii) a desk-based analysis of market conditions and regulations; iv) face-to-face semi-structured interviews; v) and, exclusively for Cornwall, focus groups involving primary producers and fisheries stakeholders.

The choice of these two European fisheries' case studies (Cornwall and Tuscany) was guided by their inclusion in the H2020 project "name of the project", with the aim of identifying and correlating practices and policies in small-scale fisheries that can better support primary producers in a context of multi-dimensional policy requirements, market imperfections and globalisation. Cornwall is the county that forms the westernmost part of the south-west peninsula of England and represents one of the key areas in the UK where inshore fishing remains a vital part of the rural community, both economically and culturally. Fishing activity in Cornwall is dispersed among more than 50 ports, but in terms of fish landings and sales, Newlyn is the most important port in Cornwall. There are approximately 619 registered fishing vessels and nearly 900 active fishers. Almost 90% of the vessels are under 10 m in length (Phillipson and Symes, 2015), which is significant given the focus of this paper on small-scale fisheries. Tuscany is a region in west-central Italy, with a coastline on the Ligurian Sea (in the north) and on the Tyrrhenian Sea (in the south), and includes the Tuscan Archipelago. Although fisheries is an active sector in the region - and coexists with a considerable marine aquaculture sector - Tuscany is still a net importer of fish and fish products. The most important port is Livorno and fishing activity is spread among 27 ports with 600 registered fishing vessels and 1053 active fishermen in 2015 (FAO, n.d.). Small-scale fisheries comprise almost 75% of the Tuscan fisheries.

The case study analysis involved a series of iterative stages, comprising expert interviews, focus groups with fishers and workshops with fishers and associated stakeholders. The interview sampling was guided by the current issues facing inshore (Cornwall) and small-scale (Tuscany) fisheries and related non-productivist activities. Within each case study a purposive sampling strategy was developed based on critical case sampling (Teddlie and Yu, 2007), focusing on specific critical cases that may not yield findings that are statistically generalizable, yet allow research to develop logical generalisations from the evidence produced. As such, the resultant findings need to be understood as illustrative rather than definitive (Patton, 2002). The final selection was guided by the need to find particular cases that can help decision-makers better understand fisheries-related non-productivist activities and to develop policy accordingly. 17 experts across the fishing industry in Cornwall were interviewed between February and March 2016. Following examination of the resultant data, the researchers held a series of participatory focus groups involving a total of 13 inshore fishers at three locations in Cornwall (conducted between December 2016 and January 2017), followed by a workshop composed of Cornwall fishery experts (in March 2017). The workshop had two aims: firstly, to 'ground-truth' the findings of the research to date; and secondly to develop a range of scenarios regarding the future viability of the inshore fisheries sector in Cornwall. In Tuscany nine people were interviewed: representatives of trawling fisheries (n = 2), small-scale fishers (3) (operating through "non-productivist" adaptation strategies), and stakeholders (4) (including a representative of a national trade organisation of agriculture and fisheries "Coldiretti", two civil servants responsible for fisheries in the Tuscany Region, and a researcher in marine biology at CIBM in Livorno, Tuscany). The following section draws on the interview findings to illustrate the resilience potential for integrating diversified activities within small-scale fishing. The interviews, as well as focus groups, put the perspective of the fishers themselves at the centre of the research. They were designed to identify and explore the challenges that fishers encounter within their activities and the related diversification and non-productivist adaptation strategies they employ, in the face of uncertainty and limiting environmental and economic conditions.

3. Results

3.1 Current challenges facing inshore fisheries in Cornwall

In Cornwall, two key issues emerged from the case study as having a significant impact on the ability of small-scale fishers to implement specific adaptation strategies in response to the challenges they face. The first concerns policy and

the management of Cornwall's fisheries, particularly in relation to the administration and availability of quota. Most of the UK fishing quota is allocated to the larger-scale boats, with the inshore sector receiving just 4% of the quota. In response, growing numbers of fishers are turning to non-quota species such as lobster. The second concerns developing new markets for the fish caught by small-scale fishers, which principally involves adding value to the catch in some way. Currently, the majority of fishers sell their catch at harbour-side, meaning that they are at the mercy of what buyers will pay on any particular day. The fishers are also fiercely independent and in general do not coordinate their marketing approach, thereby putting themselves in a weak bargaining position. In response, some fishers are engaging directly with the end consumer, such as through selling to local restaurants. Significantly, the ongoing Brexit negotiations are likely to affect both of these issues.

Entrepreneurship and the development of market outlets

Many observers feel that smaller scale fishers, especially, must add value to their catch if they are to survive. The smaller day boats in Cornwall turn over €200-€400 for every day that they are able to fish (Seafish, 2017), however it is difficult to be certain how many days a year it will be possible for them to go fishing. This may be due to bad weather (especially on the north coast of Cornwall), or that they are restricted in terms of the quota they have available. In relation to the latter, while many inshore fishers target non-quota species most also target quota species as part of a flexible and opportunity-driven strategy. In addition, a cost-price squeeze has affected all fishers over the last 20 years or so. Diesel fuel and insurance, for example, have risen very considerably, yet the price of harbour-side fish has remained relatively static, seasonal/demand peaks and troughs notwithstanding. In other words, maximising the value-added potential of their catch is likely to become ever more critical to their future economic sustainability. Nevertheless, many fishers sell all of their catch at harbour-side to fish merchants / middlemen, judging that they do not have the time to go and market the fish themselves, preferring instead to focus their energy on catching the fish in the first place. As a result, the majority of finfish landed in Cornwall goes to the harbour markets in Newlyn, Brixham, Plymouth and Looe, whereas crustacean and molluscan species go either to processors or more usually are sold abroad (mainly to France and Spain) via Vivier lorries. Overall, approximately 80% of the fish caught in Cornwall are exported.

There is an increasing realisation amongst fishers that it is important to have a strategy in terms of marketing their fish to improve their resilience in the face of uncertainty:

"*otherwise you are at the mercy of what the buyer is going to give you*" (Newlyn Focus Group).

As such, a degree of entrepreneurship is critical if small-scale fishers are to adapt to changing circumstances. It is no longer enough to be simply good at catching fish. A number of small-scale fishers from Cornwall do now sell their produce to restaurants or dealers in London, such as Dreckly Fish or Kernowsashimi, gaining a very considerable mark-up over local market prices; yet, this requires considerable extra work and know how. In the case of Dreckly Fish, they have effectively created their own market. In this respect, the advent of modern technology is providing an opportunity for small-scale fishers to increase their resilience:

"*We don't land anything at Newlyn… I come in with my fish in the morning, I speak to my customers* [in or near London] *and they say I'll have that… and they get it in their shop 20 hours from when we've caught it. … Whatever I catch is pictured on Twitter, straight to my customers and they take everything we have… Like you said, you've got to be an entrepreneur, you can't just catch fish, chuck it on the market. Those days are gone*." (Newlyn Focus Group)

Within this context, the Fisheries Local Action Group (FLAG) in Cornwall was developed in 2012 as part of Axis 4 of the European Maritime and Fisheries Fund, with the intention of "*maximis*[ing] *the economic opportunities and benefits open to Cornish fishing communities*" (Phillipson and Symes 2015, p. 350). Money available through the FLAG has had an important part to play in developing the local fishing sector in coordination with the wider food economy, principally by making investments to improve the quality/qualities of locally caught fish and to give it a "story" that is associated with traceability and sustainable fishing practices (Doeksen and Symes 2015). A key aim of the FLAG has been to make better use of the potential purchasing power of the 4.5 million visitors who come to Cornwall every year, by providing fishers with the skills and adapting tools to access a market that can help increase their profits, thereby increasing their resilience and the long-term sustainability of their fishing business:

"*A Hayle* [a small fishing port on the north coast of Cornwall] *crab boat was struggling to sell his crab for a reasonable price. So the FLAG supported him in investing in a crab potting process. This involved preparing the crab meat and putting it in nice jars with nice branding. He now can't keep up with demand. This*

is a really good way of marketing a product that comes in all year round, but can be preserved and then sold to the millions of tourists who come down only in the summer." (Expert interviewee)

There is also evidence that more and more fishers are now seeking to access Cornwall's local restaurants, making use of the opportunities provided by the influx of tourists. In this respect, Padstow (a small fishing harbour on the north coast of Cornwall) is luckier than most, in that there are a number of high-end fish restaurants and it has become a bit of a "foodie" hotspot.

Emerging responses to current changes in policy and management.

Collectively, fishers benefit from policies that govern the fleets' capacity, such as the number of vessels, gross tonnage and engine power, as well as management of the natural resource [4]. However, at the same time, these policies significantly reduce the flexibility of fishing operations. Decisions on what, where, when and how to fish are now very tightly circumscribed, affecting both short-term and longer-term business planning (Symes et al., 2015). This reduction in flexibility is particularly significant for small-scale artisanal fishers, such as those in Cornwall, who have a critical role to play in terms of their socio-cultural and economic contribution to coastal communities (Urquhart and Acott, 2013). Arguably, there is a need for different management regimes for large-scale fisheries and small-scale fisheries, with the former focused on economic efficiency, while the latter focuses more on social objectives (Urquhart et al., 2011).

From the perspective of small-scale fishers, policy-making is often associated with being "*top-down, distant, centralised and lacking local specificity*" (Workshop participant), thereby alienating many inshore fishing communities who tend to be suspicious of policy and science, perceiving it as being external or outside interference. Flexibility is seen as a key attribute of fishing sustainably and regulation is seen as "*reducing the scope for fishermen to practice many of the attributes associated with being a good skipper, such as using local ecological knowledge to determine what to fish*" (Ross 2015; p. 319). In this respect, access to sufficient quota, as well as flexibility in its allocation, are seen as being critical to the future of inshore fishing in Cornwall.

[4] The Common Fisheries Policy (CFP) sets out the overarching regulatory conditions for all fishers within the EU. First implemented in 1983, its main challenge is to manage a highly heterogeneous fisheries sector and to design optimal policies for multi-ecosystems, multi-species and multi-fleet fisheries (e.g. total allowable catches, quotas, and other technical measures).

"*One of the main factors in Cornwall is that it's such a mixed fishery in terms of things turning up and things being available to fishermen… What fishermen want to be able do inshore is take advantage of these opportunities and to be versatile; that's the absolute key to inshore fisheries being successful.*" (Workshop participant).

There are likely to be both positives and negatives associated with Brexit, as well as a period of transition. The risk of reduced access to EU markets for UK fishers could have a significant impact on Cornwall's fishers (who export 80% of their catch to the EU) and might increase the necessity to develop adaptation strategies through domestic markets and to be more entrepreneurial. In non-productivist terms, the resilience potential of the Cornish inshore fleet might focus on multifunctional activities aimed to preserve a traditional way of life and wider social fabric, rather than simply production.

3.2 Current challenges facing small-scale fisheries in Tuscany

In Tuscany there are concerns about the long-term sustainability of small-scale fisheries due to a range of critical conditions affecting the Mediterranean Sea, such as habitat loss, pollution, eutrophication, the accidental introduction of alien species and industrial overfishing (Colloca et al., 2013). Over the last decade or so, the economic crisis has also impacted local fisheries in Tuscany, both in terms of demand and price level volatility (Ferretti, 2011). The economic crisis has also led to a change in the cost of production factors, particularly higher fuel costs. This is significant in that fuel is the main production cost in fisheries activity. The small-scale fisheries sector in Tuscany is also highly fragmented, leaving individual fishers isolated and lacking negotiation power in the markets when selling their catches. The adaptive and transformative actions implemented by Tuscan small-scale fishers in response to these challenges can be classified, as follows: i) market channels and product adaptation, ii) recreational services, and iii) habitat preservation.

Market channels and product adaptation

Rising operating costs, volatile and low prices due to imports from highly competitive markets, decreasing marine stocks and a lack of distribution organisation, represent some key contextual conditions that have strongly impacted the local fisheries sector in Tuscany and prompted some local fishers to seek alternative market channels. For instance, some small-scale fishers have

started selling to solidarity purchasing groups[5] or directly to consumers (ISMEA, 2013). There are also instances where trawler fishers have sold their boats and transformed their activity into small-scale fishing, as was the case for a small cooperative of small-scale fishers in Marina di Carrara who have started to sell their catch to solidarity purchasing groups:

"*The operating costs for trawling were too high and not sustainable especially if compared with what we can actually catch and the price we can obtain. Restaurateurs and wholesalers don't leave any chance for fishers to earn enough money. Also, there is not enough fish in our sea. We could not compete with fish coming from external cheaper markets. So now 70% of our fish is sold to purchasing groups.*" (Anonymous fisher 1, 2016).

The move to supplying solidarity purchasing groups represents a transformation in the group's fishing activities, with a focus on quality products rather than quantity. For a number of fishers and fishing cooperatives, it also opened new market opportunities through processing food, communicating culinary practices and transmitting knowledge on neglected fish species:

"*Now* - that the fishing cooperative sells to purchasing groups - *we can obtain pretty high prices since the clients understand the real cost of fish. For instance they understand that there is a difference between the price of a whole fish and the price of filleted fish"* (Anonymous fisher 1, 2016).

Similarly, in the case of a larger cooperative of small-scale fisheries (25 boats) in the port of Viareggio, fishers have increased their profits by selling to ethical purchasing groups, as well as accessing other market channels and meeting the demands of fish processors for processed fish (filleted and gutted):

"*Once we joined the solidarity purchasing groups, we could also join the short chain: we could then avoid dealing with wholesalers. Now the fish is loaded into the van and taken directly from the fisherman to the consumer. The consumer can save money, and for us it is an advantage not to deal anymore with wholesalers, so we can earn something more."* (Anonymous fisher 2, 2016).

It was also observed that some fishers have developed artisanal activities, such as the transformation and processing of catches for the production of fish sauces, or fillets in oil, in order to create added value (Ferretti, 2011). One of the

[5] According to Brunori et al. (2012; p.9) solidarity purchasing groups (GAS from the Italian acronym) *"were born in Italy as networks run by citizen-consumers animated by the goal of applying the principle of solidarity in daily purchase–consumption activities*".

interviewees explained how within her business she had started to valorise the products through processing seafood:

"*I followed my culinary habits. I never used to throw away food. So, in times of fish abundance we had the idea of using the excessive amount of fish caught for preparing fish conserves and sauces. And all the ingredients I use for processing fish are 100% organic.*" (Anonymous fisher 1, 2016).

The introduction of organic products in fish processing has also led the fishing cooperative to participate in organic fairs, which now represent an opportunity to create other business contacts for further market channels within the "organic network".

Recreational services

A key non-productivist adaptation strategy is pescatourism, which can be defined as an activity carried on by a single owner, or a company or fishing cooperative, aimed to transport people other than crew, such as tourists, and to conduct recreational activities. These activities allow fishers to integrate and diversify their income as well as providing an opportunity for new employment and releasing pressure on fish stocks (PSL-GAC Toscana, 2015). The Fisheries Local Action Group "Coast of Tuscany" has supported the strengthening of the links between fishing activities and tourism through encouraging the adaptation of vessels as well as the valorisation of catches, short supply chains, and diversification of income (EC-FARNET, 2014). From interviews conducted with fishers engaged in pescatourism, it emerged that it can represent an important adaptive and transformative strategy of diversification for small-scale fisheries, especially where they struggle to sell their fish at profitable prices, that can be actively promoted through individual websites and social networks such as Facebook, YouTube and Tripadvisor. The main reasons that have persuaded fishers to adapt, or even transform, their fishing activity into pescatourism are encapsulated in the following quotation:

"*The main issues, in general, are the lack of fish stocks and the low prices fixed by wholesalers, retailers and restaurateurs*". (Anonymous fisher 3, 2016)

"*We* (the fishers' cooperative) *don't supply restaurants anymore because they pay so late and sometimes they don't pay at all. But, actually, the main issue is not even the price of fish, the real problem is that there is no more fish to catch!"* (Anonymous fisher 2, 2016)

In two of the three cases analysed in Tuscany, there is a double feedback loop between selling to purchasing groups and pescatourism. In this respect, pescatourism can be a promotional factor for selling to purchasing groups and vice versa. Furthermore, pescatourism can also be connected with the activities of environmental protection engagement, food services as well as land-based tourism and training for young fishers.

Enabling activities for marine resource preservation

Along with low income and declining profitability, mainly due to high production costs, low sales prices, and the presence of competitive cheaper markets, there is also evidence of ever decreasing catches for small-scale fisheries in Tuscany. Some response strategies, aimed at preserving the local fish stocks, consist of diversification techniques, such as shifting to new food products; in particular some fishers have adapted through diversifying their catches and changing their gear size in order to target more valuable fish species. However, the new measures of the European Maritime and Fisheries Fund (EMFF) are deemed, by one of our interviewees, to be oriented too much towards fostering markets:

"*The new EMFF focuses totally on the market, but a scientific monitoring authority is lacking for fish stocks. The real problem is not the market but the lacking fish stocks. In fact, the mesh size imposed for the nets used by us* (the cooperative) *is still too narrow. We prefer using larger mesh sizes in order to optimise the fishing effort, so our environmental impact is lower, we earn more* (with more valuable catches) *and work less*". (Anonymous fisher 2, 2016).

Other adaptive strategies that lessen the fishing effort involve the valorisation of neglected fish species and the processing of excessive catches, avoiding concentrating on a few overfished species and avoiding fish waste:

"*We had the idea of using the surplus fish caught for preparing fish conserves and sauces. Moreover, our customers* (from the solidarity purchasing group) *are very sensitive to food waste*. *We organised a meeting where we explained to them how to cook poor fishes, so that we can respect and take advantage of the seasonality of the catches*". (Anonymous fisher 1, 2016).

Other producers adopted storage strategies in order not to compromise the natural seasonality of the fish available, to avoid overfishing marine resources in periods of low availability, and to optimise the strong availability periods:

"*We* (the cooperative) *developed a particular technique for storing fish at very low temperature but keeping very good quality of the product, in order to supply very*

interesting species in times when there is no availability in the sea". (Anonymous fisher 2, 2016).

4. Discussion

When considering the non-productivist adaptation strategies examined here, it is important to bear in mind that fishers are part of coastal communities and their activity shapes – and is shaped by – the surrounding context in terms of social, environmental and economic capital. Salmi (2015) has observed that, in several European coastal areas socioeconomic and environmental drivers of change have led to societal transitions identified as a shift from a mainly food productive pattern to multiactivity patterns that include recreational services, tourism activities and environmental protection. Similarly, in analysing the adaptation strategies of fishers in France, Roussel et al. (2011) have associated such transitions with what French farmers have done in order to improve the long-term economic and environmental sustainability of their business activity, maintain their original occupational status and diversify their operations through multifunctionality.

The strategic behavioural responses analysed above can be identified as resilience actions and they can be classified into domains such as rural development, diversification, territorial integration, vertical integration and a shift to short food chains. The value of this study lies in the fact that it has allowed a novel comparative analysis of how two small-scale fisheries' sectors in the EU are responding to a multidimensional set of uncertainties, thereby extending the literature on EU fisheries' resilience and adaptive strategies (Phillipson et al., 2015) that to date focused on distinct cases. This study also improves the state of the art and knowledge on the diversity of small-scale fisheries' responses within general EU regulations. These factors provided an opportunity to draw meaningful comparisons between countries, whilst considering their different socioeconomic and environmental conditions.

In both the Cornwall and Tuscany case studies it has been observed that small-scale fishers often have to contend with powerful intermediaries, necessitating the adoption of direct selling strategies in order to add value to their catches and to obtain higher prices for them. In the Cornish case study, this has included the use of modern communication technologies for direct selling (e.g. smart telephones and applications such as Twitter and Facebook), in order to keep potential buyers (such as restaurants in big cities, most notably London) informed about the fish caught that day. In so doing, the fishers are able to bypass intermediaries and improve their resilience as they have more control over the market for their catches

and the prices they receive. Similarly, increasing numbers of fishers are seeking to sell their catch direct to local Cornish restaurants, thereby making better use of the opportunities provided by the influx of 4.5 million tourists every year to the county. However, this necessitates building up relationships of trust with the chefs involved. In a few cases, fishers have coordinated their catches in order to supply a small local processor who is able to pay them 10% over the average harbourside price, before selling direct to high-end London restaurants.

In the Tuscan case study, it was observed that a number of fishers are selling through the organisation of solidarity purchasing groups. In this respect, solidarity-purchasing groups are acknowledged and studied as non-productivist initiatives that break with an industrial productive model and represent a transition to "*resilient and socially-cohesive territories*", towards sustainable food systems (Rossi, 2017; p. 2). The social links, as building blocks of purchasing group dynamics, allow developing economies in food production as well as in distribution, contributing to economic, social and local sustainable development (Raynal and Razafimahefa, 2014). Furthermore, it is acknowledged that in these initiatives the price fixed is fair, for both primary producers and consumers, and takes into account the real cost of labour as well as the environmentally-friendly practices (Fonte, 2013). Le Velly and Dufeu (2016) also observe an increase in income for fishers involved in similar purchasing groups in France. Selling their products to purchasing groups enables primary producers to be innovative through multifunctional methods, yet retain a close connection with tradition (Brunori et al., 2012). The small-scale fishers of Tuscany who have taken the opportunity to market their catches to solidarity purchasing groups are able to build these sales channels thanks to strong social links that are well established in several communities in the region. On the other hand, purchasing group activity was not observed in Cornwall for fish. This discrepancy between Cornwall and Tuscany can be explained partly by the different cultures and traditions of cooperation in the two regions; partly by the poorly developed fish-eating culture within the UK; and partly because Cornwall is one of the poorest regions in the UK. Adding value to the fish caught necessitates consumers with sufficient spending power (such as London restaurants or better accessing the influx of tourists to Cornish restaurants). As a result, currently more than 80% of the fish caught in Cornwall are exported (much of it to the EU). While direct sales can be crucial for some fishers to capture the necessary added value that they need to remain viable, such channels also face important problems associated with efficient logistics, control of the cold-chain, and the need to respect administrative, quality and standards' requirements.

In both case study regions, it was thus observed that small-scale fishers have opted to modify their targets in order to catch more valuable fish species.

Diversifying catches by targeting a range of different or more valuable species is an acknowledged strategy for selling fish at higher prices directly to restaurants, or being able to sell fish that are not included in quota restrictions. However, such species- and size-driven selections in small-scale fisheries can have detrimental impacts on ecosystem and biodiversity richness (Lloret et al., 2018), including triggering fishing competition for new target species.

With regards to the recreational activity related to fishing, the Italian case study reveals that in the last 20 years a number of small-scale fishers have partially transformed their fishing activities by providing pescatourism services. It has been observed that pescatourism can contribute to the resilience and long-term sustainability of fishers by integrating and increasing their income, thereby helping to preserve artisanal fisheries within local coastal communities. Furthermore, pescatourism can also contribute to environmental protection since the quantity of catches is reduced compared with “business as usual” fishing activity (Lai et al., 2016).

Pescatourism and sales to solidarity purchasing groups are adaptation strategies applied by individuals or companies in Tuscany that are mainly working on and promoting sustainable fishing, as well as fostering diversification of their business activity. The use of modern communication technologies, such as smartphones for sending pictures and videos through the Facebook application, were shown to be key in order to promote pescatourism. It emerged that the capacity of small-scale fishers to diversify their activity is key to their resilience, since the implementation of one diversified activity (e.g. pescatourism) has the potential to open up further complementary activities (e.g. training), or alternative market channels (e.g. direct sales or selling to purchasing groups).

In Cornwall, while there are instances where fishers take out tourists on their boats, pescatoursim has not developed to the same extent as in Tuscany. It is not clear why this should be the case, except that the focus of support from bodies such as the local FLAG have been more in terms of improving the marketing of their catch. This is not to say that tourism and fishing are not connected; indeed, active fishing harbours are seen as one of the main draws of Cornwall as a tourist destination (with tourism responsible for 25% of the county’s GDP). As mentioned above, fish is not integral to the diets of people in the UK (in the way that it is in France, Spain or Italy for example), meaning that there is a need for more policy support to try and increase both the quantities and types of fish eaten domestically, if the potential of the tourist influx to Cornwall is to be better realised. Encouragement to increase domestic demand still further may become even more pressing following the Brexit negotiations, should high tariffs be imposed on fish exports to the EU, thereby dampening demand for Cornish fish.

It is clear that business and inter-personal skills are essential resilience factors for leading a successful pescatourism business as well as developing good relationships with restaurateurs in direct sales. This includes the use of modern technologies, such as Facebook, Twitter and the Internet more generally. However, if on the one hand technologies can help harness the benefits of tourism activity and enable direct sales, on the other hand they can be a barrier to fishers who do not have the necessary skills. Therefore, in order to encourage quality and sustainable production as well as sustainable fishing-related tourism, policy interventions could be oriented to further support training schemes and investments that can improve the adaptive and transformative capacities of fishers engaging in non-productivist business activities. For instance, in Cornwall, the Cornwall Wildlife Trusts' "Good Seafood Guide" represents a positive example of a policy tool for supporting fishers engaged in sustainable practices and for promoting sustainable fish consumption. However, when analysing the potential positive impacts of pescatourism, it is important to keep in mind that such a different functional activity for fishers may have a detrimental impact on their approach and social identity. In essence, it changes the "business as usual" activity of the fisher, potentially creating a loss of socio-cultural references as well as their sense of identity as fishers.

Key lessons learnt

In both case studies, small-scale fishers have encountered wholesalers as obstacles that impede their ability to add value to their catches and thus to earn a suitable income from their activities. Cornish and Tuscan fishers have also adopted diversification, marketing and sales strategies aimed at shortening the value chain, vertically integrating non-fishing activities, thus allowing them to propose, create and appropriate value added from their activities. In particular, tourism is a key factor of innovation and diversification with regards to income sources for Tuscan small-scale fisheries that can be further developed and spread to many other vessels. In Cornwall, there are also important links between fishing and tourism. However, while tourism is widely recognised as being critical to the overall tourist offer of the county, more needs to be done to harness the economic potential of the tourist: at present, this is limited to some fishers selling directly to local restaurants. Furthermore, local policy should evaluate different options and opportunities for supporting local small-scale fishers in their activities and in their business adaptation strategies. This should include measures such as entrepreneurial training, with a particular focus on fostering local market coordination, social cohesion of the fishing actors within local communities, as well as improving environmental-friendly activities related to fishing.

5. Conclusions

Research on fisheries management has been mainly characterised by biophysical approaches, although several efforts recently have been implemented to integrate socioeconomic, cultural and environmental issues into fisheries research. Salmi (2015) argues that key to understanding and enabling the future resilience of small-scale, inshore fishing livelihoods is the notion of 'non-productivist development' in coastal communities. Within this framing, it is necessary to acknowledge the increased complexity and diversity of uses and pressures that now confront coastal areas. This requires a governance framework that allows for interaction, understanding and the development of synergies between fishers, local communities and other user groups that ultimately may contribute to the resilience of coastal fishers and fisheries.

This work, through a comparative analysis of small-scale fisheries' responses to socioeconomic, environmental and policy uncertainties in two specific EU contexts, contributes to current knowledge about how resilience and adaptive strategies for small-scale fisheries emerge in practice. Building on the analysis of those two case studies, this paper has sought to illustrate key examples of specific adaptation strategies implemented by fishers under the common EU policy framework. Adapting a resilience perspective to the analysis of non-productivist adaptation strategies can provide those responsible for fisheries management and governance with tools for responding to uncertainty and change in sensitive coastal areas. In this respect, the capacity of small-scale fishers to diversify their activity seems to be key, since the implementation of one diversified activity (e.g. pescatourism or adding value) might enable or encourage fishers to engage with other opportunities such as training, or alternative market channels (e.g. direct sales or selling to purchasing groups).

Finally, in relation to the ongoing Brexit negotiations, there is considerable uncertainty as to their implications for the resilience of small-scale fisheries in Cornwall and therefore their adaptation strategies. According to Hirst's report (2017), there are high levels of uncertainty about the level of quota that will be obtained by the UK; potential restrictions on EU market access can be envisaged; public funding for supporting fishing communities and environmental sustainability are not sure to be maintained; and there are likely to be changes in relation to the protection of the marine environment.

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