

Postprint version of Prosperi, P., Kirwan, J., Maye, D., Bartolini, F., Vergamini, D., & Brunori, G. (2019). Adaptation strategies of small-scale fisheries within changing market and regulatory conditions in the EU. *Marine Policy*, 100, 316-323. <https://doi.org/10.1016/j.marpol.2018.12.006>

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

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### *Acknowledgements*

This work was developed within the project SUFISA-Sustainable finance for sustainable agriculture and fisheries (Horizon 2020 Grant agreement 635577).

**Title:**

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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 **1. Introduction**

2 European fisheries have undergone major structural change over the last 20 years.  
3 Processes of modernisation, concentration and technological development, for  
4 example, have reduced fishing employment by almost 50% (Symes and Phillipson,  
5 2009). In this respect, policy has been oriented towards the development of large-  
6 scale, high-tech and intensive fisheries, rather than the small-scale artisanal sector,  
7 notwithstanding that the former are considered to be the main cause of the current  
8 fisheries crisis (Urquhart and Acott, 2013). Interventions by the Common Fisheries  
9 Policy (CFP) to help restrict overfishing in EU waters (such as through limitations  
10 of fleet capacity, quota management, and technical measures regulating fishing  
11 areas, gears and catches) represent another set of pressures for fishers (Symes  
12 and Phillipson, 2009). Furthermore, interventions against overfishing have led to  
13 considerable social and employment-related issues for fishing communities,  
14 especially those that rely on small-scale fisheries (Reed et al., 2011).

15 In general, small-scale fisheries are characterised by low-capitalisation and labour-  
16 intensive management, and relatively little power over the marketing of their catch.  
17 They use multiple types of gear to target manifold fish species, deploy diverse and  
18 flexible livelihood strategies, and adapt their targets to the seasonal species  
19 available (Allison & Ellis, 2001).

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

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

38

## 39 1.2 Understanding small-scale fishers' adaptive capacities

40 In order to ensure the long-term viability of small-scale fisheries it is becoming  
41 evident that there is a need to address the social and cultural aspects of fisheries  
42 management (Symes and Phillipson, 2009; Carrà et al., 2014; Urquhart et al.,  
43 2011). There is also a call for new frameworks to explore management strategies  
44 on resource, community and market conditions oriented to preserve fish stocks  
45 and guarantee the socioeconomic performance of communities (Anderson et al.,  
46 2015). Various constraints now confront small-scale fisheries, including: pressures  
47 on their income, rising production costs, volatile fuel prices, recruitment issues,  
48 declining fish stocks and marine habitat degradation. The combination of these  
49 pressures is leading European small-scale fishers in several cases to adopt a

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<sup>1</sup> Inshore fisheries in Cornwall and small-scale 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.

<sup>2</sup> 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.

50 “*post-productivist*” model of activity (Urquhart and Acott, 2013; Salmi, 2015).  
51 Similar to what happened in European agricultural contexts, in which there has  
52 been an EU policy-driven shift from a productivist, concentrated and specialised  
53 model to more extensive, dispersed and diversified patterns of activity, the  
54 diversification of productive activities can help achieve long-term economic  
55 sustainability for fisheries businesses in coastal areas. Such functional  
56 diversification can be implemented with the aim of increasing business income,  
57 engaging in environmental protection as well as enhancing producer reputation,  
58 while at the same time maintaining the fishers’ original occupational status  
59 (Roussel et al., 2011). In particular, for fishing activities, the concept of  
60 multifunctionality refers to four main functions: food production, environmental,  
61 territorial and social capital (Malorgio et al., 2017; Ropars-Collet et al. 2017).

62 Building on a number of previous studies, Evans et al. (2002, p. 317) define five  
63 categories of ‘post-productivism’, namely: “*the shift from quantity to quality in food*  
64 *production; the growth of on-farm diversification and off-farm employment*  
65 *(pluriactivity); extensification and the promotion of sustainable farming through*  
66 *agri-environmental policy; dispersion of production patterns; and environmental*  
67 *regulation and restructuring of government support for agriculture*”<sup>3</sup>. However, as  
68 they note, the term is increasingly problematic and has been much debated (see:  
69 Wilson and Burton, 2015; Rannikko and Salmi, 2017). Wilson and Burton (2015)  
70 suggest the term ‘post-productivism’ – rarely used in fisheries contexts (Rannikko  
71 and Salmi, 2017) – is misleading since it does not capture the intermediary  
72 transitions that producers can experience, or implement, when they shift from  
73 mainly productivist activities or even when they evolve and further differentiate  
74 their activity back towards productivism (see, for example, the ‘actor-oriented  
75 spatio-temporal’ approach developed by Wilson and Burton, 2015; fig. 1, p. 54).  
76 On the other hand, the term ‘neo-productivism’ suggests the rediscovery of a  
77 productivist approach for producers who had previously shifted from a productivist  
78 towards a non-productivist model before returning to a productivist strategy, albeit  
79 through a different value proposition and creation (Brunori et al., 2012). Indeed,  
80 Wilson and Burton (2015) argue that ‘non-productivism’ is a term better able to  
81 nuance and conceptualise the complex spatial and temporal changes in modern  
82 rural activities. ‘Post-productivism’, for example, is a linear term, based on a time  
83 variable that only implies something following on temporally from productivism  
84 without leaving space to revert to productivism or ‘neo-productivism’. ‘Non-  
85 productivism’ is a more neutral concept in this regard, that allows reflecting a non-  
86 definitive trend towards less productivity and more quality and multifunctionality

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

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

95 Analysing the practices and strategies of small-scale fisheries through a non-  
96 productivist framework can also help improve understanding of their *resilience* and  
97 thereby sustainability. It can help overcome previous research analyses that  
98 tended to consider fishers as "*myopic and short-run profit maximizers*" (Sønvisen  
99 2014; p.194), overlooking the "*dynamicity*" as well as the functional diversity and  
100 complexity of fishers' behavioural strategies (Gustavsson et al., 2017; p. 104).

101 Resilience thinking originates from the work of Holling (1973) on natural  
102 ecosystems and has subsequently been adopted in the social sciences by a  
103 number of authors (e.g. Adger, 2000; Berkes et al., 2003) to analyse the  
104 interactions in coupled human-environment systems. According to Walker et al.  
105 (2004), resilience is "*the capacity of a system to absorb disturbances, to be*  
106 *changed and reorganised*" and can be understood as a crucial dimension of long-  
107 term sustainability (Almås and Campbell, 2012).

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

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

124 2009), can be considered as multifunctional practices that bring adaptation  
125 capacity to fisheries in the form of non-productivist patterns of activities.

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

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

170

## 171 **2. Methods**

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

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

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

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232

### 233 **3. Results**

234

### 235 3.1 Current challenges facing inshore fisheries in Cornwall

236 In Cornwall, two key issues emerged from the case study as having a significant  
237 impact on the ability of small-scale fishers to implement specific adaptation  
238 strategies in response to the challenges they face. The first concerns policy and  
239 the management of Cornwall's fisheries, particularly in relation to the  
240 administration and availability of quota. Most of the UK fishing quota is allocated  
241 to the larger-scale boats, with the inshore sector receiving just 4% of the quota. In  
242 response, growing numbers of fishers are turning to non-quota species such as  
243 lobster. The second concerns developing new markets for the fish caught by small-  
244 scale fishers, which principally involves adding value to the catch in some way.  
245 Currently, the majority of fishers sell their catch at harbour-side, meaning that they  
246 are at the mercy of what buyers will pay on any particular day. The fishers are also  
247 fiercely independent and in general do not coordinate their marketing approach,  
248 thereby putting themselves in a weak bargaining position. In response, some  
249 fishers are engaging directly with the end consumer, such as through selling to  
250 local restaurants. Significantly, the ongoing Brexit negotiations are likely to affect  
251 both of these issues.

252

#### 253 ***Entrepreneurship and the development of market outlets***

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

273 Spain) via Vivier lorries. Overall, approximately 80% of the fish caught in Cornwall  
274 are exported.

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

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

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

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

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

308 *“A Hayle [a small fishing port on the north coast of Cornwall] crab boat was*  
309 *struggling to sell his crab for a reasonable price. So the FLAG supported him in*

310 *investing in a crab potting process. This involved preparing the crab meat and*  
311 *putting it in nice jars with nice branding. He now can't keep up with demand. This*  
312 *is a really good way of marketing a product that comes in all year round, but can*  
313 *be preserved and then sold to the millions of tourists who come down only in the*  
314 *summer.” (Expert interviewee)*

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

320

### 321 ***Emerging responses to current changes in policy and management.***

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

334 From the perspective of small-scale fishers, policy-making is often associated with  
335 being “*top-down, distant, centralised and lacking local specificity*” (Workshop  
336 participant), thereby alienating many inshore fishing communities who tend to be  
337 suspicious of policy and science, perceiving it as being external or outside  
338 interference. Flexibility is seen as a key attribute of fishing sustainably and  
339 regulation is seen as “*reducing the scope for fishermen to practice many of the*  
340 *attributes associated with being a good skipper, such as using local ecological*  
341 *knowledge to determine what to fish*” (Ross 2015; p. 319). In this respect, access

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<sup>4</sup> 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).

342 to sufficient quota, as well as flexibility in its allocation, are seen as being critical to  
343 the future of inshore fishing in Cornwall.

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

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

357

### 358 3.2 Current challenges facing small-scale fisheries in Tuscany

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

373

374

#### 375 ***Market channels and product adaptation***

376 Rising operating costs, volatile and low prices due to imports from highly  
377 competitive markets, decreasing marine stocks and a lack of distribution  
378 organisation, represent some key contextual conditions that have strongly  
379 impacted the local fisheries sector in Tuscany and prompted some local fishers to  
380 seek alternative market channels. For instance, some small-scale fishers have  
381 started selling to solidarity purchasing groups<sup>5</sup> or directly to consumers (ISMEA,  
382 2013). There are also instances where trawler fishers have sold their boats and  
383 transformed their activity into small-scale fishing, as was the case for a small  
384 cooperative of small-scale fishers in Marina di Carrara who have started to sell  
385 their catch to solidarity purchasing groups:

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

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

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

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

405 *“Once we joined the solidarity purchasing groups, we could also join the short chain:*  
406 *we could then avoid dealing with wholesalers. Now the fish is loaded into the van*  
407 *and taken directly from the fisherman to the consumer. The consumer can save*

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<sup>5</sup> 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”*.

408 *money, and for us it is an advantage not to deal anymore with wholesalers, so we*  
409 *can earn something more.”* (Anonymous fisher 2, 2016).

410 It was also observed that some fishers have developed artisanal activities, such  
411 as the transformation and processing of catches for the production of fish sauces,  
412 or fillets in oil, in order to create added value (Ferretti, 2011). One of the  
413 interviewees explained how within her business she had started to valorise the  
414 products through processing seafood:

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

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

423

#### 424 ***Recreational services***

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

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

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

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

454

#### 455 ***Enabling activities for marine resource preservation***

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

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

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

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

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

482 “*We (the cooperative) developed a particular technique for storing fish at very low*  
483 *temperature but keeping very good quality of the product, in order to supply very*  
484 *interesting species in times when there is no availability in the sea”*. (Anonymous  
485 fisher 2, 2016).

486

#### 487 **4. Discussion**

488

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

501

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

514 In both the Cornwall and Tuscany case studies it has been observed that small-  
515 scale fishers often have to contend with powerful intermediaries, necessitating the  
516 adoption of direct selling strategies in order to add value to their catches and to

517 obtain higher prices for them. In the Cornish case study, this has included the use  
518 of modern communication technologies for direct selling (e.g. smart telephones  
519 and applications such as Twitter and Facebook), in order to keep potential buyers  
520 (such as restaurants in big cities, most notably London) informed about the fish  
521 caught that day. In so doing, the fishers are able to bypass intermediaries and  
522 improve their resilience as they have more control over the market for their catches  
523 and the prices they receive. Similarly, increasing numbers of fishers are seeking  
524 to sell their catch direct to local Cornish restaurants, thereby making better use of  
525 the opportunities provided by the influx of 4.5 million tourists every year to the  
526 county. However, this necessitates building up relationships of trust with the chefs  
527 involved. In a few cases, fishers have coordinated their catches in order to supply  
528 a small local processor who is able to pay them 10% over the average harbourside  
529 price, before selling direct to high-end London restaurants.

530 In the Tuscan case study, it was observed that a number of fishers are selling  
531 through the organisation of solidarity purchasing groups. In this respect, solidarity-  
532 purchasing groups are acknowledged and studied as non-productivist initiatives  
533 that break with an industrial productive model and represent a transition to “*resilient*  
534 *and socially-cohesive territories*”, towards sustainable food systems (Rossi, 2017;  
535 p. 2). The social links, as building blocks of purchasing group dynamics, allow  
536 developing economies in food production as well as in distribution, contributing to  
537 economic, social and local sustainable development (Raynal and Razafimahefa,  
538 2014). Furthermore, it is acknowledged that in these initiatives the price fixed is  
539 fair, for both primary producers and consumers, and takes into account the real  
540 cost of labour as well as the environmentally-friendly practices (Fonte, 2013). Le  
541 Velly and Dufeu (2016) also observe an increase in income for fishers involved in  
542 similar purchasing groups in France. Selling their products to purchasing groups  
543 enables primary producers to be innovative through multifunctional methods, yet  
544 retain a close connection with tradition (Brunori et al., 2012). The small-scale  
545 fishers of Tuscany who have taken the opportunity to market their catches to  
546 solidarity purchasing groups are able to build these sales channels thanks to strong  
547 social links that are well established in several communities in the region. On the  
548 other hand, purchasing group activity was not observed in Cornwall for fish. This  
549 discrepancy between Cornwall and Tuscany can be explained partly by the  
550 different cultures and traditions of cooperation in the two regions; partly by the  
551 poorly developed fish-eating culture within the UK; and partly because Cornwall is  
552 one of the poorest regions in the UK. Adding value to the fish caught necessitates  
553 consumers with sufficient spending power (such as London restaurants or better  
554 accessing the influx of tourists to Cornish restaurants). As a result, currently more  
555 than 80% of the fish caught in Cornwall are exported (much of it to the EU). While  
556 direct sales can be crucial for some fishers to capture the necessary added value

557 that they need to remain viable, such channels also face important problems  
558 associated with efficient logistics, control of the cold-chain, and the need to respect  
559 administrative, quality and standards' requirements.

560 In both case study regions, it was thus observed that small-scale fishers have  
561 opted to modify their targets in order to catch more valuable fish species.  
562 Diversifying catches by targeting a range of different or more valuable species is  
563 an acknowledged strategy for selling fish at higher prices directly to restaurants, or  
564 being able to sell fish that are not included in quota restrictions. However, such  
565 species- and size-driven selections in small-scale fisheries can have detrimental  
566 impacts on ecosystem and biodiversity richness (Lloret et al., 2018), including  
567 triggering fishing competition for new target species.

568 With regards to the recreational activity related to fishing, the Italian case study  
569 reveals that in the last 20 years a number of small-scale fishers have partially  
570 transformed their fishing activities by providing pescatourism services. It has been  
571 observed that pescatourism can contribute to the resilience and long-term  
572 sustainability of fishers by integrating and increasing their income, thereby helping  
573 to preserve artisanal fisheries within local coastal communities. Furthermore,  
574 pescatourism can also contribute to environmental protection since the quantity of  
575 catches is reduced compared with "business as usual" fishing activity (Lai et al.,  
576 2016).

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

587 In Cornwall, while there are instances where fishers take out tourists on their boats,  
588 pescatourism has not developed to the same extent as in Tuscany. It is not clear  
589 why this should be the case, except that the focus of support from bodies such as  
590 the local FLAG have been more in terms of improving the marketing of their catch.  
591 This is not to say that tourism and fishing are not connected; indeed, active fishing  
592 harbours are seen as one of the main draws of Cornwall as a tourist destination  
593 (with tourism responsible for 25% of the county's GDP). As mentioned above, fish  
594 is not integral to the diets of people in the UK (in the way that it is in France, Spain

595 or Italy for example), meaning that there is a need for more policy support to try  
596 and increase both the quantities and types of fish eaten domestically, if the  
597 potential of the tourist influx to Cornwall is to be better realised. Encouragement to  
598 increase domestic demand still further may become even more pressing following  
599 the Brexit negotiations, should high tariffs be imposed on fish exports to the EU,  
600 thereby dampening demand for Cornish fish.

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

620

### 621 ***Key lessons learnt***

622 In both case studies, small-scale fishers have encountered wholesalers as  
623 obstacles that impede their ability to add value to their catches and thus to earn a  
624 suitable income from their activities. Cornish and Tuscan fishers have also adopted  
625 diversification, marketing and sales strategies aimed at shortening the value chain,  
626 vertically integrating non-fishing activities, thus allowing them to propose, create  
627 and appropriate value added from their activities. In particular, tourism is a key  
628 factor of innovation and diversification with regards to income sources for Tuscan  
629 small-scale fisheries that can be further developed and spread to many other  
630 vessels. In Cornwall, there are also important links between fishing and tourism.  
631 However, while tourism is widely recognised as being critical to the overall tourist  
632 offer of the county, more needs to be done to harness the economic potential of

633 the tourist: at present, this is limited to some fishers selling directly to local  
634 restaurants. Furthermore, local policy should evaluate different options and  
635 opportunities for supporting local small-scale fishers in their activities and in their  
636 business adaptation strategies. This should include measures such as  
637 entrepreneurial training, with a particular focus on fostering local market  
638 coordination, social cohesion of the fishing actors within local communities, as well  
639 as improving environmental-friendly activities related to fishing.

640

## 641 **5. Conclusions**

642 Research on fisheries management has been mainly characterised by biophysical  
643 approaches, although several efforts recently have been implemented to integrate  
644 socioeconomic, cultural and environmental issues into fisheries research. Salmi  
645 (2015) argues that key to understanding and enabling the future resilience of small-  
646 scale, inshore fishing livelihoods is the notion of 'non-productivist development' in  
647 coastal communities. Within this framing, it is necessary to acknowledge the  
648 increased complexity and diversity of uses and pressures that now confront coastal  
649 areas. This requires a governance framework that allows for interaction,  
650 understanding and the development of synergies between fishers, local  
651 communities and other user groups that ultimately may contribute to the resilience  
652 of coastal fishers and fisheries.

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

667 Finally, in relation to the ongoing Brexit negotiations, there is considerable  
668 uncertainty as to their implications for the resilience of small-scale fisheries in  
669 Cornwall and therefore their adaptation strategies. According to Hirst's report

670 (2017), there are high levels of uncertainty about the level of quota that will be  
671 obtained by the UK; potential restrictions on EU market access can be envisaged;  
672 public funding for supporting fishing communities and environmental sustainability  
673 are not sure to be maintained; and there are likely to be changes in relation to the  
674 protection of the marine environment.

675

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