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Is existing legislation supporting socially acceptable aquaculture in the European Union? A transversal analysis of France, Italy and Spain

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Abstract :

According to the European Commission, aquaculture is among those maritime sectors contributing to the blue economy due to its potential for generating jobs, business opportunities and, most importantly, for ensuring food security in Europe. In 2014, EU member states set new strategies to support sustainable aquaculture and ambitious targets of productions to be met by 2020 in the three segments, marine fish, freshwater fish and shellfish. A recent assessment made by the European Commission concludes that some countries might not be able to attain the established goals and this paper presents an in-depth analysis of such strategies to identify the social constraints hampering aquaculture growth in France, Italy and Spain as well as the measures established to overcome them. Most of the identified issues are related to the social acceptability of local communities, local stakeholders and consumers, suggesting that this still represents an unsolved issue hampering aquaculture development in Europe. In fact, our results show that (a) the sector suffers from a bad image related to its environmental impacts; (b) a lack of integrated spatial planning is leading to increasing conflicts with other activities; and (c) there is predominance of top-down consultation mechanisms. It is concluded that there is not a single solution to enhance social acceptability of aquaculture since this depends on a number of social, economic and environmental factors that may differ from site to site, and countries need to adopt a more integrated approach where concerns of local communities and stakeholders are understood and taken into account.

Keywords : aquaculture, blue economy, social acceptability, integrated management, public consultation

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1. Introduction

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Marine ecosystems provide many services to human well-being and the demand for such services is expected to increase as the world population grows (Howard, 2018). In 2012, during the Rio +20 United Nations Conference on Sustainable Development, the term “blue economy” was conceived as an extension to the oceans of the land based strategy called “green economy” and endorses the principle of promoting social equity while reducing environmental risks (UN, 2012; 2014). In the EU concept of Blue Growth (Com(2012) 494 final) seas are considered drivers for the economic recovery and great consideration is given to stakeholders participation (EC, 2017). The UN and the EU definitions of blue economy present differences also in the way the human-ocean relation is articulated (see also Silver et al., 2015). In Europe, marine and freshwater aquaculture is among the activities contributing to the economic growth, producing about 20% of food and directly employing 70,000 people in small-medium or micro-enterprises in coastal and rural areas (Source: <https://ec.europa.eu/fisheries/cfp/aquaculture/>). However, aquaculture production is considered stagnant with a growth that has been almost constant in volume since 2000, in contrast with the positive trend seen in other regions of the world (STECF-18-19, 2018). Constraints hampering the sector development in this area include, but are not limited to, licencing (Renwick, 2018), market related issues (EC 2009; Freeman and Angel, 2011, Ertör & Ortega-Cerdà, 2017) and social acceptability (Fezzardi *et al.*, 2013; FAO 2016; Thomas et al. 2017). The definition of social acceptability varies across industries (Boutilier, 2014) and it is not simply related to the compliance of industry with legal obligations but it depends on a number of good governance principles like legitimacy, transparency, fairness, inclusiveness and accountability (Lockwood et al., 2010; Van Putten et al., 2018).

In aquaculture, social acceptability increases when socio-economic benefits (e.g. employment opportunities) are demonstrated as well as the impacts on the environment are assessed and communities are kept informed about the management requirements that business must comply with (Carvalho 1998; Wilson 2001; Whitmarsh and Palmieri, 2009). Thus, the way the sector is regulated can contribute to improve social acceptability if the principles of environmental sustainability, social equity and well-being, transparency and participation are ensured. In Europe, aquaculture is regulated under the Common Fisheries Policy, although it is estimated that the number of applicable EU legislation is currently likely to exceed the 150, but only around 20 can be regarded as the most significant (European

71 Parliament, 2009). Aquaculture production is mainly concentrated in 5 countries: Spain
72 (21%), France (15%), Italy (14%), the United Kingdom (14%), and Greece (10%), making up
73 74% of the sales volume (STECF-18-19, 2018). According to the last EC assessment
74 (STECF-18-19, 2018), the ambitious growth targets set in 2014 by the three most important
75 EU producers, France, Italy and Spain, are unlikely to be met and this study wants to
76 investigate which are the social related issues hampering aquaculture development.

77 France showed a decrease of 10% in volume and 6% in value in the period 2008-2015
78 (STECF-18-19, 2018) while the national objectives set in 2014 are an increase of volume of
79 22% and 50% in value to be achieved by 2020 (EC, 2016a). The sector is dominated by
80 oysters and mussels farming with no new finfish project developed in the last 15 years
81 (PSNPDA, 2015). During the same period (2008-2015) a drop of 12% of the total employees
82 has been recorded (STECF-18-19, 2018). Similarly, Italy showed a decrease of production of
83 5% of volume and 2% in value in the period 2008-2014 due to the collapse of the freshwater
84 segment (-35%)(STECF-18-19, 2018). The overall production is planned to increase of 32%
85 in volume and 38% in value for the period 2013-2025. Italy also recorded a decrease of total
86 employees of 6% for the same period (STECF-18-19, 2018). Between 2008 and 2016
87 Spanish production increased of 9% of volume and 26% of value against the +20% (volume)
88 and +26% (value) estimated in the national plan for the period 2012-2020 (STECF-18-19,
89 2018). Spain is the largest producer of mussels (*Mytilus galloprovincialis*) in EU and this
90 species represents 73% of the total national production while seabass and rainbow trout are
91 the main species of farmed finfish. In terms of employment there has been a decrease of 24%
92 of the total employees in the period 2008-2015.

93 Unlike France, where the competent authority responsible for aquaculture management
94 is national, in Italy and in Spain the regions have the exclusive competence but only Spain
95 developed regional strategic plans to address specific problems.

96 This work will contribute to the existing literature analysing the social acceptability of
97 aquaculture under a policy and governance perspective by a comparative analysis of the
98 national and regional strategies established by France, Italy and Spain to fulfil the
99 requirements of the aquaculture related legislation. Based on such an analysis,
100 recommendations are given in the Discussion and the Conclusion sections.

101 **2. Social acceptability and regulatory requirements**

102 This manuscript does not need an ethical approval

103

104 In the literature, social acceptability of aquaculture is mainly related to 1) the actual or
105 perceived environmental impact (Burbridge et al., 2001; Katranidis et al., 2003; Whitmarsh
106 and Wattage, 2006; Verbeke et al., 2007; Chu et al., 2010; Shalag, 2010; Whitmarsh and
107 Palmieri, 2011; Freeman et al., 2012; Murray and D'Anna, 2015; FAO, 2016; Aguilar-
108 Marjarrez et al., 2017); 2) the social and economic conflicts over the use of the space
109 (Hoagland et al., 2003; Tollefson and Scott 2006; Halwart et al., 2007; Shafer et al., 2010;
110 Nimmo et al., 2011 ; Sanchez et al., 2016) and 3) the transparency and participatory process
111 (Carvalho, 1998; Kaiser and Stead, 2002; Shindler et al., 2002; Katranidis et al., 2003; Buanes
112 et al., 2004; Barrington et al., 2010; FAO, 2016; Kelly et al., 2017).

113 In 2014, EU member states established their national, and in some cases regional,
114 aquaculture strategies as required by the reformed EU Common Fishery Policy (CFP,
115 Regulation No 1380/2013). Such strategies, named Multiannual National Strategic Plans for
116 the promotion of sustainable aquaculture are accompanied by Operational Programmes
117 elaborated in the framework of the European Maritime and Fisheries Fund (EMFF). In this
118 study, the national (and regional) strategies and operational programmes of France, Italy and
119 Spain have been analysed to understand how they are addressing social acceptability related
120 issues. Other relevant information has been gathered in countries reports regarding the
121 implementation of the Maritime Spatial Planning Directive (2014/89/EU), the Water
122 Framework Directive (2000/60/EC), the Marine Strategy Framework Directive (2008/56/EC),
123 the Environmental Impact Assessment Directive (2014/52/EU as amended), the Strategic
124 Environmental Assessment Directive (2001/42/EC), and the NATURA 2000 directives since
125 these regulate, among other things, aquaculture related impacts.

126 **3. Strategies towards a socially acceptable sector**

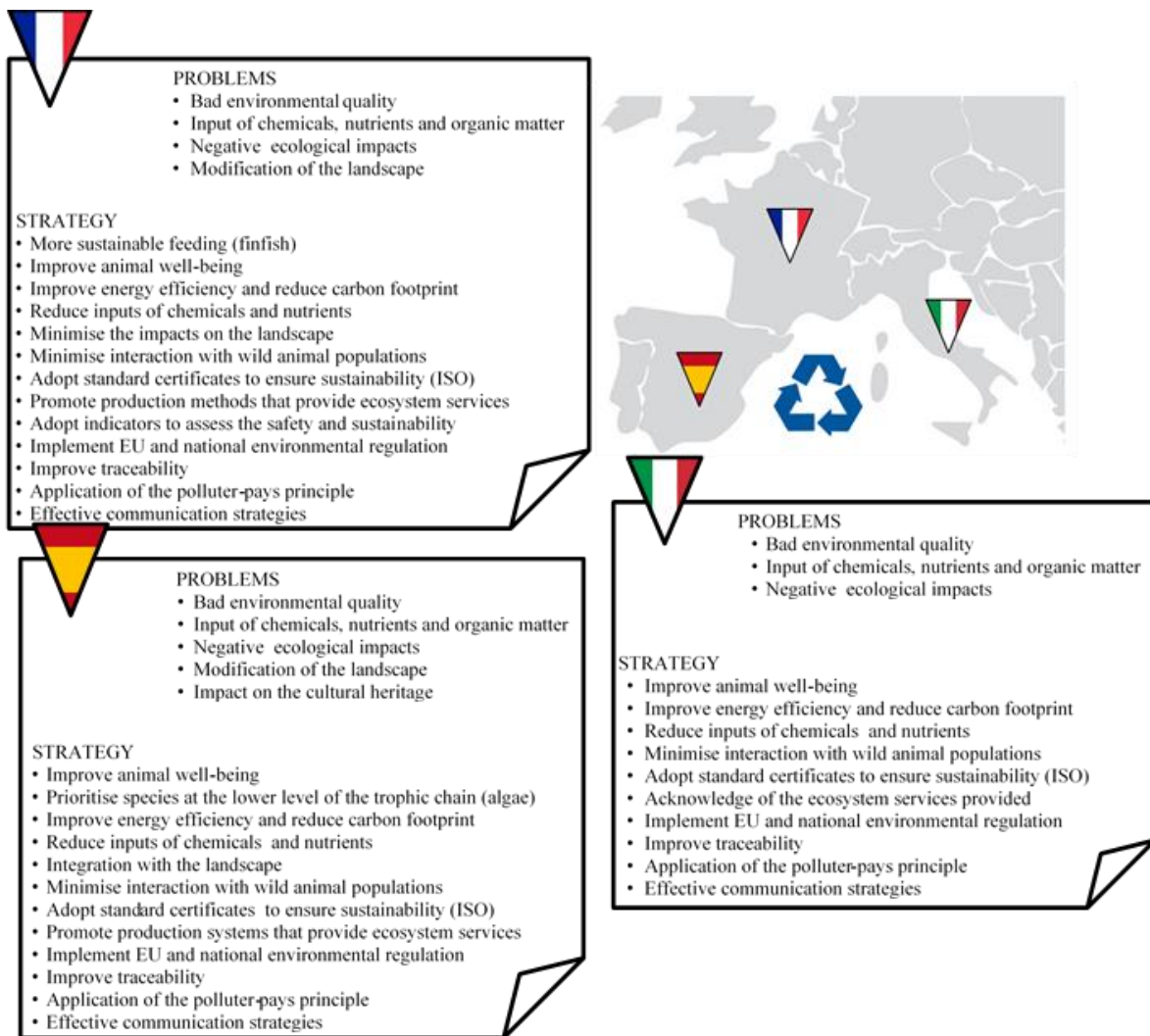
127 In the three countries strategic plans, the issue of social acceptability is mentioned but
128 under different contexts. For instance, in the French report, the term social acceptability is
129 mentioned once in relation to both the products and the management practices and the
130 strategies to enhance it are focused to “*promote synergies with the environmental NGOs and*
131 *consumers associations*”. More broadly, in the Italian Plan the term social acceptability is
132 mentioned once and strategies are aimed at “*ensuring the environmental, economic and social*
133 *sustainability of the sector (...) developing new communication plans to improve the image*
134 *among consumers through transparent and efficient information*”. In the Spanish global

135 strategy, social acceptability is ensured through the establishment of the AZAs (Allocated
 136 Zones for Aquaculture) to prevent conflicts of uses.

137 *3.1 Environmental sustainability*

138 In the SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) presented in the
 139 strategic plans of the three countries, the bad image of the sector is considered an element of
 140 primary concern hampering the development of new projects and influencing consumer
 141 perception. The proposed actions aim to improve marketing communication strategies about
 142 the quality of the farmed products and the environmental sustainability of production systems.
 143 Less attention is given to improve the perception of local communities on the environmental
 144 and ecological impact where aquaculture takes place (Figure 1).

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Figure 1. Environmental related problems contributing to the bad image of the sector and strategies proposed to address them

149 In the French National Strategic Plan, a negative image of the sector has emerged as a
150 result of the spread of misleading information which sums to the inability of people to assess
151 the actual impact of aquaculture (PSNPDA, 2015). Public concerns are mostly associated to
152 quality and safety of the aquaculture products, namely (human) health aspects (e. g.
153 phytotoxins in seafood), zoosanitary (shellfish mortality) but also to the alteration of the
154 marine ecosystems (as a result of an increase of chemicals, nutrients and organic matter
155 inputs) and the impact on the landscape. To demonstrate the environmental sustainability of
156 the sector, and thus to improve the image in the society, the French strategy is to adopt
157 indicators that will enable people to assess when the impact of this activity is acceptable
158 (PSNPDA, 2015). In France, the EU Environmental Impact Assessment has been transposed
159 into the national law (Art. L.122-1 à 3 et R.122-1 à 15 du Code de l'Environnement) and the
160 need for an assessment 1) is related to the characteristics of each project, its location, and its
161 potential impacts on the environment and human health; 2) is established case by case but, in
162 general, it is required for marine farms with a production volume of 20 T/y. France recognises
163 that the characterisation and quantification of the negative and positive impacts is necessary to
164 apply the polluter-pays principle but also to identify the services offered by aquaculture in
165 terms of maintenance of biodiversity (PSNPDA, 2015). To promote the image of the sector in
166 relation to its environmental impact and the quality of products, France focuses on improving
167 the traceability providing information about the environmental sustainability of the activity
168 (International Organization for Standardization (ISO) 14044) which plays a decisive role in
169 the national market (PSNPDA, 2015). Other actions are established at local level (namely in
170 the “*Schéma Départemental Des Structures Des Exploitations De Cultures Marines*”) to
171 improve the perception of the quality of the waters adjacent marine farms and to highlight the
172 importance of the ecosystem services offered by certain type of aquaculture, e.g. shellfish.

173 In the Italian Strategic Plan (PS, 2015), ensuring the environmental sustainability of
174 the sector has emerged as a priority although the bad image of aquaculture is related to the
175 quality of the products, influenced by the quality of the water where sites are located, and less
176 to the impact of the activity on the environment. The actions proposed are aimed at improving
177 the water quality preventing microbiological and chemical contamination, controlling the
178 introduction of alien species, managing the interaction with wild predators especially if
179 protected species (cormorants), improving the welfare of farmed animals, mitigating the
180 impact in the landscape together with new investments in antibiotics and vaccines. Each of the
181 proposed actions are implemented to meet the obligation of European environmental

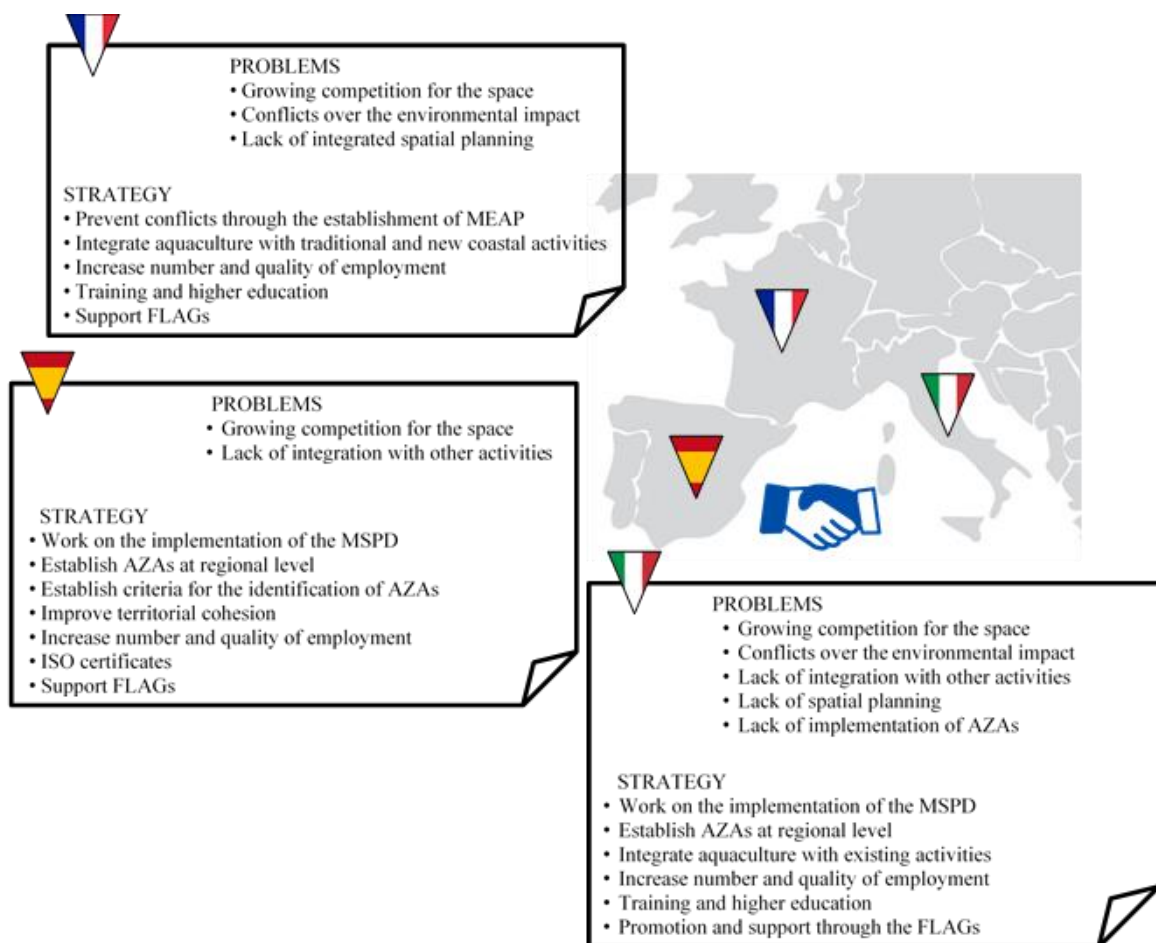
182 legislation, namely the Water Framework Directive and the Marine Strategy Framework
183 Directive for the chemical and ecological quality, the NATURA 2000 directives (Habitats and
184 Birds directives) for biodiversity conservation and the *Reg.* 1143/2014 for preventing the
185 introduction of alien species. The Operational Programme proposed by Italy is accompanied
186 by a Strategic Environmental Evaluation (VAS, 2015) to assess the impact of the actions
187 proposed to support aquaculture growth identifying early threats under the precautionary and
188 the polluter-pays principles. An Environmental Impact Assessment is required for new
189 projects submitted for the EMFF fund together with a declaration, produced by a third party
190 (usually the region) demonstrating that the project does not alter the surrounding landscape
191 (PS, 2015). As for France, the Italian Strategic Plan presents several measures to improve the
192 image of the aquaculture through a more efficient marketing strategy on the quality of the
193 products and on the ecosystem services they provide.

194 Spain is the only country, among the three, to develop detailed regional strategic plans
195 for aquaculture (PEP, 2015) in addition to a national plan. The environmental sustainability is
196 considered a key element for the expansion of the sector and is strictly linked with society
197 perception (PE, 2015). To this end, a national campaign to communicate the sustainability of
198 aquaculture and the quality of the products is launched and producers are suggested to invest
199 to promote the image of their products on social media (radio, TV, internet and social
200 networks). Moreover, a number of actions (37 at national level and approximately 300 in the
201 regions) are proposed to address a wide range of environmental impacts that can affect the
202 negative social perception. Even though the actions vary among regions, all of them are aimed
203 at monitoring, mitigating and preventing the introduction of invasive species, escapes,
204 interaction with cormorant population, organic and contaminants inputs. In the national and
205 regional plans, the most relevant EU legislation is mentioned together with specific national
206 regulation, for instance the National Plan on Prevention and Management of Escapes and the
207 Plan on Reduce, Threat and Valorisation of Aquaculture Waste. The Environmental Impact
208 Assessment (Ley 21/2013, de 9 de diciembre, de evaluación ambiental) is considered one of
209 the most important tools to protect the environment and requirements vary among regions but,
210 in general, it is necessary for sites which production passes 500 T/year and for those project
211 adjacent to NATURA 2000 sites. Great emphasis is given to the promotion of eco-friendly
212 aquaculture by financing the conversion of conventional infrastructures into ecologically-
213 sensitive farms (under EC *Reg.* N. 834/2007 on organic production and labelling of organic
214 products), reinforced by assessments of the environmental impact and carbon footprint (PE,

215 2015). Moreover, Spain proposes a number of sustainability certificate, namely ISO
 216 14001:2004 (ERM), ISO 14040:2006 and 14044:2006 (LCA), ISO 14067 (carbon footprint);
 217 and the Quality certificates ISO 9001:2008 (quality management), and ISO 22000:2005 (food
 218 safety)(EC, 2016b).

219 *3.2 Social and economic conflicts prevention*

220 The three countries recognise the need to work on the allocation of aquaculture sites in
 221 an integrated way with the other activities according to the principles of the Maritime Spatial
 222 Planning Directive to prevent conflicts among users (Figure 2).
 223



224 Figure 2. Problems and strategies related to the lack of integration with other maritime sectors and local
 225 communities (Abbreviation: AZAs: Allocated Zones for Aquaculture; FLAGs: Fisheries Local Action Groups;
 226 MEAP: Meilleurs Emplacements Aquacoles Possibles; MSPD: Maritime Spatial Planning Directive)
 227
 228

229 The French Plan highlights that the growing competition for the space with the other
 230 economic activities, namely fishery, tourism, shipping and even with existing aquaculture,
 231 represents an impediment for the expansion of the sector as well as an increasing conflict with
 232 coastal communities. France recognises the need to adopt an Integrated Coastal Zone

233 Management to prevent such conflicts and has been working on the establishment of best site
234 for aquaculture (*Meilleurs Emplacements Aquacoles Possibles* (MEAP)) with the use of GIS
235 tools at regional level (SRDAM - *Schema Regional de Developpement de l'Aquaculture*
236 *Marine*). It suggests that local business have to work to integrate aquaculture into the local
237 context by increasing the number and quality of employments, improving the value of farmed
238 products and diversify local economy through the introduction of new activities contributing
239 to the Blue Growth (PSNPDA, 2015). At local level, France has several FLAGs (Fisheries
240 Local Action Groups) that involve actors directly and indirectly related to aquaculture (fishers
241 organisations, public sector, administrations at different levels, representatives of regional
242 parks, research institutions and groups of citizens) and some of their objectives are focused on
243 promoting the sector and developing partnerships with other stakeholders, setting up
244 discussions groups on conflicts of use and supporting local fishery activities among other
245 (source: [https://webgate.ec.europa.eu/fpfis/cms/farnet2/on-the-ground/cooperation/by-](https://webgate.ec.europa.eu/fpfis/cms/farnet2/on-the-ground/cooperation/by-member-state/fr-flag-cooperation-france_en)
246 [member-state/fr-flag-cooperation-france_en](https://webgate.ec.europa.eu/fpfis/cms/farnet2/on-the-ground/cooperation/by-member-state/fr-flag-cooperation-france_en)).

247 Similarly, the SWOT analysis presented in the Italian Strategic Plan identifies a
248 growing competition for the space with other maritime sectors which is, in part, the result of
249 the lack of spatial planning as well as the lack of criteria and indicators to be adopted for the
250 identification of the AZAs (PS, 2015). Italy is still in the process of developing its maritime
251 spatial plans in the context of the Maritime Spatial Planning Directive (EC, 2018) and a
252 number of workshops have been held with regional stakeholders (e.g. the Plan Coast and the
253 ADRIPLAN project) to fill the gaps between authorities and citizens. In the Italian
254 Operational Programme and the Strategic Environmental Assessment it is proposed to
255 improve the territorial cohesion, new jobs, training and higher education as measures to
256 support the social well-being of aquaculture and fishing communities. These actions should be
257 implemented by the FLAGs giving them more financial and administrative power (PS, 2015).

258 Spain also recognises a lack of spatial planning in some regions and a growing conflict
259 between aquaculture and the other coastal users (PS, 2015). As for France, Spanish strategy is
260 focused on improving its coastal planning where suitable areas for aquaculture are identified
261 in line with the requirements of the Maritime Spatial Planning Directive and the Integrated
262 Coastal Zone Management and having in mind the principle of sustainability of the Marine
263 Strategy Framework Directive. These AZAs (or ZIA - *Zona de Interés para la Acuicultura*)
264 are defined in different way across the regions and should be located where there is little
265 interference with other activities (PEP, 2015). The regions of Galicia and Andalusia have

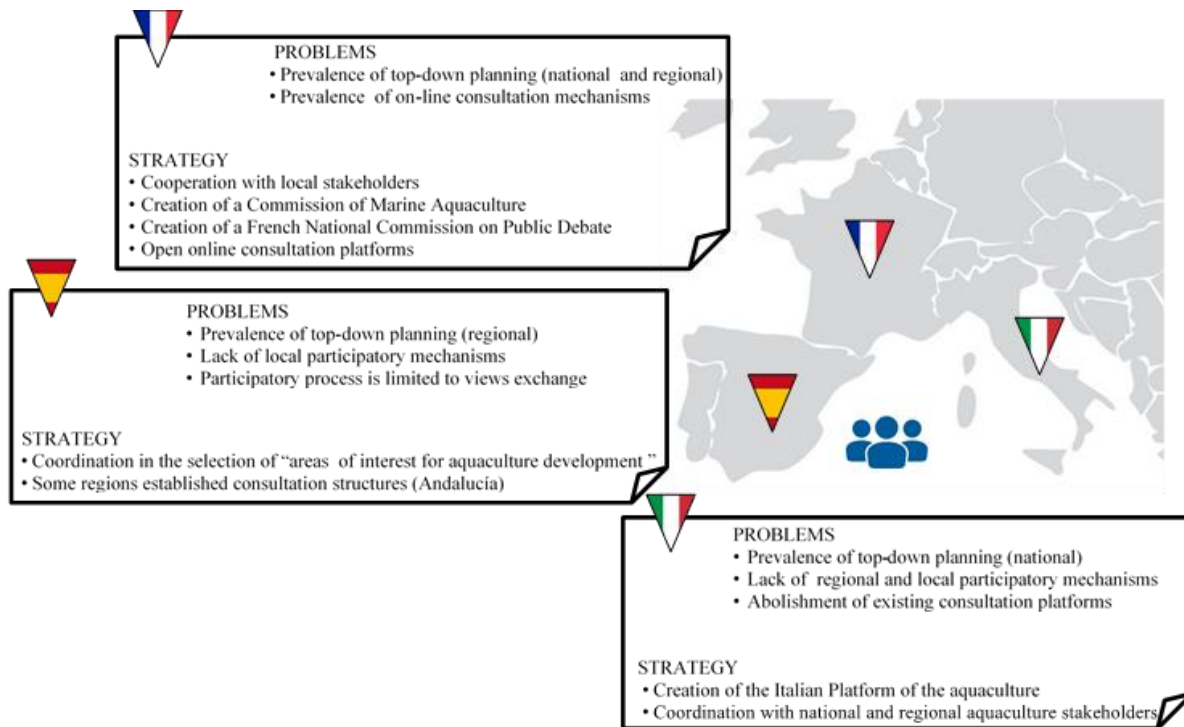
266 already started this process and they are proposed as good example for the other regions (PE,
267 2015). In Galicia, for example, a management plan for aquaculture in the sea-land interface
268 has been established and this includes the internal cohesion and the coordination with the
269 other activities as pillars (*Plan de Ordenación dos Cultivos en la Zona Marítima*
270 (POCUMA)). Similarly, in Andalusia, the regional competent agency has identified AZAs
271 and a specific Committee of Aquaculture has been created to facilitate this process (AGAPA,
272 2012). Other regions are working on the establishment of such areas and the central
273 government proposes common criteria and parameters. The Spanish measures to increase
274 social cohesion include the provision of employment in local areas where aquaculture occurs
275 as well as social responsibility certificates (ISO 26000 (SR)), Fair Trade and SA 8000 (work
276 conditions) (PE, 2015). In Spain there are about 40 FLAGs, most of which are related to
277 fishery but that also include the aquaculture sector. For example, the Murcia GALPEMUR
278 covers all the municipalities of the region and has, among its objectives, fostering local socio-
279 economic development by creating new jobs and strengthening social cohesion in the area
280 (<http://galpemur.es/>).

281 3.3 *Transparent and fair participatory process*

282 Most of the cited documents about the national strategies of aquaculture development
283 of the three countries have been the result of cooperation among all relevant stakeholders and
284 further submitted to public consultation, but with great differences on the level of the spatial
285 scale (from local to national), type of stakeholders and type of platforms (Figure 3).

286 In France, the public participation on environmental affairs is regulated by the Aarhus
287 Convention, the Barnier Law 1995 and the 2010 Laws on the Democratisation of the
288 Environmental Dialogue (*Art. 7 of the Charte de l'Environnement*). The National Strategic
289 Plan and the Operational Programme (PO, 2015) were the result of large consultation
290 processes which included ministries, national public institutions, local administrations, NGOs,
291 associations of producers, retailers and processors, and other marine sectors. The Operational
292 Programme was further submitted to online public consultation open to all citizens. The
293 reports developed at regional level (*Schéma Régional de Développement de l'Aquaculture*
294 *Marine*) provide maps of existing and suitable aquaculture sites identified after consulting all
295 relevant actors and successively opened to public consultation (PSNPDA, 2015). Moreover,
296 each new aquaculture project or any modification to existing projects (i.e. extension of the
297 area or displacement) have to be assessed by the Commission of Marine Aquaculture

298 (*Commissions des Cultures Marines*) that gathers 2-4 times per year and includes several
 299 categories of actors depending on the district where it belongs (Prou, 2012). Nonetheless, with
 300 the purpose of simplifying administrative process and to reduce the time for licencing, from
 301 2014 the “tacit acceptance” procedure allows a given project to be approved if no objections
 302 are received from other parties during a given period (PSNPDA, 2015).
 303



304
 305 Figure 3. Problems and actions related to the stakeholders and society participation in aquaculture planning
 306

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 308 Convention, the Barnier Law 1995 and the 2010 Laws on the Democratisation of the
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323 are received from other parties during a given period (PSNPDA, 2015).

324 The French National Commission on Public Debate (*Commission Nationale du Débat*
325 *Public*: <https://www.debatpublic.fr/>) provides a further multi-purpose platform to ensure the
326 fairness of the consultation and the transparency of the information, allowing all categories of
327 citizens to express the opinion and to exchange views on a given environmental project. As
328 for the transparency of the French administrative and legislative processes, all the cited
329 documents are available online and the contributions and comments provided by participants
330 are mostly public.

331 Italy recognises the importance of an open public participation and shared
332 responsibility in the development and implementation of its national strategy for aquaculture
333 and gives the FLAGs a central role at local level (PS, 2015). On the other hand, two existing
334 consultation platforms have been abolished, namely the Central Consultative Commission for
335 Fishery and the Aquaculture (*Commissione Consultiva centrale per la Pesca e*
336 *l'Acquacoltura*) and the Research Committee (*Comitato Ricerca*) creating a gap in the
337 participatory mechanisms, a lack of space for debate, exchange of views and opinions in the
338 development of political strategies (PS, 2015). In 2017, the Aquaculture Platform
339 (*Piattaforma Italiana Acquacoltura*) was created in collaboration with research institutions
340 and the national environmental agency, representatives of the aquaculture sector, regional and
341 national administrations serving as a platform for interact, exchange and collaborate among
342 stakeholders. The documents related to the Italian strategy, namely the Strategic National
343 Plan, the Operational Programme and the Strategic Environmental Assessment, were the
344 result of public consultation where the most relevant stakeholders at national and regional
345 level have participated to set objectives and priorities. Opinions and concerns provided during
346 the consultation have been analysed and when possible incorporated in the mentioned
347 documents suggesting a transparency throughout the entire process (PS, 2015). In contrast
348 with France and Spain, no regional or local strategic plans for aquaculture have been
349 developed in Italy although regions presented specific Operational Programme for the EMFF.
350 Such programmes have been submitted to fisheries related stakeholders’ consultation but no
351 information about regional or local consultation mechanisms have established in relation to
352 aquaculture development in Italy.

353 The Spanish National Strategic plan was the result of a participatory process among
354 regions and competent authorities at different levels and representatives of the aquaculture
355 sector (12 months and 30 meetings). Spain defines the participative approach as “the
356 consideration of opinions and views of all interested parties in every step of a process of
357 selection of AZAs (PE, 2015). According to the national plan, the stakeholders’ participation
358 process does not replace the decision-making process, however it allows all the interested
359 parties to express their opinion. Little information has been found about the level of local
360 public participation initiatives set by regions in the definition of the AZAs. Nonetheless, the
361 region of Valencia has recently introduced a new online public consultation that allows
362 collecting the opinion of people affected before the plan is developed (PEP, 2015). In the
363 national plan, it is stressed the importance of considering the social acceptability of
364 aquaculture since the social opposition was behind many failed new projects.

365 **4. Discussion**

366 Social acceptability of aquaculture is well studied in North America (usually referred
367 as social licence to operate)(Mather and Fanning, 2019; Milewski and Smith, 2019) and North
368 Europe while it is poorly understood in other areas of Europe. However, this issue has
369 recently received growing attention by policy makers and by the scientific community in
370 southern Europe (see Bacher et al., 2014; Cavallo et al., 2020; Corner et al., 2020, Porporato
371 et al., 2020; Ruiz-Chico et al., 2020). For instance, the FAO proposes guidelines to assist
372 governance and decision-making processes with practical methods and actions (FAO, 2019):
373 i) Stakeholders’ involvement in aquaculture and participatory approaches in planning are very
374 relevant on policy decision making effectiveness and enhancement of social acceptability; ii)
375 there is a need to bring consumers closer to the origin of the product and the farms and to
376 enhance their knowledge and understanding of the sector in order to avoid misinformation and
377 conflicts; iii) site selection and AZAs imply also considering social and economic aspects as
378 well as the involvement of the local community.

379 The present analysis of the national strategies of aquaculture development of France,
380 Italy and Spain has allowed to understand if social acceptability is recognised as a problem
381 hampering the sector growth and to identify the actions established to address social
382 acceptability related issues. Even if the term social acceptability has been barely mentioned in
383 the countries strategies, all of them are taking into consideration policy requirements

384 concerning the environmental sustainability, the integration with the other activities and the
385 public participation on aquaculture planning and management.

386 *4.1 Improve the environmental sustainability of aquaculture*

387 The comparative analysis of the strategies of the three countries has shown that the
388 society perception on the environmental impact and the environmental quality of aquaculture
389 sites, undermines the expansion of the sector and they propose a wide range of measures to be
390 implemented at different levels, by central, regional and local governments, and by the same
391 producers and representatives. All of them recognise that the sector suffers from a negative
392 image and are working on more effective communication strategies to highlight the
393 environmental sustainability, the quality and safety of farmed products and the ecosystem
394 services provided by certain systems of productions (e.g. integrated multi-trophic aquaculture
395 or shellfish farming). In particular, Spain recommends producers to make a better use of
396 social media (TV, radio, press and social networks) and launched annual national campaigns
397 to promote the quality of the products.

398 The Operational Programme of Italy and Spain is accompanied by a detailed Strategic
399 Environmental Assessment where possible negative environmental effects are identified
400 together with appropriate mitigation measures. On the other hand, France provides an
401 environmental evaluation for each of the Departmental Scheme for the Exploitation of Marine
402 Aquaculture (SDS). The three countries require an Environmental Impact Assessment but
403 conditions under which such an assessment is required differ from country to country.
404 Moreover, the results of such assessments are not always accessible or easy to understand by
405 a wider public. The fact that in Spain, France and Italy the sector is characterised mostly by
406 medium and small enterprises producing mostly shellfish, the environmental impact might be
407 minimum however, issues like visual impact, introduction of non-native species and animal
408 well-being can result in public opposition even for this type of farming (see also Murray and
409 D'Anna (2015)). The last EC data on aquaculture production of the three countries show that
410 they are quite far from their predicted targets especially for what concerns finfish and the role
411 of social acceptability in this type of aquaculture needs to be better addressed if countries
412 want to achieve their ambitious production targets.

413 Even though the national strategies have clearly established actions to meet the
414 requirements of environmental policies, the compliance of these policies relies in the hands of
415 single business, and governments need to demonstrate their commitment to ensure that

416 unsustainable practices will not have negative impact on the environment and on the other
417 maritime activities.

418 4.2 *Preventing social and economic conflicts with coastal communities*

419 Even when the environmental impact of aquaculture is minimised and the promoter
420 complies with existing regulation, the social acceptance is not guaranteed if related social and
421 economic benefits are not clearly demonstrated and not fully recognised by local
422 communities. Costa-Pierce (2010) contribution on the ecological aquaculture, suggests that
423 together with the environmental sustainability and the economic benefits, the sector has to
424 provide “social profit by developing social capital and social networks that promote business,
425 education and community stewardship practices”. Authors exploring social acceptability of
426 other economic sectors point out the importance of building trust (Ogier and Brooks, 2016),
427 developing relationship with local communities (Boughen *et al.*, 2014, Cavallo *et al.*, 2020),
428 acknowledging the value of information provided by all parties and respecting other party's
429 values (Vanclay, 2012). France, Italy and Spain have worked to ensuring the social and
430 economic well-being of the coastal communities where aquaculture is developed with the
431 FLAGs playing a key role. The FLAGs are a network of people implementing Community-
432 Led Local Development with the aim to enhance local employment, quality of jobs and
433 territorial cohesion and acting as a place of debate among fishers, aquaculture producers,
434 NGOs and groups of citizens (https://ec.europa.eu/fisheries/cfp/emff/clld_en).

435 The three countries are facing a growing competition for coastal areas that is limiting
436 the expansion of the sector. To prevent conflicts, France and Spain have already established
437 suitable areas for aquaculture developed (generically defined as AZA) while Italy has recently
438 started working on these to meet the obligation of the Maritime Spatial Planning Directive. In
439 the case of France, these areas were proposed by producers while in some Spanish regions
440 they have been established in coordination with national, regional and local competent
441 authorities and relevant stakeholders (mostly producers and fishers associations). Shellfish
442 aquaculture has taken large areas of certain Spanish and French regions, notably in Galicia for
443 Spain and in Brittany for France, leading to increasing competition among producers and
444 limiting the production. Moving production to the subtidal offshore environment might
445 represent a valuable solution to this problem (Barillè *et al.*, 2020).

446 According to Hofherr *et al.*, (2015) only 630ha are used to produce 95% of European
447 marine aquaculture and the coastline impacted ranges between 0.5% and 3.0%. Aquaculture

448 worldwide is expected to grow at substantial rate to meet the growing demand of seafood and
449 in Europe this sector will play a key role to reduce dependence on imports and the
450 overcapacity in fishing fleets. European countries should question which will be the
451 consequences for human welfare, and not only the economic loss, if the aquaculture
452 production continues to decline. Integrating aquaculture with local communities and
453 traditional activities should be carried out under the principle of Ecosystem-Approach of
454 Aquaculture (see also Corner et al., 2020) defined by FAO (2010) as a ‘strategy for
455 integration of aquaculture activity within the wider ecosystem, which promotes sustainable
456 development, equity and resilience within interlinked social–ecological systems, linking
457 human and environmental impacts’.

458 4.3 *Improving the effectiveness of participatory processes*

459 The three strategic plans were the result of consultation among all interested parties at
460 national level. In France, aquaculture related plans established at national, regional and
461 department level were open to online public consultation and such consultation is also
462 required for every new project. Moreover, an ad-hoc National Commission on Public Debate
463 has been created to ensure the fairness of the consultation and the transparency of the
464 information. The consultation platforms established by the three countries allowed a wide
465 range of actors to be consulted; nonetheless it is not clear if these guarantee an active
466 participatory process where all the parties have the opportunity to collaborate in the decision-
467 making processes of the selection of the AZAs. In fact, at lower national level, people are
468 mostly consulted when the plans are already developed and most of them through online
469 platforms.

470 According to Burbridge *et al.*, (2001) the future of marine aquaculture depends, among
471 other things, from an effective elaboration of policy where stakeholders are involved since the
472 early stages of decision making to anticipate potential conflicts rather than seeking way to
473 solve conflicts once they have occurred. It has been widely discussed in the literature that
474 social acceptability of aquaculture is strictly linked to the effectiveness of participatory
475 process (Costa-Pierce, 2010; Ogier and Brooks, 2016; Kelly *et al.*, 2017). Since Arnstein's
476 (1969) publication of her ladder of public participation, other authors have analysed and
477 adapted other forms of public participation in government-led planning and decision- making
478 (Parenteau, 1988, Creighton 1986, Cornwall 1996, Ross *et al.*, 2002). Considering the trends
479 of aquaculture production of the last 10 years, achieving the established ambitious targets by

480 the end of 2020 seems a real challenge for the three countries. A more effective participatory
481 process with representatives of the sector but also with representatives of local communities
482 and local stakeholders in the establishment of such targets could help to set more realistic
483 production goals taking into account the real potential of the sector to expand and the
484 limitations due to the interaction with existing activities and the acceptance of local
485 communities.

486 **5. Conclusions**

487 This review has shown that the social acceptability of aquaculture still represents an
488 unsolved issue despite the efforts made by the European Commission, the FAO and Member
489 States to enhance it. The complex and rigorous legislative framework that ensures an
490 environmentally sustainable aquaculture along with healthy seafood has not guaranteed the
491 acceptance of the sector by the local actors where aquaculture is developed and by consumers.
492 From the analysis of the three countries national reports has emerged that the most relevant
493 environmental regulation is applied, while many differences have been found in the strategies
494 set to improve communication and to establish public participatory programmes. This
495 descriptive analysis does not allow understanding if some of the cited strategies are more
496 effective than other to enhance social acceptability, thus dedicated studies at local level may
497 be of value to understand if, among the mentioned actions, there are some good practices that
498 can be applied to other areas, or even to other contexts (e.g. ocean energies). It is concluded
499 here that there is not a single solution to enhance social acceptability of aquaculture and
500 administrations, aquaculture producers and citizens should collaborate in the development of
501 national and regional strategies under a more integrated perspective, taking into consideration
502 environmental, economic, social and governance related aspects. On the other hand, local and
503 regional administrations need to develop the capability and the tools to recognise when a
504 further aquaculture development is likely to deteriorate the social and economic wellbeing of
505 their communities.

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512

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