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Title: Actor intentions implementing 'ecosystem Europe': The contested case of aquaculture

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Abstract

The application of the Ecosystem Approach (EA) to the government of aquaculture has been strongly advocated by many scientists and NGOs. However, knowledge gaps exist on actual actor intentions implementing this approach in the European Union (EU) which are often assumed to simply fit with a universalized model. Presenting findings on salmon in Scotland, trout in New Aquitaine (France) and seabass and seabream in Greece, we show that not only do a variety of actor intentions exist, but these can be unexpected. As a result, different forms of ‘modernizing’, ‘competing’ and ‘appeasing’ EU-EAs have been institutionalised. Further, although EA regulation is supported by a well-established EA scientific community, the political project has not followed the scientific one. Consequently, stating that the EA has been applied to aquaculture does not, in and of itself, tell you which socio-ecological interdependencies matter most to actors on the ground, nor how wider debates on the legitimacy of this industry have been addressed.

Highlights

- Actor intentions implementing the European Union ecosystem approach (EU-EA) can be surprising.
- Rather than a universalized model, we found ‘modernizing’, ‘competing’ and ‘appeasing’ EU-EAs.
- But in all cases, the regulatory scientific EA project has not been accompanied by the political one.
- Finding the EA tells us little about actor priorities of socio-ecological interdependencies.
- EU-EAs are ambivalent on growth and do not affect the concentration of economic power.

Key words: Aquaculture, Ecosystem Approach, Europe, Governance, Interdependency, Politics

1. Introduction

In recent decades, the idea of an ‘ecosystem Europe’ has gained in political traction influencing the contents of a wide range of European Union (EU) environmental public policies and legislation (Van Hoof, 2015; Van Leeuwen et al, 2014; Fletcher, 2007). Many policy areas, including biodiversity, river and sea water quality, marine spatial planning, now promote Ecosystem Approaches (EU-EAs) (Bouleau et al, 2018). But what do we know about the implementation of such EU-inspired EAs governing industry-ecology relations, especially for food production?

The EA has been described as a key sustainability paradigm, potentially transforming industry governance through placing interactions, interdependencies and well-being between animals, humans and non-living environments at its centre (Soto et al, 2008). As well as promoting these interdependencies for governance, the EA also promises institutional innovation, equal access to resources and participatory decisional processes (Waylen et al., 2014). In this manner, it appears to offer a

holistic approach to ecological transition governance, including providing a political means to legitimize that transition.

When it comes to aquaculture, the application of the EA to its government has, for some time now, been strongly advocated by an international and pluri-disciplinary scientific and Non-Governmental Organization (NGO) community (Brugère et al, 2019; Ferreira et al, 2014; Ross et al, 2013; Costa-Pierce, 2010; Soto et al, 2008; Folke and Kautsky, 1989). In the global aquaculture discourse, the EA is promoted to provide the necessary enabling policy environment for the growth of aquaculture meeting United Nations (UN) Sustainable Development Goals (Brugère et al, 2019; FAO, 2017; Soto et al, 2008). A specialist 'EA-aquaculture' science has supported regulation in different settings (Ross et al, 2013). Yet, notwithstanding a wealth of international knowledge on the EA for aquaculture, a recent review nonetheless pointed to a lack of knowledge on implementation processes and their effects (Brugère et al, 2019). More specifically, knowledge gaps exist on actual actor intentions implementing the EA into practice, especially in the EU and for finfish aquaculture. In the absence of such research, actor intentions can be assumed or universalized, meaning that we think we already know why actors might opt for this form of governance in line with global rationales. This matters especially because conflicts in European finfish aquaculture are often over environmental justice claims (Ertör and Cerdà, 2015), a challenge which the EA ostensibly promises to address.

To contribute to these debates, this article presents findings on public and collective private actor intentions implementing EU-EAs to govern Europe's three principal fish farming industries: salmon in Scotland, trout in New Aquitaine (France) and seabass and seabream in Greece. Compared to other food production industries in Europe, finfish aquaculture is relatively new (Stead et al, 2002), intensifying production only since the 1980s. Its establishment has been dogged by a polarized debate on its very contribution meeting sustainability challenges (Carter, 2018). Regarded by many as an important industry tackling global change, producing food through fish farming has however been highly contested and companies have been under pressure to defend continued growth (Vormedal, 2017). Critics point to environmental impacts of intensive production on water quality and biodiversity (organic and inorganic discharges); negative interactions with wild fish (spread of diseases; escapees); pressures on wild fisheries for fish feeds; visual impacts on the coastline; and, finally, in some territories, an increasing concentration of production in the hands of a few powerful multinational companies. In response, those in support of this industry have highlighted its positive connections with multiple challenges of food security, collapsing fisheries and mental health. They argue that finfish aquaculture is an efficient mass producer of proteins, compared with other food production industries; that its environmental impact on water quality or climate change is much less than that of other food production industries (e.g. beef); that it relieves pressures on wild fish stocks through farming fish; and that eating fish is part of a healthy diet, e.g. omegas 3 and 6 in fish protein enhance human mental health. They also argue that, because of its location, fish farming can provide stable and professional employment in rural and coastal areas and protect the social fabric of local communities stressed by global change.

It follows that because of these opposing positions, this industry provides a thought-provoking case study in which to examine the political uptake of the EA. Whereas

proponents of the EA expect it to solve certain problems facing aquaculture, are these the reasons why the EA is implemented in practice? If not, why have actors opted for this approach and how does knowledge on their choices help us to reframe the challenges facing the ecological transition of this industry more generally? To provide answers to these questions, I draw on conceptual and qualitative material generated within empirical research projects,¹ as well as from more detailed published work (Carter, 2018). Qualitative data comes from documents (e.g., position papers, commissioned reports and policy documents of public bodies, collective private organisations and NGOs; stakeholder responses to European Commission consultations; speeches), 60 semi-structured interviews with different categories of actors and participant observation of stakeholder seminars. As explained in more detail below, this data was coded, organized and analyzed using NVivo software to draw out actor intentions influencing governing trajectories over several decades.

The article is organized as follows: Section 2 summarizes conceptions of the EA as put forward by natural and social scientists. Section 3 first explains the article's approach pinpointing actor intentions implementing the EA in European aquaculture and then presents comparative coupled 'industry-territory' storyline accounts explaining those intentions and their consequences. Section 4 discusses findings and draws conclusions. Overall, rather than explicit strategies to apply this approach holistically in line with international guidelines, instead we find episodic, non-linear implementation in the face of persistent problems - specific to each case. The result is the institutionalization of a variety of 'EU-EAs' underpinned by quite different, and at times unexpected, actor intentions. Paradoxically, therefore, stating that the EA has been applied to European aquaculture does not tell you, in and of itself, which socio-ecological interdependencies matter most to actors on the ground. Nor does it clarify how wider, and more fundamental, interdependencies, i.e., between fish farming as a mode of food production and global environmental change, are being governed at a territorial scale.

2. The 'Ecosystem Approach'

The 'Ecosystem Approach' (EA) is associated first and foremost with the Convention on Biodiversity (CBD) in 1995 (Castro and Ollivier, 2012), although it had been taken up in international law before this time (de Lucia, 2015). The concept of the 'ecosystem' (Holling, 1973; Odum, 1969; Tansley, 1935; Elton, 1930) provided the EA its early theoretical underpinnings - an idea which historians have traced back to dynamic visions of nature in early 20th century marine fisheries science in California (Schieber, 1997). As a natural scientific project with the ecosystem at its core (Schieber, 1997), the initial intention of this approach was to recognize and evaluate "complex non-linear relations between entities under continuous change and facing discontinuities and uncertainty from suites of synergistic stresses and shocks" (Folke et al., 2002: 438). Viewing the ecosystem as "a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit" (CBD Secretariat, 2004: 6), research was aimed at preventing or

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reversing “increasingly negative trends of resource depletion and ecological degradation” (de Lucia, 2015: 92).

Yet, the EA was not just conceived as a natural science research project. On the contrary, the EA operates at the interface of science and politics (Cochon, 2021). Connected to the question of which interdependencies mattered most when evaluating ecosystem impacts was the question of how to govern any fundamental relationships identified. In this respect, like other sustainability schools of thought, advocates of the EA paid attention to the kind of political change required to govern those nature-society interdependencies considered to be at stake. EA proponents drew especially on deliberative theories of governance, emphasizing participatory democracy (Bouleau et al, 2018). Participation was not solely aimed at securing the legitimacy of public action. The collective construction of problems and their solutions was viewed as an important motor for change (Fletcher, 2007). More specifically, participatory governance was especially promoted to move beyond ‘command and control’ regulation and put in place more dynamic spatial and temporal policy instruments, such as multi-annual plans, spatial planning or spatial and/or seasonal closures/fallowing. In this vein, the EA has been presented as an alternative to corporatist modes of governance, opening environmental decision-making up to a wider range of stakeholders (Van Leeuwen et al, 2014) and putting in place forms of integrated management (de Lucia, 2015). This is because, rather than adopting a single species focus, proponents sought to design science and policy considering multiple interactions and interdependencies at wide scales.

Both the Food and Agriculture Organization (FAO) and a scientific literature has supported its application to aquaculture, expected to be guided by three principles (Brugère et al, 2019): i) aquaculture development and management should take account of the full range of ecosystem functions and services and should not threaten the sustained delivery of these to society; ii) aquaculture should improve human well-being and equity for all relevant stakeholders; iii) aquaculture should be developed in the context of other sectors, policies and goals (Soto et al, 2008). EA policy tools to be adopted respecting these principles include carrying capacity models, cumulative impact models, integrated spatial planning and inter-sectoral governance (Costa-Pierce 2010; Ross et al, 2013; Sanchez-Jerez et al, 2016).

Whereas the above description presents the EA as premised upon a shared set of values, social science analysis has nonetheless highlighted important political tensions at its heart (Conchon, 2021). Indeed, already from the end of the 1990s, scholars were discussing the politics of ecosystem management (Cortner and Moote, 1999). An important such tension exists between ecocentric versus anthropocentric EAs (de Lucia, 2015). Although each version is supported by its own narrative of nature-society relations and gives rise to a specific logic of public action, both act in the name of the EA (de Lucia, 2015). For example, in their idealized form, ecocentric EAs seek to conserve biodiversity in a logic of increasingly reduced human use of natural resources supported by public strategies re-wilding nature. Any participatory governance arrangements established serve as teaching devices to ‘educate’ people about conservation rationales as defined by scientists (Grumbine 1994; Noss 1992). This contrasts with more anthropocentric EAs, such as those codified by the CBD, or in the work of Folke (Folke 2006; Folke et al, 2002). In these, regulatory attention is paid to the carrying capacity of the ecosystem to support socio-economic activities.

Instead of re-wilding, the challenge implementing this EA is to collectively agree ecosystem-imposed limits on production growth (“How large can the economy become relative to the constraints of the ecosystem?” Folke and Kautsky, 1989: 241). Other important tensions within the EA have also been highlighted. For example, the work of Waylen et al (2014) has pinpointed ambiguities at the heart of the EA, especially over stakeholder participation. Identifying and unpacking three variants of the EA found in conservation projects - ‘ecosystem-based management’, ‘ecosystem approach’ and ‘ecosystem services’ - they revealed how each variant established its own hierarchy of stakeholders and knowledge considered pertinent for policy. This resulted in different degrees of stakeholder involvement and conservation policy outcomes, all in the name of the EA. Differences in hierarchy of actors and knowledge have also been found in comparative ecosystem governance (forest, estuarine, marine) (Carter et al, 2020; Bouleau et al, 2018). Indeed, in studies on integrated maritime policy more generally, research has highlighted the illusion of ‘idealized cooperation’ as espoused by the EA compared to the reality of power struggles informing policy outcomes (Mazé et al, 2017).

In summary, whereas for its proponents the EA is often presented as an internally consistent and clear alternative to ‘command and control’ neo-corporatist regulation - and one which can rally different interests towards a common set of goals – empirical analyses of EA applications in biodiversity conservation point instead to a politics of values at its very core. It follows that to understand actor intentions implementing ‘ecosystem Europe’ when governing aquaculture, research must unpack these politics. It is to this that we now turn.

3. Putting ‘ecosystem Europe’ into practice: comparative actor intentions

An important feature of the European government of aquaculture is that, rather than being regulated through a vertical Common Aquaculture Policy (equivalent to the Common Agriculture Policy, for example), this industry has been governed through transversal EU legislation, e.g., on environmental impact, water quality, fish health and/or maritime spatial planning. More precisely, EU regulation potentially governing aquaculture includes the Marine Strategy Framework Directive (MSFD) (2008/56/EC), the Water Framework Directive (WFD) (2000/60/EC), the EC Species and Habitats Directive (92/43/EEC); EC rules on Integrated Coastal Zone Management and Integrated Maritime Policy; the Maritime Spatial Planning Directive (2014/89/EU); the reformed Common Fisheries Policy; and the EU Fish Health Directive (2006/88/EC). Over time, this legislation has been increasingly influenced by EA philosophy and associated policy instruments and social contracts (Bouleau and Pont, 2015; Van Hoof, 2015; Nunes et al., 2011; Stead et al., 2002). Yet, how have actors governing finfish aquaculture in different locations worked within, or directly mobilized, these approaches?

To answer this question, I first identified three coupled ‘industry-territory’ cases: salmon in Scotland, trout in New Aquitaine, seabass and seabream in Greece. These cases represent Europe’s three main fish farming products and sites. My aim was to assess why and how the EA had been implemented in respect of each industry-territory through examining governing trajectories over decades. To do so, I drew upon a range of primary and secondary data generated within collective research projects as outlined in the Introduction. Primary data (generated through interviews, participant observation, documentary analysis) was first analysed to grasp the politics

and narratives of ‘sustainability interdependence’ regulating these ‘industry-territories’ (Carter, 2018). This study concluded that a convergence of governance towards the EA could be observed. Starting with this result, I then re-analysed the data reconstituting actor intentions to produce synthesized ‘storyline’ accounts in respect of each coupled ‘industry-territory’. This enabled me to isolate persistent problems which actors had faced in each case and for which the EA had been viewed as the solution. As we will see, these problems both differ between ‘industry-territory’ and at times seem far away from reasons generally mooted for adopting an EA in aquaculture.

An important factor guiding the inquiry was the desire to “reconcile top-down and bottom-up approaches” analysing policy implementation (Arts et al, 2014: 8). Not only did this make sense for aquaculture in the absence of a common vertical ‘top-down’ EU policy but was in keeping with de-centered accounts of European government more generally which have grasped European implementation as a collection of on-going ideas, instruments and actor interactions, rather than a specific action (Fligstein, 2008). Additionally, as a recent assessment has shown in the case of regional biodiversity governance (Carter et al, 2020), top-down/bottom-up sensitivity enables research to capture the full range of actor processes institutionalising EAs. Top-down implementation can occur when the EA is institutionalised locally following EU policy mandates (e.g., the Water Framework Directive: WFD). We have an example of this type of EA in the case of trout in New Aquitaine which, as we will show, has been countered with an alternative industry-specific interpretation. EA implementation can also occur through ‘bottom up’ practices, for example when an accumulation of discourses, policy instruments and ideas institutionalize the EA over time. We have this especially in the salmon in Scotland case study. For all these reasons, we paid attention both to actors’ mobilisations of EU-EA rules and norms to solve locally defined problems, and to their intentions going around them when they caused unwanted challenges.

Consequently, in what follows, the aim is to present material in a synthetic way setting out three ‘storyline’ accounts of how EU-EAs have been taken up within each coupled ‘industry-territory’ trajectory over several decades (for more detail on the politics of these industries, see Carter, 2018).

3.1 ‘Modernizing’ EAs: salmon farming in Scotland

Salmon have been farmed in freshwater and seawater lochs on the West Coast of Scotland, the Highlands and Islands, Orkney and Shetland since the 1970s/1980s. Commenced on a small crofting scale, the industry has expanded over the years, ever concentrating production in the hands of a decreasing number of multinational (mainly Norwegian-owned) companies, many of whom are vertically integrated, transforming and marketing as well as farming their products. In 2019, 7 companies accounted for 99% of production whose total value was £618 million, and salmon was Scotland’s largest food export. In some parts of Scotland, such as in the Shetlands, salmon farming has been especially welcomed contributing to local employment and quality of life. In others, this has not been the case, where it has competed with other models of rural development or has been attacked for its environmental impact.

Whereas the industry has had to grapple with several different challenges over the years, a persistent one has been to justify its increasing growth and concentration of economic power. And, it has been to address this persistent problem that a variety of actors have mobilized around EAs, implementing 'ecosystem' Europe through constructing hybrid EU/Scottish approaches within a broader project of modernisation.

Early growth of the industry was supported by the Crown Estate (then seabed/foreshore landowner) and the then Scottish Office (UK Government in Scotland pre-devolution in 1999) (Coull, 1988). If any environmental considerations were taken into account at this stage, it was on the siting of farms (e.g., away from wild salmon runs) (Lloyd and Livingstone, 1991). Mostly though growth was viewed favourably providing new social and community benefits in remote areas of Scotland (Peel and Lloyd, 2008; Lloyd and Livingstone, 1991). Indeed, it was only when EC directive 85 on Environmental Impact Assessment (EIA) came into force that more details on environmental impacts were requested (Priyan and Smith, 1994). As the industry expanded and grew in more and more areas of Scotland so critical voices could be heard. Environmental organisations (Scottish Countryside and Wildlife Link (today Scottish Environmental Link), Friends of the Earth, World Wildlife Fund: WWF) began to raise questions about environmental impacts, highlighting that many were unknown (Berry and Davison, 2001). Debates on the ecological effects of farming were joined up with other discussions on the role of local authorities in decisions over whether or not to allow a fish farm in their area. In response the Crown Estate drew up a list of consultees (Macartney, 1985), but still the sentiment grew that local stakeholders had limited choice over fish farming.

This was the situation when devolution took place in 1999 creating a new Scottish Government (SG) and Parliament. As stated on interview, there was pressure to change the way government and industry and other stakeholders interacted because it had been a very toxic relationship. A first and important decision taken was to enhance the powers of regulatory agencies, in particular the newly created Scottish Environment Protection Agency (SEPA) and Scottish Natural Heritage (SNH). These bodies provided statutory advice on applications for licences/farm development. As regulatory agencies both bodies were responsible for implementing key elements of EU legislation which in the early 2000s meant especially Natura 2000 (habitats directive) and the WFD, both of which adopted EA philosophies. On the one hand, regulatory agencies drew upon these directives to develop criteria on siting, e.g., the SNH drew up a series of guidelines which allowed a holistic approach to biodiversity protection to be integrated in the licencing process. On the other hand, they developed their own rules on discharges and carrying capacity. Working closely with scientists, themselves in wider EA science networks and communities, a new ecosystem model DEPOMOD was developed to model waste dispersion from cages (Cromey et al., 2002). The implementation of the EU fish health directive coupled with on-going local scientific advancements also encouraged further reflection on ecosystem regulatory approaches to regulate interactions with wild fish and spread of disease. These were applied by the newly created government body 'Marine Scotland' to govern cumulative effects of different farms operating on marine and freshwater ecosystem waterbodies (also in line with the MSFD).

An accumulation of regulatory responses to a range of ecological challenges in line with EU legislation resulted in applications of EAs governing environmental impact and shaping the licensing procedure. But not all initiatives stemmed from EU imperatives. The SNH for example, went further to launch a debate on landscape aesthetics as part of an expanded EIA (FAO, 2017). Within the SNH, concerns were raised whether Scottish coasts should be mainly for salmon farming or for a more diversified economy. One of the features of salmon farming was that it was growing in very scenic areas of Scotland. SNH started to couch its advice also in terms of a 'visual carrying capacity'. Drawing on landscape science, they developed new guidelines and visual impact assessments as tools in the formal authorization processes. Similarly, economic actors were spurred into private self-regulation setting standards on EA impacts following scientific and NGO mediatisation of salmon health and fish feeds (Hites et al, 2004; Huntington report 2004). Critics argued that the regulation of feeds was missing wider ecosystem impacts and especially impacts on feed fisheries. This led to a sea-change in the way salmon was sold. From then on, supermarkets started working with producers and feed manufacturers setting responsible and sustainability standards for differentiated markets, acknowledging both local and distant ecosystem impacts (Carter, 2015).

Running parallel with the development of these public and private regulatory EAs, a form of participatory governance was also institutionalised post-devolution. Concentration of industry and increased privatisation of a common resource had raised the question of who could decide on growth. Up until the end of the 1990s, it was the Crown Estate working with the Scottish office. Following devolution, as part of a wider project to modernise government in Scotland, these powers were instead assigned to local authorities. However, whereas this democratisation of the licensing process increased the number of actors governing salmon farming, it did not result in an integrated approach. This was because at the same time as local authorities were granted new powers, stakeholder working groups were established within the framework of a SG growth strategy (producers government officials, regulatory agencies, scientists, and NGOs). These quickly became the primary public Scottish-wide space for debating salmon farming. Working groups operated a form of technical participatory democracy and did not include local authorities. Rather, decisions over authorisations to grow production were taken in a parallel political process subject to local politics. Consequently, although working groups took important decisions considering ecosystem effects, e.g., over the collective management of sea lice outbreaks, it would be a stretch to conclude that they were established as part of a holistic EA. More in line with a modernisation project, they focused primarily on individual company problem-solving removing obstacles to growth. As a result, decisions taken therein did not always join up with local discussions over the place for salmon farming in Scotland's future.

3.2 'Competing' EAs: Trout farming in New Aquitaine, France

By contrast with salmon farming, freshwater trout farming in New Aquitaine takes place in tanks along the riverbank. Water is diverted from the river, run through the tanks, and replaced back into the river. Trout farming was initially carried out by small family-run businesses in mountain areas (e.g., Pyrenees). In the 1980s, an increasing number of companies were established when the industry was specifically grown in the rural area of Les Landes to replace a collapsed resin industry and

create local employment. Some of the original trout farming companies still exist today, some have gone out of business, whereas others still survive within the frame of a cooperative, collectively transforming and marketing products (and trout eggs) on both national and global markets.

Unlike salmon in Scotland, the trajectory of trout in New Aquitaine is not one of continued growth, but rather one of initial growth, followed by decline and stabilization (between 1997-2007 production declined by 19%). As in Scotland, this industry has been contested. However, the nature of the contest is not the same. Rather, the persistent problem faced by this industry is one of French government ambiguity concerning its very future. Indeed, it is to overcome this problem that we find actor conflicts implementing 'ecosystem' Europe and 'competing' EAs.

Since 1964, trout farming has been governed through French water law. This law originally endorsed an anthropocentric EA to river governance (Bouleau et al, 2018). Multiple economic use of river water was recognised and governed through norms of equity sharing a common resource (over both quantity and quality of water) (This is not "Jean de Florette!": interview public actor, 2012) (Fourmond, 2000). Rights to river water were granted by public actors (e.g., the prefecture) following EIAs updated by EU biodiversity rules. The implementation of the EU fish health directive in 2006 further strengthened this watershed-scale ecosystem management. An important actor has been the recreational fishers and trout farmers association protecting fish and environmental health, GDSAA, which worked with trout farmers to establish EU-recognised disease-free river zones.

However, in the mid-2000s this situation changed with the implementation of the WFD when ecocentric approaches to river governance began to challenge established anthropocentric ones. Evoking images of 'wild' over 'living' rivers (Germaine and Barraud, 2013), a coalition of environmental public officials and scientists, supported by local NGOs against trout farming (e.g., ANPER-TOS), promoted quasi biocentric implementations of the WFD in France. This can be understood against the backdrop of France's more recent relationship to rivers (Bouleau, 2014). Past governments had embarked on a series of river modification projects to "nationalise" nature and "conquer" rivers in the name of social progress (Pritchard, 2004). Many actors now saw in the WFD an opportunity for the river to "reconquer" infrastructures through the removal of these river obstacles. Strong images of wild, flowing rivers influenced WFD implementation, supported by the setting of universal rules. Conflicts emerged between producers and public actors. For producers, new rules on ecological continuity and low flow water targets posed challenges, especially for small companies. Another concern was that complete free circulation of water would pose a threat to hard worked-for disease-free zones. For environmental officials, they accepted that stricter norms were being applied than in other EU member states but pointed to the financial support provided to help farms make changes.

Whereas these kinds of tensions over socio-ecological interdependencies are neither surprising nor specific to finfish aquaculture, the big challenge for trout farmers was that the French government had become increasingly ambiguous on growth. Indeed, no government signal existed, as in Scotland. Consequently, producer associations sought ways to work around the rules yet staying within the WFD framework. Building

alliances with other actors (regional council, e-NGOs, aquaculture scientists), they worked politically to (re)present their relationship to rivers, arguing both that trout farming could co-exist with healthy rivers and that not all types of rivers and production are the same. Rather than universal approaches, socio-ecosystem diversity should be respected. To these ends, they developed a public-private charter AQUAREA to certify and 'prove' that their production was in line with EA-inspired criteria. They worked with the WWF to set collective standards selling their products to supermarkets, also respecting local and far distant ecosystem impacts. They developed new labels for their fish stressing territorial embeddedness, politicising their interpretation of sustainability, and stressing human health benefits eating trout. On interview, they were keen to communicate their strong attachment to water: "we are hooked on the environment really hooked like drugs". They also invited the NGO 'International Union for Conservation of Nature' (IUCN) to carry out an assessment of the industry. The IUCN report (2011) recommended that the French government carry out an ecosystem services' valuation, both to inform an appropriate regulatory response and public choices on trout farming. It also pointed to a lack of knowledge and technical support for farmers adapting to rules. Engaging in the dominant discourse on conquest, and referring to trout farmers, the report summarised producers' political work stating that: "the warriors are tired". Yet, during the IUCN-led discussions, no-one from the Ministry of Ecology was present at working groups and meetings organised, operating an empty chair policy. Indeed, 6 years later, weak political support was still being highlighted as a major challenge (CESE, 2017).

The story of trout in New Aquitaine is thus one of intentions of dominant actors governing rivers competing with those of producers (at times in alliance with regional actors and NGOs), each side prioritising and seeking to uphold distinct socio-ecological interdependencies. But a central difference between trout and salmon governance has been the absence in the case of trout of a dedicated space of public action for debating fish farming in line with river futures. Of course, the governance of rivers is carried out through participatory river basin committees. Trout farmers are represented in these arenas but are in a minority. The absence of a dedicated industrial public policy results in political engagement mostly by interprofessional lobbying of relevant government departments. An additional challenge has been a lack of coordination between the agriculture and environmental ministries, highlighted by successive non-governmental reports on French aquaculture. Certainly, the 'silo' mentality of the organisation of government has not been conducive to developing integrated approaches.

3.3 Appeasing EAs: Seabass and seabream farming in Greece

Greek seabass and seabream farming takes place in freshwater hatcheries and sea lagoons where fish are raised in net cages. Farming began in 1981 and was especially encouraged by a Greek governmental policy on growth which issued a starting quota of 320 licenses encouraging new companies to be established. Growth was rapid, with annual increases in production of 70% between 1990 and 1999. As the industry grew, it also contracted, following company collapses, buy-outs and mergers. In 2018, total production was 125,772t and fish is Greek's most exported animal product. Although around 63 companies make up this industry (and family-run businesses target niche markets, e.g., organic production: 1% of production), production is dominated by a handful of publicly listed companies.

As with both salmon and trout, this industry has been contested. Yet, once again, the specific nature of the challenge differs. The persistent problem for the governance of seabass and seabream farming has been one of conflicts over licenses. Whereas this problem initially raised its head in a context of legislative anarchy (Conan, 2000: 274), including non-application of legal texts and non-compliance with the rules, public actors have sought to solve it through implementing EU-EA spatial planning instruments and 'appeasing' EAs.

Environmental protection has been a Greek constitutional principle since 1975 and early fast growth was accompanied by EIAs. However, the EIA was applied in a universal manner fixing a limit of tonnes of fish (150t) per 10,000m², irrespective of wider farm site characteristics (Karakassis, 2013). As the industry continued to expand and concentrate in the hands of a decreasing number of companies, a competitive situation arose. In this context, many companies did not always respect the rules on carrying capacity considered largely rigid. For many local communities, growth rates seemed to be out of control. Yet, during this period too, environmental evaluations were conducted (Mantzavrakos et al, 2007; Papoutsoglou, 2000) and EA approaches developed within the Greek scientific community (Karakassis, 2013).

The political situation began to change in the 2000s. First, on a state-wide scale, this period would witness a more general transformation of the Greek state towards its political autonomy from civil society (Papadakis, 2012). Central ministries became more rigorous, issuing fines, forcing sales of fish and closing some sites. Second, local interested parties began to complain to the planning department about the positions of farms and licenses and raise their concerns with the State Council. In this process, it became clear that previous Greek governments had failed to develop constitutionally required enabling framework legislation for planning (Karka, 2011). Licences had rather been issued to companies on a case-by-case basis. Legally, texts on which licenses were based, were not effective (Conan and Prieur, 2000). In an act of judicial review, the State Council annulled licenses.

At this stage, different processes began to join up resulting in new initiatives connecting EA policy tools of carrying capacity and spatial planning. First, Greek public actors launched a public consultation process with producers, scientists, NGOs and the public. Following a study carried out by scientists at the University of Crete, a new EA formula was developed working with international aquaculture scientists and drawing on many years' experience in EU projects researching EA approaches to aquaculture (Karakassis, 2013). This formula could capture variations between sites in relation to the depth of the sea, currents and distance from the shore. This new approach was welcomed both by public officials and producers: "the new legislation gives you the ability to adapt your production to the carrying capacity" (interview, producer). Second, officials in the then Ministry for the Environment, Spatial Planning and Public Works carried out a public consultation in a participatory democratic initiative and drew up a Special Framework for Aquaculture, replacing an earlier coastal plan never endorsed (Karka, 2011). In this action, they were strongly encouraged by the European Commission, who had been frustrated by the annulment of licences. The new plan institutionalised broader EU-EA norms on spatial management, coupled with Greek ones on zoning. Different zoned coastal

areas were identified ranging from zones for larger farms (equivalent to industrial estates) to areas set aside for one or two farms (Karka, 2011).

Drawing on EU policy norms, the objectives of the plan were both to apply integrated spatial management, but also to manage conflicts. For example, some producers felt the plan would protect them against attack providing legal certainty. However, a number of tensions have since emerged. First, whereas the making of the plan engaged different actors, political engagement of finfish companies continued to operate through classical lobbying or personal contacts. In the absence of dedicated decisional structures for debating this industry's future, it was ambiguous how new challenges might be addressed. Second, and linked to this, questions were asked whether the plan ultimately encouraged integrated management. Due to local attacks, the plan initially separated fish farming from fisheries' zones and tourism. This was because such attacks, although at times centred on environmental impacts (Ertör and Cerdà, 2015) were not motivated by ecocentric visions of wild coastal futures. Rather, in many cases frustration came from landowners or villages who preferred to develop tourism and build hotels and considered aquaculture an obstacle to this form of coastal development. Attacks therefore posed in a conflictual way the question who should profit from lagoons, fish farming or tourism? Whereas the plan sought to appease these tensions, doubts were raised whether zoning would enable the integration of activities, for example developing alternative eco-tourist initiatives.

Discussion and Conclusions

This article has sought to fill a knowledge gap on actual actor intentions implementing EU-EAs to govern finfish aquaculture. The case studies show that no universalized model exists. Rather storyline accounts show multiple and at times unforeseen actor intentions adopting EAs to solve persistent problems.

This has resulted in an on-going institutionalisation of three forms of 'modernizing', 'competing' and 'appeasing' EU-EAs. Each approach has used EU 'EA-inspired' institutions (rules and norms) in a different manner. First, actors governing salmon in Scotland adopted a modernising approach reconciling 'top down' with 'bottom up' initiatives. EU-EA institutions have not only been omnipresent regulating impacts, but have become entangled with Scottish ones, especially in the work of regulatory agencies and scientific networks. These public regulatory approaches have been further mixed with private self-regulation setting product standards selling salmon onto sustainable markets. By contrast in the case of trout, the French-wide implementation of the WFD challenged a pre-existing approach to water governance. This altered river governance politics creating competitions between different coalitions of actors. Producers forged new alliances to develop a bottom up, anthropocentric EA to compete with what they perceived as a top down, quasi ecocentric one – both sides claiming to be acting within the framework of EU public policy on water quality. In this case, therefore, a public transversal approach on river governance competed with a collective regional aquacultural one. Finally, in the case of seabass and seabream, the most visible uptake of EU-EAs has been over the implementation of the spatial plan, coupled with new rules on carrying capacity. Here public actors sought to reconcile 'top down' approaches with 'bottom up' ones to fulfil Greek legislative obligations and re-establish trust. The resultant 'appeasing' EA

entangles ecosystem science and policy tools with a changing Greek administrative culture.

Not only does each EA contain its own mix of territorial approaches (EU, national, region), it is also dominated by different actors and prioritizations of socio-ecological interdependencies (Table 1). An important question raised by Brugère et al (2019) was how EA uptake in aquaculture was altering choices and this differs in each case. For the modernising EA, lead actors are the SG, Scottish regulatory agencies and producers and the dominant logic of public action is to regulate watershed ecosystem and landscape impacts in a way which is consistent with growth (setting high targets to increase production). Here, we find that the EA sits alongside growth and the concentration of economic power. For the competing EA, environmental officials, scientists (aquatic ecologists), local NGOs (against trout farming) formed a dominant alliance supporting river continuity everywhere. Because successive French governments have been ambiguous on growth, this alliance was countered by another one between producers, the regional council, global NGOs and aquaculture scientists arguing for the reconciliation of diverse types of production (cooperative, family business) with specificities of river zones. Here, the EA also proved to be ambivalent on growth. In the appeasing EA, the Greek government has been a lead actor, acting to gain trust and appease conflicts arising from judicial review of licenses and past visions of production as ‘out of control’. EA policy tools do not counter the concentration of economic power and production but contain it spatially and in tension with other coastal industries (especially tourism).

Modernising	EA finfish regulatory tools co-exist with concentration of economic power and a logic of governmental action supporting increased growth.
Competing	EA finfish regulatory tools compete with EA river continuity regulatory tools in a logic of governmental ambiguity over growth.
Appeasing	EA finfish regulatory tools are combined with EA spatial coastal tools in a governmental logic of appeasement and containment.

Table 1: Three institutionalised EAs, each prioritising different socio-ecological interdependencies and logics of public action.

These differences notwithstanding, in no situation did we find integrated, holistic EA aquaculture governance. Rather than transforming them, regulatory EU-EAs have instead become entangled in industry-territory politics. The EA therefore seems more accommodating than its transformative promise would suggest – a conclusion which confirms social science analyses of its application to biodiversity conservation (Waylen et al, 2014). Even for salmon in Scotland where a dedicated public strategy exists, participatory democracy has largely been dominated by the interests of producers and the Scottish Government. As time has gone by, tensions have emerged especially over who benefits from Scottish coasts. For trout, EA participatory approaches have been implemented governing rivers in a revived environmental politics. But there has been an absence of a dedicated public space for debating trout farming futures. This has also been the case for seabream and seabass where public consultation helped design the spatial plan, but where producer political engagement has continued to take the form of classical lobbying of government ministries. As a result, whereas in each case we find regulatory EAs, especially regarding environmental impacts and supported by a well-established EA scientific project, we do not find EA-inspired governing arrangements for debating fish farming’s future. The political EA project has not followed the scientific one.

Consequently, whereas there can be a tendency to draw conclusions about aquaculture governance due to the presence or not of the EA, our study cautions against such extrapolations. On the contrary, we conclude that the existence of EA-inspired regulation or policy tools does not, in and of itself, inform us on which socio-ecological interdependencies have been selected and promoted for governance by actors, nor how more fundamental relationships between aquaculture and global environmental change have been addressed. Instead, the classifications elaborated in this article (modernising, competing, appeasing) contribute more readily to our understanding because they provide answers to these questions. Of course, such classifications emerge from the 'industry-territories' studied here. A next step for research would be to determine how generalisable these are through examining EU-EA implementation in other cases.

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