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Governing complex environmental commons: a case for “sea-ing” conservation law?¹

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Abstract

The paper investigates the environmental governance of complex commons from the point of view of nature conservation law in England, using the analytical framework for social-ecological systems developed by Ostrom and colleagues. The two commons under analysis are resource systems falling within statutorily designated sites for the conservation of nationally important habitats and species: namely Sites of Special Scientific Interest on common land and Marine Conservation Zones. The regulatory means used by conservation law to designate and manage complex marine and terrestrial environmental commons are compared. If conservation law originated with terrestrial ecosystems in mind and expanded its regulatory means seaward, the entry into force of Part V of the Marine and Coastal Access Act 2009 marks a divide between terrestrial and marine conservation law. The divide occurs along a series of lines and it seems to be dictated by the recognition of three (proprietary, physical and knowledge) differences between marine and terrestrial commons. Because of the lack of a structured system of property rights, marine conservation law is unable to use popular terrestrial instruments such as the ‘management agreement’ to regulate its commons, opting instead for the establishment of participatory decision-making at the site designation stage. Also, due to the physical qualities of the sea and the high scientific uncertainty related to the marine environment, marine conservation law uses a ‘network’ approach to the designation of conservation zones, whose key design principles include connectivity and best available evidence. Yet, is the divide between terrestrial and marine conservation law justified if we bring contextual variables into the analysis? The paper asks whether the approach used by marine conservation law could inform amendments to terrestrial conservation law if we bring into the picture climate change concerns and we provide a wider understanding of property rights beyond statute on common land.

Key words: Nature conservation law/marine conservation law/common land/property rights/climate change/comparison

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Introduction

This article investigates the governance of complex environmental commons in England. Complex environmental commons are defined here as resource systems 1) falling within statutorily designated sites for the conservation of nationally important habitats and species, 2) generating an assortment of common-pool goods and 3) involving a variety of resource users/actors. The issue at the core of this paper is to understand how effectively conservation law³ regulates this complexity. More precisely, how does conservation law interact with existing institutional arrangements on the commons, such as property rights, and integrate a variety of demands coming from different social and environmental fields in fulfilling its conservation objectives?

To answer this question, the discussion in this paper unfolds along comparative lines, exploring the relationship between the regulatory means used by conservation law to designate and manage complex *terrestrial* and *marine* commons. Both these types of commons are challenging for conservation law whose tools have been mostly designed for regulating non-common spaces, i.e. for land privately owned and occupied that makes up most of the English countryside. Secondly, protected areas law in England originated with terrestrial ecosystem in mind, almost totally neglecting the marine environment. In fact, a key statute for protected areas in England, the Wildlife and Countryside Act 1981 (hereafter, the 'WCA 1981'), dedicated much more attention to protected areas on land (Sites of Special Scientific Interest, hereafter 'SSSIs') than to protected areas at sea (called in the Act Marine Nature Reserves). Part V contains provisions for the designation and management of a new marine protected area (Marine Conservation Zone, hereafter 'MCZ') that should form the part of an ecologically coherent network of marine protected areas.

The divide between marine and terrestrial domestic conservation law produced by the passing of the 2009 Act seems to be dictated by the recognition of the intrinsic physical, proprietary and knowledge differences between marine and terrestrial socio-ecological environments. Instruments such as the "management agreement"-a way to shape the exercise of property rights to achieve conservation goals-have been the fundamental pillars of conservation law on land privately owned and occupied and have been stretched to common land because of the existence of a legally defined, albeit complex, property rights system. In contrast, because of the fluid nature of the sea, of a lack of a structured system of property rights and gaps in scientific knowledge about marine ecosystems, conservation law and policy has rethought its marine approach by emphasising the concept of "resilient network", by following a precautionary approach and, unable to use the instrument of the management agreement to fulfil its governance's objectives, by attempting to provide institutional spaces where different interests could be reconciled, thereby developing a participatory approach to decision-making at the early stages, i.e. at the designation stage under the 2009 Act.

Yet, should these regulatory steps only be confined to marine conservation law or could they also inform amendments to terrestrial conservation law for enhancing the governance of complex terrestrial commons if we bring in certain contextual factors overlooked by terrestrial conservation law? With rising awareness of climate change, should the marine concept of "resilient network" be imported to (non-fluid) terrestrial common spaces? And could a participatory approach to decision-making be valuable for complex terrestrial commons if we think about property rights on common land more critically, thereby revealing that the structured system of property rights on which terrestrial conservation law

³³ This paper is concerned with a branch of conservation law, namely protected areas law.

relies to negotiate management agreement may be a legal abstraction/distortion that does not reflect the practices and use rights of these lands?

The structure of the paper is as follows: the first section defines complex commons drawing on the commons literature, more specifically employing the analytical framework developed by Ostrom and colleagues for studying social-ecological complex systems (Ostrom 2007, Ostrom and Cox 2010, Cox 2011). Section two categorises and compares the two commons of this paper focussing on the core of the analytical framework, i.e. the four sub-systems. Although the two commons exhibit a number of similarities, attention is put on the three issues differentiating the marine common from the terrestrial one that necessitate the development of a different regulatory approach for marine conservation law. In section 3 the analytical framework is completed by adding the “related ecosystem’s” category (ECO) through a consideration of the effects of climate change on biodiversity and the “social, political and economic” context (S) through a critical re-definition of property rights beyond statute. It becomes visible that the three differences distinguishing the marine from the terrestrial environments are less pronounced than a preliminary analysis (focussed only on the core elements of the analytical framework) suggests as protected areas on common land are confronted by similar difficulties found for the marine environment once these contextual dimensions are brought into the picture. The question then becomes how viable it is to import some of the tools developed by marine conservation law for strengthening conservation law on common land. What are the pros and cons to start ‘sea-ing’ conservation law for the governance of English common land? The paper argues that we can extract certain principles from marine conservation law that can be valuable guides to re-think terrestrial conservation law, though different legal histories and environments do not allow merging the two regulatory regimes.

1. Defining complex commons: academic territories

This article is concerned with commons falling within statutory nature conservation designations of national importance in England. The commons considered are protected common land (the terrestrial common) and the territorial sea surrounding England (the marine common).

Common land is privately owned land over which third parties (the commoners) *have profits a prendre*. The system dates back to manorial times with the lord of the manor owning the soil in the manorial ‘waste’ and granting use rights to the commoners (the tenants). These use rights were to be exercised for necessary purposes so they were all related to the taking of some products offered by the land and excluded rights to carrying out development. Under common law, six categories of rights of common were developed, including the right of pasture (right to graze animals on the land), the right of turbary (take peat or turf for fuel), the right of piscary (right to take fish from fresh water), the right of estovers (take wood for domestic use), the right of pannage (right to graze pigs) and rights to take wild animals and the soil itself. The right of pasture remains of central significance in upland commons today and still today rights of common do not include the right to develop the land (see Commons Act 2006).

The modern property framework is to be found in the Commons Registration Act 1965 (hereafter, ‘CRA 1965’) that required the registration of both common land and right of common over it in commons registers, amended by Part I of the Commons Act 2006. Moreover, the picture needs to be completed by adding the rights of way granted to the

general public with the passing of the Countryside and Rights of Way Act 2000 (hereafter ‘CROWA 2000’). Common land, therefore, holds an important recreational value too today.

The agricultural and the recreational values are not representative of all the common-pool goods on common land as the biodiversity value of common land is also high. 20% of common land sits within SSSIs (Natural England 2013) and it is exactly this 20% that will be covered by this paper. SSSIs are the primary conservation designation in England representing areas of land that are of special interest by reason of any of its flora, fauna, or geological or physiographical feature. The designation and management provisions, which will be looked at in detail below, are to be found in s 28 of the WCA 1981, as amended by Schedule 9 of the CROWA 2000. The main regulatory body for SSSIs is Natural England, an executive non-departmental public body responsible to the Department of Environment, Food and Rural Affairs (Defra) and whose general purpose include the promotion of nature conservation and the protection of biodiversity (Natural Environment and Rural Communities Act 2006, s 2).

Having delineated the contours of common land lying within SSSIs, we can now turn to the marine common. The sea has been considered the quintessential common. As well known, the oceans were used by Hardin to exemplify the tragedy of the commons and, though much of the sea has been ‘nationalised’ under the United Nations Convention on the Law of the Seas (UNCLOS),⁴ the high seas, together with the Earth’s atmosphere, the outer spaces and Antarctica, are defined by international law as the four global commons as they lie outside the reach of states. The marine common considered in this paper is the English territorial sea within MCZs. MCZs are a new type of marine protected areas whose designation is provided for under s 116 of the 2009 Act. Much like SSSIs, MCZs are designations to protect nationally important habitats and species. Differently from other protected areas, such as special areas of conservation under Council Directive 92/43/EEC (known as the ‘Habitats Directive’), the law on MCZs does not list a limited number of species and habitats to be protected. The Act itself states that MCZs are to be designated for conserving the diversity of marine fauna and flora (with special attention to rare or threatened ones) and marine habitats and for conserving features of geological or geomorphological interest (2009 Act, s 117(1) and s 117(4)). Most of the seabed of the territorial sea is owned by the Crown Estate but rights by lease or licence can be granted so the seabed is used for various activities such as extractive industrial works (aggregates and oil and gas), marine renewable (offshore windfarms and tidal and energy devices), mooring etc.. The freehold rights of the Crown Estate are also subject to the public right to fish and navigate at common law. However, the ownership boundaries of the public right to fish are difficult to draw due to the lack of a definitive legal authority on the matter so that the way fisheries are regulated at present is by means of a complex system of vessels licences and quotas (heavily influenced by the EU with the Common Fisheries Policy)⁵ and their ownership as a legitimate expectation is currently being tested in court (*The Queen on the Application of the UK Association of Fish Producer Organisations v the Secretary of State for Environment, Food and Rural Affairs*, CO/4796/2012).

⁴ The United Nation Convention on the Law of the Sea (UNCLOS) created new rights in the sea for parties to the convention. It extended the sovereignty of a state to territorial waters (up to 12 nautical miles) and introduced the concept of the exclusive economic zone, an area stretching from the territorial waters out to 200 nautical miles, as measured from the coast, over which a state has special rights of exploitation and use of marine resources.

⁵ For a detailed analysis of property rights in marine fisheries see Barnes (2011).

Therefore, the territorial sea hosts a variety of activities, ranging from commercial fishing, to recreational activities (such as diving, surfing and angling), to extractive industrial works and to marine renewables but the property rights' boundaries of some of these activities, namely the public right to fish, are murky. Conservation law is therefore confronted with an unstructured system of property rights when attempting to protect areas of the territorial waters with the establishment of MCZs.

As visible from the above introduction, the commons considered in this paper are complex because they generate a variety of common-pool goods and their environmental governance requires the co-ordination of efforts between different interests groups at multiple scales. The two key problems of the commons (the difficulty of excluding users and the subtractability problem) are accentuated in complex protected commons precisely because these are not commons with a single user group and a single resource. The complexity of these systems requires Ostrom's broad diagnostic approach for social-ecological systems to capture the multiple variables, scales and relationships at play in each system. Ostrom's diagnostic approach (Ostrom 2007, Ostrom and Cox 2010, Cox 2011) for social-ecological systems builds on the well-known Institutional Analysis and Development framework (Ostrom 2005) and on a wealth of empirical research carried out by commons and resilience scholars over the years to incorporate into the IAD framework academic developments calling for the recognition of multiple links between social and ecological systems (for example, see Berkes and Folke 1998). The IAD framework is in fact principally a social framework preoccupied with dissecting and finely exploring layers of rules, human actors and their interactions. Although the biophysical conditions are considered within the IAD, these are part of the 'exogenous factors', rather than part of the core 'action situation'.

What the diagnostic approach for social-ecological systems does is to ecologically contextualise the entire framework, recognising the intrinsic connection between the social and the biophysical and analytically unpacking complex interrelations.⁶ This is a very important improvement on the analytical framework because it overcomes the dichotomy of society vs. nature permeating much of modern Western thought and it builds interdisciplinary bridges between the natural and social sciences.

From the viewpoint of a socio-legal scholar working on nature conservation, it also represents a radical innovation for regulation literature. In fact, if Ostrom's recognition of the panacea problem and her call to avoid imposing uniform institutional blueprints on environmental conservation efforts is somewhat familiar ground for a regulation scholar, the re-materialisation of the framework by focussing on social-ecological systems has yet to be explored by the regulation literature. To dwell on this point a little further, the resonance between, for example, smart regulation (Gunningham and Grabosky 1998) and Ostrom's call for mixing governance types depending on the specificity of the situation is evident (Ostrom and Cox 2010). Indeed, although operating along parallel lines, both regulation scholars and commons scholars have since the 1990s recognised the importance of moving beyond the one-size-fits all governance solution, understanding the necessity to contextualise the regulatory designs and acknowledge, rather than eliminate, complexity. Therefore, rather than replacing the state or market panaceas with a third one, i.e. community-based governance, both commons scholars and regulation scholars have for more than two decades de-centred

⁶ Young (2002: 176) defines the diagnostic approach as "The diagnostic approach seeks to disaggregate environmental issues, identifying elements of individual problems that are significant from a problem-solving perspective and reaching conclusions about design features needed to address each of the elements identified".

regulation exploring, inter alia, the value of polycentric governance scenarios both from a descriptive and normative perspective (e.g. Black 2001, Ostrom 2010). However, only the commons scholars have recently incorporated the biophysical environments within their analytical frameworks, siding with resilience scholars and to a certain extent even with critical human geographers (see for example Whatmore 2002) and environmental anthropologists (see for example Ingold 2000 and Strang 2004) who have criticised the society/nature boundary as the product of a specific modern sensibility.⁷ Differently, regulation scholars-paradoxically even those with environmental concerns at the core of their analysis-have marginalised the physical environment representing regulation as a wholly socially-driven business. Although this is not the place to carry out a theoretical critique of regulation and commons scholarship, it is worth appreciating this point because it could be a starting point for a future development and refinement of regulation scholarship in the environmental field.

Turning attention to the complex commons considered in this paper, Ostrom's diagnostic framework of social-ecological systems will now be used to provide an outline of their characteristics and compare them. In Ostrom's framework, each social-ecological system is composed of 4 key sub-systems: the resource system, the resource units, the governance system and the users and is affected by the social, economic and political setting as well as by related ecosystems (Ostrom 2007).

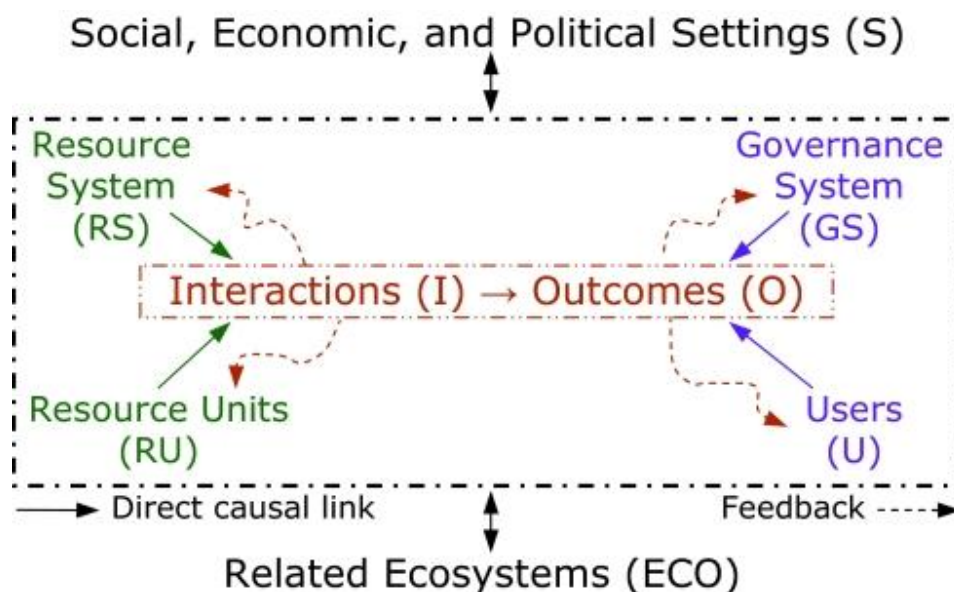


Fig 1. Image from Ostrom (2007).

⁷ Clearly these bodies of literature have different theoretical underpinnings and project with the commons/resilience scholars generally more driven by a functionalist/ policy-oriented understanding of the matter (asking what works and what does not) while critical human geographers and ecological anthropologists more preoccupied with offering a critical commentary on the forgotten materiality of living. Despite these differences, they converge in recognising the necessary interconnections between nature and society.

Each of this sub-system can be disaggregated in a number of smaller variables.

Table 1. Second-tier variables in framework for analyzing an SES

Social, Economic, and Political Settings (S)	
S1- Economic development. S2- Demographic trends. S3- Political stability. S4- Government settlement policies. S5- Market incentives. S6- Media organization.	
<p style="text-align: center;">Resource System (RS)</p> <p>RS1- Sector (e.g., water, forests, pasture, fish)</p> <p>RS2- Clarity of system boundaries</p> <p>RS3- Size of resource system</p> <p>RS4- Human-constructed facilities</p> <p>RS5- Productivity of system</p> <p>RS6- Equilibrium properties</p> <p>RS7- Predictability of system dynamics</p> <p>RS8- Storage characteristics</p> <p>RS9- Location</p>	<p style="text-align: center;">Governance System (GS)</p> <p>GS1- Government organizations</p> <p>GS2- Non-government organizations</p> <p>GS3- Network structure</p> <p>GS4- Property-rights systems</p> <p>GS5- Operational rules</p> <p>GS6- Collective-choice rules</p> <p>GS7- Constitutional rules</p> <p>GS8- Monitoring & sanctioning processes</p>
<p style="text-align: center;">Resource Units (RU)</p> <p>RU1- Resource unit mobility</p> <p>RU2- Growth or replacement rate</p> <p>RU3- Interaction among resource units</p> <p>RU4- Economic value</p> <p>RU5- Size</p> <p>RU6- Distinctive markings</p> <p>RU7- Spatial & temporal distribution</p>	<p style="text-align: center;">Users (U)</p> <p>U1- Number of users</p> <p>U2- Socioeconomic attributes of users</p> <p>U3- History of use</p> <p>U4- Location</p> <p>U5- Leadership/entrepreneurship</p> <p>U6- Norms/social capital</p> <p>U7- Knowledge of SES/mental models</p> <p>U8- Dependence on resource</p> <p>U9- Technology used</p>
<p style="text-align: center;">Interactions (I)</p> <p>I1- Harvesting levels of diverse users</p> <p>I2- Information sharing among users</p> <p>I3- Deliberation processes</p> <p>I4- Conflicts among users</p> <p>I5- Investment activities</p> <p>I6- Lobbying activities</p>	<p style="text-align: center;">→ Outcomes (O)</p> <p>O1- Social performance measures (e.g., efficiency, equity, accountability)</p> <p>O2- Ecological performance measures (e.g., overharvested, resilience, diversity)</p> <p>O3- Externalities to other SESs</p>
<p style="text-align: center;">Related Ecosystems (ECO)</p> <p>ECO1- Climate patterns. ECO2- Pollution patterns. ECO3- Flows into and out of focal SES.</p>	

Image 2 from Ostrom 2007.

2. Illustrating the characteristics of complex commons

I will illustrate the characteristics of the complex commons considered in this paper first by concentrating on the 4 sub-systems and only at a later stage considering the wider context, i.e. the social, economic and political settings (the S) and the related ecosystems (the ECO). This two stage approaches will serve to demonstrate that the differences between these two commons that seem to justify two different legal approaches to the conservation of nature are called into question if we embrace a wider understanding of property rights (the S variable) and if we bring climate change considerations into conservation law (the ECO variable). Analytically, this stresses the importance of the consideration of the changing social-ecological context and legally it helps us crossing some of the boundaries between marine and terrestrial conservation law.

The table below considers the four sub-systems and some of the second tier variables from the perspective of conservation law. The reason to exclude some of the second-tier variables is that they are either 1) mutable in both cases and/or 2) require empirical research to be detected and this is outside the scope of this paper. So for example, the size of the resource system is in each case variable as SSSIs can cover large tracts of common land or very small and similarly MCZs' size varies. Similarly, the history of use, the technology used, the number of users etc. can vary from one common to the next and these differences can be revealed only by careful empirical study so they are not key variables for the present comparison.

Complex commons	Terrestrial	Marine
Resource System	SSSI Predictability of system dynamics: high	MCZ Predictability of system dynamic: low to medium
Resource Units	Nationally Important Habitats and Species on Common Land Mobility: limited	Nationally important marine Species and Habitats Mobility: high
Governance System	Conservation law: WCA 1981, CROWA 2000 Property rights: Owners and commoners' use rights subject to the public right of way. Regulators: Natural England	Conservation law: 2009 Act Property rights: Crown seabed ownership (see Crown Estate Act 1961). These rights are subject to the public right of fishing and navigation and administratively authorised activities. Regulators: Marine Management Organisation (hereafter 'MMO') and the Inshore Fisheries Conservation Authorities (hereafter 'IFCAs') while Natural England and Joint Nature Conservancy Council (hereafter 'JNCC') act as statutory advisory bodies.
Users	Actors: Commoners, general public with different socio-economic attributes Knowledge: -Scientific: highly developed -Traditional Ecological Knowledge: high	Actors: Fishermen, Developers, recreational interests with different socio-economic attributes Knowledge: -Scientific: high uncertainty -Traditional Ecological Knowledge: high

The similarities between these two complex commons are multiple. First of all, both SSSIs and MCZs are designations to conserve habitats and species of national interest. Secondly, there are easily identifiable technocratic regulators. In the case of MCZs, the regulators are the MMO and IFCAs with Natural England and JNCC (the key conservation councils in England) playing a statutory advisory role. In the case of SSSIs, the key regulator is Natural

England. Thirdly, there are multiple user groups in both commons. Although both complex commons share these attributes, there are also key differences that have served to produce the legal separation of these commons. The three key differences are that in the sea 1) there is not a single and structured system of property rights sanctioned by statute as on common land, 2) that the resource units tend to be mobile and less bounded and 3) that the scientific knowledge of the marine environment is partial compared to that of the terrestrial environment.

These differences contribute to explaining and justifying the development of two separate legal regimes for the conservation of these commons, as explained in turn below. As mentioned above, the legal provisions for the designation and management of SSSIs are to be found in the WCA 1981 as amended by the CROWA 2000. These apply to all SSSIs, irrespective of the fact that they are covering land privately owned and occupied or common land. The legal provisions for the designation and management of MCZs instead have been developed much later under Part V of the 2009 Act. Although there were some provisions (now repealed by the 2009 Act) for the designation of nationally important marine sites (called marine nature reserves) under ss36 and 37 of the WCA 1981, these covered only a minor section of the marine environment (they could stretch up to 3 nautical miles from the coast) and their conservation value has been questioned extensively in the literature (Gubbay 1995, Reid 2009, Rodgers 2013, Pieraccini 2013).

The temporal difference in developing legal frameworks for terrestrial and marine protected areas has much to do with the gaps in the scientific knowledge of the marine environment. While scientific knowledge of terrestrial biodiversity is well developed, less research has been carried out in the marine environment due to the practical difficulty in conducting research in this environment (technological challenges, costs...) and to the misguided, now outdated, perception of the marine environment as an infinite resource, whose resilience was taken for granted for a long time.

Secondly, the two legal regimes could not be developed together for the simple reasons that SSSIs are designated with property rights in mind. This is evident by reading the provisions for designation and management of SSSIs under section 28 of the WCA 1981 as amended. Throughout s 28, the references to the owners and occupiers of SSSIs are multiple and are the key determinants of management measures. Once the designation of a site has been confirmed, the owners and occupiers cannot carry out operations likely to damage the special interest unless the the operation is carried out with Natural England's written consent; or in accordance with the terms of a management agreement or management scheme or management notice (WCA 1981, s 28(E), as amended by CROWA 2000, Sch 9). These measures serve to restrict or reshape the property rights of the owners and occupiers to achieve the conservation objectives of the sites. Therefore, the consideration of property rights is a central component in the negotiation of conservation management measures. The centrality afforded to property rights is due to the fact that most of the British countryside is in individual ownership and as a consequence SSSI's management is generally the matter of a contractual arrangement between the regulator (Natural England) and the landowner. This managerial system applies also to common land. However, negotiating a management agreement with an individual owner on land that is privately owned and occupied is more straightforward than negotiating one to take into account the multiple use rights of the commoners. In the specific case of common land, while the owner's rights are not of particular concern as the owner has only rights in the soil (and any surplus of the unused common rights) and most works are prohibited on common land (see Pt 3 of the Commons Act 2006), the complex matrix of commoners' property rights is to be the subject of the

negotiation. However, this complexity *seems* to be clarified by common land registers, as required by the CRA 1965 that outline the rights of the landowner and rights of commoners for each common land unit. This clarification is however only apparent and I will return to this point in the contextual analysis below.

In the sea, this official system of property rights is not in place. Apart from the Crown Estate's ownership of the seabed, as we saw above fisheries do not have officially recognised property rights. As a consequence, the SSSIs' management model could not provide useful tools to protect the marine environment and this serves to explain the difference in approach taken by the 2009 Act regarding both designation and management measures. Differently from the terrestrial system where sites have to be designated by the regulator on scientific grounds only, in the marine environment "socio-economic consequences" may be taken into account when deciding whether to designate a MCZ (2009 Act, s117(7)). This, in practice, has meant the development of an elaborated participatory decision-making process: 4 regional projects have been set up around the country involving a variety of stakeholders to decide the boundaries of the MCZs taking into account the effect that certain designation may have on their economic activities or social practices. By involving stakeholders at the designation stage, marine conservation law departed from the technocratic approach of terrestrial conservation law. The rationale behind this choice was not to dilute the conservation aims of the protected areas but to contribute to the creation of a sense of ownership over decision-making for all the stakeholders that would have ensured compliance with the conservation measure of the sites once in place.

In regard to management, a twin system is developed depending on whether an operation likely to damage the site is a work that requires an administrative authorisation before it can be carried out. S. 126 of the 2009 Act outlines the procedure to be followed by the public authority (in England the MMO) to determine whether to grant authorisation for the doing of an act that is capable of affecting, other than insignificantly, the conservation objectives of an MCZ. The operator seeking authorisation can go ahead if it satisfies the MMO that there is no significant risk of the act hindering the conservation objectives of the MCZ (s 126(6)) or that there are no alternative solutions and if the public benefit of proceeding with the act outweighs the ecological benefits of not proceeding and if compensatory measures are taken (s 126(7)). Decisions will be made on a case by case basis. For controlling all the activities that do not require administrative authorisation, the regulatory authority has the power to impose bylaws. Bylaws can be made, inter alia, to prohibit or restrict the entry into or movement by person or animal or vessel into a MCZ. The secretary of state must confirm them before they become operational unless the regulatory body thinks there is an urgent need to protect the MCZ. In that case the MMO can make an emergency bylaw. Finally, byelaws can be made even before designation of an MCZ occurs if the public authority thinks that there are or may be reasons for the Secretary of State to consider whether to designate the area as an MCZ, and that there is an urgent need to protect the feature. This management system differs greatly from that on SSSI as it does not (it cannot) centre on any negotiations between property rights and conservation measures as the marine activities are not regulated by an official system of property rights and this is also why participation at the designation level was considered extremely important. What we witness in the marine environment is therefore a reversal of the terrestrial approach as the negotiated forms of control and the diffusion of responsibility across actors occurs at an early stage- that of designation- with regulation becoming more centralised at the management stage. Indeed, if on land, the technocratic approach driven by scientific imperatives at the designation stage is acceptable for the primary users of the resource (those holding property rights) because at the management level their property rights are taken into consideration through negotiations, in the sea, negotiations happen at the

designation stage while the management exemplifies direct regulation because there is no official system of property rights that can form the basis of a negotiation. In a nutshell if on land the difference between designation and management is characterised by a movement from centred to de-centred regulation, in the sea it is from de-centred to centred regulation due to the non-existence of a structured system of property rights.

The third and final difference between the two complex commons relate to the ecological characteristics of these spaces. The more defined and contained physical characteristics of terrestrial habitats and species have allowed for the establishment of SSSIs as ecological islands, contrasting the less bounded marine environment that hosts some very mobile species and habitats, especially in environmentally dynamic sea areas.⁸ These perceived ecological differences have led to different site selection mechanisms: if SSSIs have been designated on a site by site basis, MCZs are planned designed following a networked approach. Under s 123(1) of the 2009 Act, MCZs must be designated to contribute to the achievement of an ecologically coherent network of MPAs that include other marine protected areas designations at different jurisdictional scales. The importance of a network approach for protecting the marine environment is well established scientifically to conserve a diverse ecosystem and also to contribute to its resilience (Roff and Zacharias 2011). The network's criteria to be taken into account when designating MCZs have been laid down in a statutory guidance drafted by Natural England and JNCC (2010) and two are of particular concern for the present argument: connectivity and best available evidence. Connectivity between the areas is important to protect organisms that inhabit different environments at different stages of their life cycles, accounting for the dispersal distances of marine organisms. As for 'best available evidence', this serves to recognise a precautionary approach as the guidance states that lack of full scientific certainty should not be used to postpone proportionate decisions on site selection.

From the above analysis it is clear that due to the three key differences of the marine environment, conservation law had to rethink its approach to designation and management of sites in the sea. To summarise, the above discussion noted that to account for the lack of an officially recognised structure of property rights, marine conservation law cannot rely on a strict technocratic approach to site designation tamed by the use of management agreements as on land. It therefore factors in at the early stage of designation social-economic considerations and allows stakeholders to participate in the planning process and build a sense of ownership over the decision-making process, giving a voice to legally unrepresented rights and to traditional ecological knowledges and hoping to avoid future non-compliance with the management measures that will be decided technocratically. Secondly, the lack of scientific knowledge is counteracted by involving stakeholders to integrate traditional ecological knowledges in the planning and especially by employing a precautionary approach to site selection as visible, for instance, in the network design principle n. 7, i.e. 'best available evidence'. Finally, to overcome the mobility of the resources, conservation law uses the network approach to site planning that consider, inter alia, issues of connectivity.

What I aim to show in the subsequent section is that the proprietary, ecological and knowledge differences found in the marine environment are difficulties that we can also find on common land once we introduce two contextual variables into our analytical system, namely climate change (ECO variable) and a wider social understanding of property rights (the S variable). It then becomes possible to ask what lessons protected areas law on

⁸ It is important not to overstate marine species mobility as scientific research has demonstrated that certain fish populations are reasonably stable (see for example Poulsen et al 2011).

common land can learn from marine conservation law. This argument does not imply that the differences between the marine and the terrestrial protected commons are to be erased in toto but that there are certain general principles of conservation law that are transposable from an environment to the other.

3. Contextualising the diagnostic framework: adding the larger ecological (ECO) and social (S) settings

I begin to contextualise the diagnostic framework by adding climate change considerations (the ECO setting) to the picture. Terrestrial conservation law in the UK developed much before climate change issues became a policy priority. It is not surprising therefore that the laws outlining the designation and management provisions for SSSIs do not contain any references to climate change and it is doubtful whether the principles upon which Natural England reaches judgements regarding the special interest are ‘climate proof’ as the site selection is based on specific habitats and species-groups that are already present on the site (JNCC 1998), rather than their potential for harbouring a range of possibly different species and habitats in the future. This is not a shortcoming specific to domestic conservation law. In fact, similar issues have been raised at the international level, where a mismatch between international conservation law and climate change has been identified (Trouwborst 2009).

Climate change is likely to create new challenges for terrestrial species and habitats as climate is one of the key factor in changing the abundance and distribution of species. The importance of protected areas in conserving biodiversity in a changing climate can therefore be questioned as protected areas are static while distributions of species are dynamic. However, recent research on various bird and butterfly species suggests that species respond to climate change by disproportionately colonising SSSIs when they expand to new regions (Thomas et al. 2012). Protected areas can therefore play an important role in providing suitable spaces for biodiversity in a changing climate. Nevertheless, if habitats are fragmented, certain species will find it more difficult to move from one protected area to the next (Wills et al. 2010 and Hopkins et al. 2007). Hopkins et al. argue that ‘habitats fragmentation would appear to be a key factor preventing range expansion as the climate changes, and may threaten some species with extinction on the habitat islands where they are trapped’ (2007: 9). Ensuring that protected areas are well connected could be useful to decrease this risk. Unfortunately, connectivity is not a key criterion to designate SSSIs. The guidance outlining the selection criteria for designating SSSIs takes their ‘island’ character as a given stating that “while these clear-cut edges are unusually unnatural, they usually have to be accepted as practical boundaries in the selection of sites. In the lowlands, the important sites, are often thus delimited as ‘islands’ within a set of artificial land” (JNCC 1998: 33). This statement conveys a static view of biodiversity and emphasises the individual value of protected areas, rather than their values as networks to protect a changing suite of species. Terrestrial domestic conservation law can therefore learn something from marine conservation law because as we saw above the latter has put networks as its core and one of the key principles driving the designation of the network was connectivity.

Having said this, there is much scientific uncertainty in relation to species’ patterns of dispersal and as a consequence uncertainty in relation to the functionality and fundamentality of protected areas’ connectivity. Species’ ability to adapt and disperse depends on biotic interactions, reliance on particular habitats, their evolutionary capacity and the frequency of extreme events. Scientific papers have in fact criticised the ‘climate envelope’ approach for

being too simplistic and not taking into account other than climate factors that play an important role in shaping species and habitats dynamics. The climate envelope approach assumes that species shifts are solely dependent on climatic variations. By mapping a species distribution only on climate-space, the approach assumes that when the climate changes, the species will ‘follow’ the climate more congenial to them. This approach however is misleading because, as Davis et al. (1999) have demonstrated, it does not consider interactions between species and their dependence on particular sources and sinks, important variables that also affect species’ distribution. Also, other research has demonstrated that historical local adaptations may preclude populations from colonizing new areas (Pelini et al. 2010) or that climate change may have more effect on species’ abundance in particular localities rather than redistribution (Gregory et al. 2009 and Simpson et al. 2011).

Precise predictions on the impacts of climate change on biodiversity are therefore difficult to make as there is a high degree of uncertainty about the future responses of individual species and habitats to climate change (Hopkins et al 2007). Therefore, designing well connected networks of protected areas may only be part of the solution as species’ mobility is affected by a vast number of variables. Terrestrial conservation law therefore must also be amended to take into account this high scientific uncertainty surrounding biodiversity’s response to climate change. Once again some lessons can be learned from marine conservation law as high scientific uncertainty was one of the three variables identified above characterising marine ecosystems. As outlined in section 2 above, marine conservation law deals with scientific uncertainty by relying on a precautionary approach. One of the guiding principles for the establishment of the network of marine protected areas was the use of “best available evidence”, so that lack of full scientific certainty would not be used as a means to postpone site selection. The precautionary approach is one of the key pillars of environmental law, it is enshrined in key legal and policy instruments, such as the principle 15 of the Rio Declaration 1992 and the Treaty on the Functioning of the European Union (Art 191(2)) but it has not been particularly central in the field of terrestrial nature conservation law. For example, owners and occupiers whose land has been designated as an SSSI will need to obtain the consent of the Natural England for operations likely to damage the special interest. ‘Likely’ has been interpreted by the Court to mean that there must be a probability, not a mere possibility, that the operation would damage the SSSI conservation objectives (see *North Uist Fisheries v Secretary of State* (1992) JEL 241). Therefore, because not all activities that carry a possibility of significant harm can be guarded against, the approach is not precautionary. Due to the high scientific uncertainty related to the way in which climate change will impact biodiversity, it is imperative to integrate a precautionary logic into terrestrial domestic conservation law.

Introducing into the analytical framework the ECO variable has demonstrated that two guiding principles can be extrapolated from marine conservation law to inform amendments of terrestrial conservation law as climate change calls for a less patchy approach to terrestrial conservation and increases scientific uncertainty, thereby demanding a precautionary approach.

Introducing the S variable will show that other lessons can be learned from marine conservation law as the property rights picture on common land is more blurred than a statutory view would assume, thereby resembling the unstructured property rights system at sea. As mentioned above, terrestrial domestic conservation law relies on property rights to operate. If this is relatively straightforward where the land proposed for an SSSI notification is privately owned and occupied, the situation is more complicated for common land. Though there are modern statutes that delineate the property rights on common land, namely the CRA

1965, these have not enabled the production of truly representative registers of use rights and farming practices. This has proven to be particularly problematic for upland commons as the number of registered grazing rights was higher than what the common could actually sustain, thereby producing overgrazed commons. The erasure of customary practices from the commons registers goes much further than the inflation of rights of pasture encompassing issues such as the failure to updating the registers to report property transactions, thereby producing outdated registers. Only some of the Act's shortcomings have been rectified by Part I of the Commons Act 2006. A detailed critical analysis of the property rights system on common land has already been offered by this author and colleagues (Rodgers et al. 2011) and the only point to be emphasised here is that common land exhibits an officially recognised system of property rights but this is partially flawed, principally due to the shortcomings of the CRA 1965. The amendments made by the Commons Act 2006 are a step in the right direction but as they still rely on common registers established under the CRA 1965, they build on unstable legal foundations. As the system of property rights on common land is more unstructured and complex than what may appear from a cursory glance at legal instruments, it is questionable whether conservation law should rely on registered rights when negotiating management agreements on common land. Poorly drafted property rights can have damaging environmental consequences especially if they are one of the pillars of environmental governance. I have argued elsewhere that a way to overcome this problem is for conservation law to strengthen its reflexive side to better account for the unofficial, ecologically-embedded forms of property rights on common land (Pieraccini 2012). But there can also be another way to improve conservation law's effectiveness if we follow the example of marine conservation law. Due to the lack of legal clarity regarding who owns the resources at sea, we saw above that marine conservation law cannot operate through the instrument of management agreements and consequently it has developed a less technocratic decision-making procedure at the site designation level, by including socio-economic consequences as criteria that may be taken into account by the regulators and, in connection to this, by developing participatory techniques to draw sites' boundaries with the hope of building a sense of ownership over the decisions and over the marine protected areas. Some of these innovations could also inform amendments to terrestrial conservation law related to common land so that commoners and members of the public could be given more effective opportunities to participate in defining conservation priorities for sites. The obvious difficulty in importing the approach of marine conservation law to terrestrial environments is that, in the sea there are no existing MCZs. By contrast, most common land is already designated as an SSSI and using the marine approach would not be feasible even for the designation of future SSSIs as the designation happens on a site-by-site basis rendering the formation of participatory decision-making's fora for each site a very expensive and time consuming exercise. However, as argued in relation to the challenge of climate change, the lessons that marine conservation law can teach terrestrial conservation law are not specific courses of action (due to the different geographies but also to the different legal histories that cannot be erased) but more general guiding principles, in this context meaning a more participatory approaches to decision-making.

Conclusion

This paper compared common land within SSSIs and MCZs from the perspective of conservation law using Ostrom's diagnostic approach for socio-ecological system. The comparison highlighted the differences between the two systems that justify the existence of two separate legal regimes to conserve these spaces, namely the 2009 Act for MCZs and the

WCA 1981, as amended by the CROWA 2000 for SSSIs. However, this analysis was called into question once we contextualise the environmental governance of these commons by integrating climate change considerations into the conservation picture and by adopting a wider definition of property rights beyond statute. At this point, the terrestrial common shares with the marine one a high level of scientific uncertainty regarding species adaptation to climate change and an ill-defined legal system of property rights.

Following marine conservation law's approach, terrestrial conservation law on common land could be improved first of all by including more participatory decision-making procedures to make sure that property rights on the ground and the general public's conservation opinions are taken into account and contribute to a collective sense of conservation, rather than playing out the purposive dimension of conservation law on interventions premised on market values, such as management agreements leaving the costs of conservation as well as its definition on the hands of the state. Secondly, it could be improved by using a more networked and precautionary approach to site designation to take into account high scientific uncertainty and species dispersal due to climate change. This second recommendation is in line with recent policy developments that are recognising the importance of resilient ecological networks for terrestrial biodiversity protection through, inter alia, the establishment of 'New Improvement Areas', i.e. areas to connect wildlife to increase their resilience to climate change (Defra 2011, Warren 2012).

Therefore, although the two commons remain different because of different legal and environmental histories that cannot be erased, terrestrial conservation law could begin re-thinking the appropriateness of its approach when designating and managing SSSIs on common land. In a nutshell, two lessons can therefore be learned from the example of marine conservation law: one is for terrestrial conservation law to use a public rather than private interest orientation in regulation, the second is to think about habitats and species in a more dynamic way recognising the challenge climate changes poses and the importance of a dynamic, adaptive and networked approach to conservation. The recent policy developments should be closely monitored to check their effectiveness.

To conclude, two important areas for future research can be identified. First of all, this paper has compared the two commons' environmental governance only from the perspective of domestic nature conservation law. However, if the research aim would be to provide a full picture of the environmental governance's mechanisms occurring on these commons, researchers will need to consider more legal sources and jurisdictional levels, such as the role played by two key EU policies, namely the Common Fisheries Policy and the Common Agricultural Policy and their interactions with conservation law and local institutional arrangements. Secondly, even if the focus of future research remains on domestic conservation law, the strengths of marine conservation law identified in this paper must be assessed against its on-going implementation and close primary qualitative analysis that may reveal a very different picture.

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