



Marine governance in the English Channel (La Manche): Linking science and management



G. Glegg^{a,*}, R. Jefferson^{a,b}, S. Fletcher^a

^a Centre for Marine and Coastal Policy Research, Plymouth University, Drake Circus, Plymouth PL4 8AA, UK

^b RSPB Centre for Conservation Science, RSPB, The Lodge, Sandy, Bedfordshire SG19 2DL, UK

ARTICLE INFO

Article history:

Available online 26 March 2015

Keywords:

English Channel
Marine
Governance
Ecosystem approach
Marine spatial planning
Integration

ABSTRACT

The English Channel is one of the world's busiest sea areas with intense shipping and port activity juxtaposed with recreation, communications and important conservation areas. Opportunities for marine renewable energy vie with existing activities for space. The current governance of the English Channel is reviewed and found to lack integration between countries, sectors, legislation and scientific research. Recent developments within the EU's marine management frameworks are significantly altering our approach to marine governance and this paper explores the implications of these new approaches to management of the English Channel. Existing mechanisms for cross-Channel science and potential benefits of an English Channel scale perspective are considered. In conclusion, current management practices are considered against the 12 Malawi Principles of the ecosystem approach resulting in proposals for enhancing governance of the region through science at the scale of the English Channel.

© 2015 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

1.1. The English Channel as a socio-economic system

The English Channel is one of the busiest marine areas in the world with 300–400 ships of over 300 tonnes passing through East to West each day, whilst around 100 ferries run North to South transporting goods and people between the UK and France (CAMIS, 2013a). In addition to the large ports with intercontinental links (Southampton, Le Havre, Rouen and Dunkirk) there are numerous small regional ports and marinas dotted along the coasts providing economic and social interest. Industries, such as submarine cables and marine aggregate extraction, and their associated infrastructure, provide economic benefits and employment to the region. Fisheries and aquaculture for shellfish and algal products are significant to the local economy and an important element of the cultural heritage of communities along the English Channel coasts. All these activities are overlaid on a singular natural environment, valued for its environmentally and culturally significant features which make the area popular with residents and tourists (CAMIS, 2013a). Effective governance of this region and its associated activities can readily be seen to be a very tricky undertaking.

In recent years the density and diversity of these activities have increased. New industries such as marine renewable energy are welcomed by the EU, national governments and the local coastal authorities as opportunities for economic growth and (sustainable) development, but these place additional pressures on an already stressed system. The marine environment has been considered to be the 'next industrial estate' and there is the perception by some that every square inch of sea can or should be used to maximum benefit (Smith, 2000). In areas such as the English Channel this has serious implications for resource management, safety of those at sea, management of human activities and protection of vulnerable habitats and species. Integrated management which recognises the interests and values of all those involved and seeks to balance development within ecological boundaries is essential to ensure we can sustain existing activities and changes as they occur.

1.2. English Channel ecology

The English Channel is a single system containing diverse ecosystems with ecological functions and processes occurring across a Median line which separates the French and UK marine areas (see Fig. 1) (Tappin and Millward, 2015). Physically the English Channel can be split into Western and Eastern basins, with the dividing line running between Portland in the North and Alderney in the South, but within these regions many of the characteristics are analogous (Dauvin, 2012). Some key differences include the presence of a major freshwater input on the French

* Corresponding author. Tel.: +44 01752 584728.

E-mail addresses: gglegg@plymouth.ac.uk (G. Glegg), rebecca.jefferson@rspb.org.uk (R. Jefferson), steve.fletcher@plymouth.ac.uk (S. Fletcher).

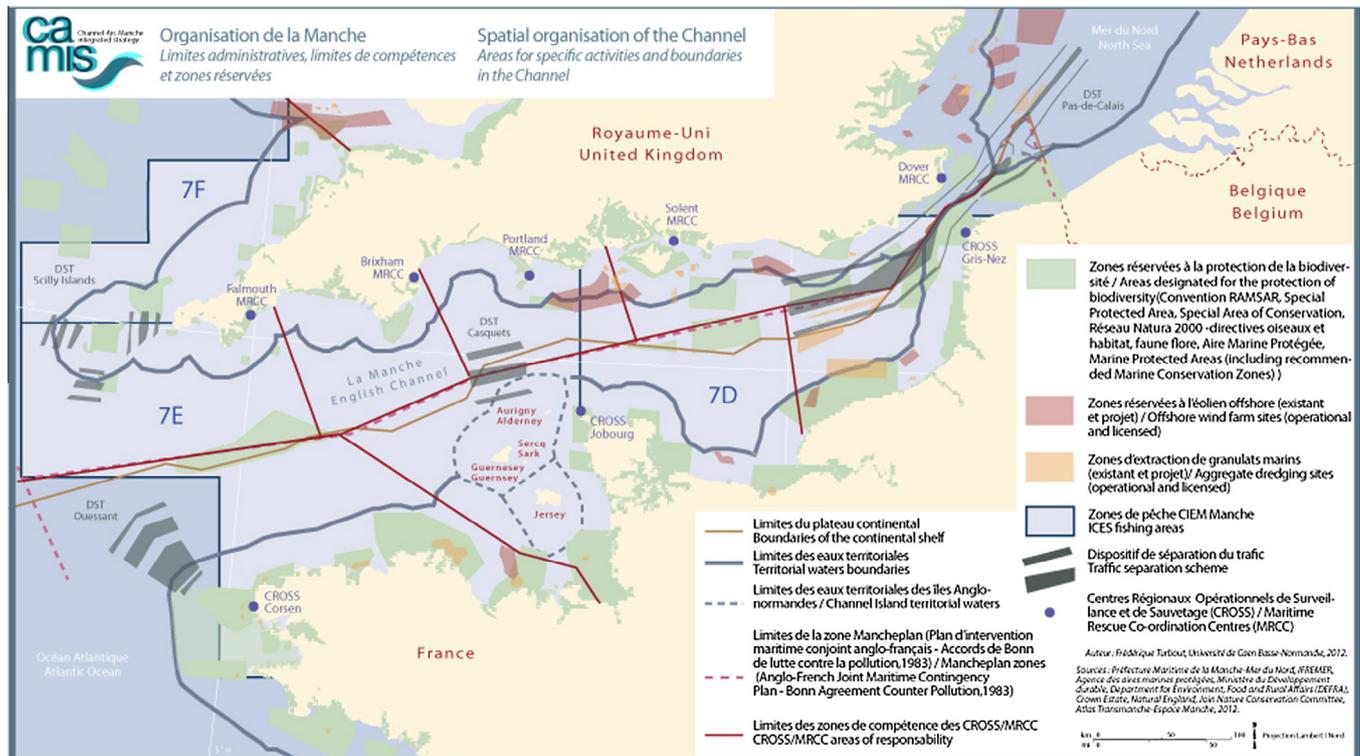


Fig. 1. A chart illustrating some of the key management boundaries in the English Channel. Source: F. Turbout, University of Caen, 2013 – Cross Channel Atlas – Channel Spaces.

side (the Seine) in the Eastern basin, the presence of a strong summer thermocline in the Western basin, different temperature and tidal ranges, and the geology of the coastal zones. There are also differences in the biogeographic features of the two areas but the similarities and close connectivity suggest that an ecological approach to the management of the system as a whole is by far the most appropriate (Dauvin, 2012). Adopting a holistic, ecosystem scale approach allows natural processes in the English Channel to be taken into account fully and assimilated into the development of management concepts and practice.

1.3. The ecosystem approach – science and governance

In 1995 the Convention on Biological Diversity (CBD) adopted the Ecosystem Approach (EA) as its primary framework for holistic management of natural resources and subsequently in 1998 the 12 Malawi Principles were defined (CBD, 1998). These principles, which address the why, how and what of ecosystem management, are listed in Table 3 which will be discussed later. This approach is specified in most, recent environmental legislation from the EU (e.g. the Recommendation on Integrated Coastal Zone Management (ICZM, 2002) and the Marine Strategy Framework Directive (MSFD; EU, 2008)) and in national legislation (e.g. the UK's Marine and Coastal Access Act (MCAA, 2009)).

The CBD specifies that adaptive management is an essential requirement for EA implementation and refers to the need for the application of relevant data, the involvement of stakeholders in management processes and the conservation of ecosystem structure and functioning (CBD, 1998). All of these features require a fundamental understanding of the science underpinning the operation of the system. In an adaptive process there is opportunity to learn from experience and to alter the management processes used in light of observation (Curtin and Prellezo, 2010).

This means that the integration of science and management is a fundamental condition for successful implementation of an EA.

The Convention specifies, unsurprisingly, that the EA should operate at the scale of the ecosystem but it does not define that scale and notes that the 'scale of analysis and action' should be determined on the basis of the issue being addressed with decentralisation to the lowest appropriate level (CBD, 1998). It also calls for inter-sectoral cooperation. Thus the style and form of implementation can vary greatly from system to system depending, for example, on the scale of the area, the components and condition of the natural ecosystem, the existing policy and legislative frameworks and the nature of the human activities. It will also be dependent on the specific issues of concern; for example, addressing the problems associated with the trans-boundary transport of atmospheric pollutants and the local impact of shellfish aquaculture would require quite different tactics but they could both use the EA to provide the framework for action.

Although it was argued above (Section 1.2) that there were differences in the East and West English Channel, for the purposes of the EA the management unit is very likely to be the whole English Channel. Here, although there is an international boundary, as delineated by the Median line, it is likely the sea water involved comprises a single diverse ecosystem and that the pressures exerted by human activities have impacts across the whole area. However, the presence of an international boundary makes coherent governance problematic unless there is positive management to ensure cooperation.

1.4. Aim of the paper

In recent years there have been a variety of natural science studies on the English Channel, some of which are discussed in this journal issue. Concurrently, projects such as EMDI, CAMIS and PEGASEAS, have explored the socio-economic characteristics of

the English Channel and considered how society's aspirations for development in the English Channel might be balanced with a thriving natural ecosystem through a system of effective governance at an appropriate scale (Buléon and Shurmer-Smith, 2007; CAMIS, 2013a; PEGASEAS, 2014). Building on these studies the aim of this paper was to make the case for advancing scientific research at the scale of the English Channel to inform a holistic system of governance through resolving key issues including the following:

- What are the current governance mechanisms and to what extent do these facilitate governance at the scale of the English Channel?
- What is needed to enable the relevant principles of the EA to be applied in the English Channel?
- How can a more integrated approach to English Channel science support a more coherent governance system in the English Channel?

2. Methods

The INTERREG IVa funded Channel Arc Manche Integrated Strategy (CAMIS) project ran from 2009 until 2013 and published an Integrated Maritime Strategy for the English Channel (IMS; CAMIS, 2013a). The IMS provides the context and framework to enable improved cooperation across sectors and places in the English Channel. The IMS was developed through a stakeholder engagement process which was possible using the Cross Channel Forum, created by the CAMIS project. There were five forum events, each a one day meeting in either France or UK open to stakeholders from all marine and maritime sectors across the region, which provided opportunities through workshops and discussions for data collection to inform the development of the IMS. These were supplemented by stakeholder interviews and wider surveys to prepare the draft IMS in English and French which was then made available for general consultation before the final IMS was completed. More recently there have been a further two Cross Channel Forums under the auspices of the PEGASEAS project. The IMS identifies particular features which are required to facilitate integration at the English Channel scale, and in this paper these features will be interpreted through a 'science into governance lens' to identify how English Channel scale governance can be supported through English Channel scale science (CAMIS, 2013a).

Table 1 lists the main elements of the stakeholder engagement which led to the development of the IMS. Through a stepwise process the IMS was populated by considering how things are currently, how stakeholders would like them to be and what steps they feel should be taken to reach those goals. The majority of the data were qualitative, and were analysed using thematic identification to address particular questions related to improving crossregion and crosssector integration in the English Channel.

3. Governance in the English Channel

3.1. Governance

The term governance does not have a fixed interpretation globally and its use has been changing in recent years (Rhodes, 1996). The central point to recognise is that governance is not simply the result of central government actions but of the whole system that supports outcomes and this system can be defined in a number of ways reflecting the nature and form of the processes employed (Rhodes, 1996).

The European Commission introduced a White paper in 2001 which defined governance as 'rules, processes and behaviour that

Table 1

The elements of stakeholder engagement which contributed to this study. Note some individuals may have contributed on more than one occasion, especially during the development of the IMS.

Form of engagement	Place, date	No. of participants
Five Cross Channel Forums for Channel Arc Manche Integrated Strategy (CAMIS)	Exeter, UK, October 2010 Rennes, France, November 2011 Southampton, UK, September 2012 Caen, France, March 2013 Rouen, France, November 2013	65 95 111 93 122
Detailed interviews for CAMIS	Summer 2011 UK and France	12 selected individuals representing key sectors
Questionnaires to stakeholders for CAMIS	Spring 2011 distributed through the CAMIS database to participants from UK and France	53 individuals responded
Public consultation of IMS February 2012 ^a	Spring 2013 draft IMS distributed to over 100 people and organisations	Over 20 detailed responses from French and UK stakeholders
Two Cross Channel Forums for Promoting Effective Management of Channel Seas (PEGASEAS)	Southampton, UK, March, 2014 Caen, France, July 2014	55 155

^a Earlier iterations of the IMS were distributed for comment in July and September 2012 and received input from stakeholders independently and via the Cross Channel Forums.

affect the way in which powers are exercised at European level, particularly as regards openness, participation, accountability, effectiveness and coherence' (EC, 2001). Improving governance across all aspects of life in the EU is seen as a route to opening up the process of policy making and governing to more individuals and institutions in order that there may be greater transparency and engagement and thus better policy and regulation. This aspiration is admirable but in the marine environment this wider engagement can present significant challenges, especially offshore. In the English Channel it may be less difficult to achieve than in other marine areas, given the intensity of the human activities and proximity of the two coastlines which means the extent of open water is constrained.

3.1.1. Marine governance

In this paper marine governance is defined in the broadest sense as the sum of all the processes, organisations, institutions and instruments with an influence over how the marine ecosystem of the English Channel is used and managed (PEGASEAS, 2014). This can include both voluntary and statutory mechanisms and organisations as well as the wider population in line with EU philosophy. The interest here is how, in reality, this works in the English Channel? How the system is governed will reflect all the existing management structures operating in the region, some of which can be seen to work at the scale of the English Channel whilst others operate at a much wider, or indeed smaller, scale. In the case of the English Channel there are statutory and non-statutory mechanisms and institutions at the local, national, regional, EU and international scale. Marine governance of the English Channel encompasses the disciplines of marine conservation, integrated coastal zone management and maritime spatial planning as well as sectoral management of the widest possible range of human activities and interests.

3.2. International agreements

3.2.1. Global conventions

The overarching legal framework for marine waters lies principally with the United Nations Convention on the Law of the Sea (UNCLOS) which has, as its central aim, to establish a legal order of the seas and oceans, to facilitate communication between nations and enable peaceful, equitable and efficient use of the seas and their resources whilst enabling conservation of the living resources and the study, protection and preservation of the marine environment (Sands, 2003). Alongside UNCLOS, international regulations have been developed since the 1970s to prevent pollution from shipping (under MARPOL) and to promote safe shipping and prevent accidents at sea (Sands, 2003). The International Maritime Organisation (IMO) acts to support the implementation of these regulations by nation states (IMO, 2014). This legislation, of course, applies equally to the UK and France, both of which are signatories of UNCLOS, IMO and MARPOL.

These legal requirements facilitate the management of shipping and other commercial activities in the English Channel. As one of the busiest shipping areas in the world the English Channel has been under intense pressure for many years, some of which is outside the direct control of the UK and France. This led to the development of the first internationally recognised traffic separation scheme in the Dover Straits in 1967. Subsequent accidents, such as the Torrey Canyon and the Pacific Glory, kept the need for greater shipping safety on the agenda and in the early 1970s the Channel Navigation Information System was introduced in Dover, UK, working in close co-operation with Cross de Gris Nez in France which developed a very similar system (Squire, 2003). This joint working led to the development of the MANCHEPLAN, an Anglo-French plan for cooperation and coordination of actions in the event of a maritime accident, which is still in place today (CAMIS, 2013b).

Traffic separation schemes for shipping (see Fig. 1) are now implemented by the IMO and so the nation states will consider these as largely immovable, when considering, for example, marine planning. If a country wishes to make a change, this would be enacted through the IMO which would seek agreement of all signatories and then take steps to notify all sea users, as was the case for the recent extension of the jurisdiction of the Scilly Islands (PBO, 2009).

There are numerous international agreements such as the Ramsar Convention on wetlands, the London Convention on waste dumping at sea, and others which act on the English Channel (Sands, 2003). Some of these agreements have successfully influenced the management of human activities in the last few decades and improved the governance of the marine environment in general and the English Channel specifically. For example, there are a number of areas designated under the Ramsar Convention (1974) as wetlands of international importance, such as Chesil Beach and the Fleet Lagoon and Portsmouth Harbour on the UK side and the Baie du Mont Saint-Michel and Baie du Somme in France. Through the London Convention (and the associated Oslo Convention) the disposal at sea of wastes such as industrial wastes and sewage sludge has ceased (Oslo, 1989). In the 1980s some 300,000 tonnes (dry weight) of sewage sludge was dumped into the seas around the UK annually with this practice continuing into English Channel waters until 1998 (Jones and Irish, 2001). The implementation of these agreements is of benefit to the whole area acting to reduce pressure on the natural system.

3.2.2. Regional agreements

Regional agreements on marine environment management in the English Channel now focus around the OSPAR Convention (1992) which works in concert with the EU. In the early years,

OSPAR, and before that the Paris and Oslo Conventions, worked very effectively to reduce pollutant inputs to the North East Atlantic and this is reflected in the reduction in the loads of some pollutants input to the English Channel reported in this special issue (Tappin and Millward, 2015). OSPAR's approach, which began by developing compatible methods for assessing pollutant inputs and monitoring the environment (Glegg, 1994) has achieved much in terms of improving management of point source discharges but greater problems have been encountered in the control of diffuse inputs. This need for appropriate compatible data to facilitate improved marine environmental management is still not met in many sectors, for example, shipping (OSPAR, 2009).

The focus of the most recent OSPAR strategy (2010–2020) is not only on hazardous substances, but also on approaches to combat eutrophication and prevent any further loss of biodiversity. The links between this and the Marine Strategy Framework Directive (MSFD) (EU, 2008) are clearly made in the OSPAR strategy. Within OSPAR the English Channel is considered only as a part of Region II, the Greater North Sea. It is recognised as a very busy shipping lane but is viewed as a connector between the Atlantic and North Sea rather than an area with a distinct identity as noted by Tappin and Millward (2015). The English Channel ecosystem is identified as of particular importance both as a MARPOL Special Area, because of its particular geographic nature, and as a Particularly Sensitive Sea Area (PSSAs) reflecting its vulnerability to environmental harm (OSPAR, 2009).

3.3. European policy and governance

In recent years the EU has made significant changes in its approach to legislation relevant to protection and exploitation of marine and coastal areas. In the 1970s and 1980s the approach to environmental management focussed on single activity, single substance regulation (such as the Dangerous Substances in water Directive (76/256/EEC) or the Directive on waste from the Titanium Dioxide industry (78/176/EEC)) but as the impossible scale of this task for every polluting substance and industry became obvious a more holistic and precautionary approach was seen to be needed (Ducrotoy and Elliott, 1997). This has led to an Ecosystem Approach which is central to EU environmental management and this is reflected in its more comprehensive environmental legislation relevant to the marine and coastal systems such as the Water Framework Directive (WFD, 2000/60/EC), the Marine Strategy Framework Directive (MSFD, 2008/56/EC), and conservation measures associated with the (Natura, 2000) networks. Alongside these environmental measures legislation exists to promote the 'Blue Growth' agenda of the EU, designed to facilitate sustainable growth in the marine and maritime sectors, creating jobs and economic prosperity. These include the overarching Integrated Maritime Policy and new Directive 2014/89/EU (MSPD) which provides a framework for Maritime Spatial Planning and will act alongside the more sectoral policies such as the Common Fisheries Policy, the European Commission Communication on Blue Energy and the Transport White paper. Table 2 lists several key EU Directives and policies of relevance to English Channel waters, the majority of which will at least benefit from a joint approach across English Channel waters, to provide coherent management.

3.3.1. Environmental measures in the English Channel

The WFD, and more recently the MSFD, represents a relatively new approach to implementing EU legislation in which the Directives specify the required management outcomes. Member states, possibly through regional networks, are required to devise and implement appropriate mechanisms within their national legislation or management regime to ensure compliance with the

Table 2
Main national and EU maritime legislation and policies relevant in the English Channel.

EU (http://ec.europa.eu/maritimeaffairs)
Common Fisheries Policy
Habitats and Birds Directives
Integrated Maritime Policy
Marine Strategy Framework Directive
Maritime Spatial Planning Framework Directive
Transport White Paper
Blue Energy Communication
Integrated Coastal Zone Management recommendation
Water Framework Directive
Environmental Impact Assessment Directive
Strategic Environmental Assessment Directive
EU Maritime Strategy for the Atlantic Ocean Area
UK (www.defra.gov.uk)
Marine Policy Statement 2011
Energy Act 2011
Climate Change Act 2011
UK Marine Industry Growth Strategy 2011
Marine and Coastal Access Act 2009
Transport Act 2000
Coast Protection Act 1949
France
Loi n°2010–788 du 12 juillet 2010 portant engagement national pour l'environnement (Chapitre V – Dispositions relatives à la mer)
Loi n°2010–874 du 27 juillet 2010 de modernisation de l'agriculture et de la pêche (Titre VII – Moderniser la gouvernance de la pêche maritime et de l'aquaculture)

specified outcomes (Raakjaer et al., 2014). Under the WFD this approach is readily adopted with states surrounding crossboundary catchments having a specific requirement to work together to consider the whole catchment and the marine area to 1 nm offshore. Under the MSFD the regions are very large, and the English Channel is divided between two regions with the larger eastern component in the Greater North Sea and the smaller in the Celtic Seas (PISCES, 2014). A key purpose of these directives is harmonisation and compatibility. However, it is not known how effectively France and the UK will work together, although OSPAR may act as an intermediary. The central purpose of both these directives is for a high environment quality (good ecological and chemical status under the WFD; good environmental status under the MSFD) to be achieved by 2020 although each Directive has a different approach to identifying that status (Borja et al., 2010).

The Wild Birds Directive and the Habitats Directives have been used in concert to create the Natura 2000 network which forms the central component of marine biodiversity protection in the EU. It is proposed that this network will not only arrest the loss of biodiversity but facilitate a move towards improving marine conservation whilst enabling sustainable use of marine resources. Within the English Channel Fig. 1 demonstrates the extent to which the coastal area has a degree of protection including Natura 2000, Ramsar sites and national marine protected areas. Very few of the sites are in open water, with only one in French waters, and several of those shown in UK waters not yet implemented. In terms of governance the question is whether or not there is a mechanism for assessing the effectiveness of the existing sites as a network across the English Channel which will protect, conserve and restore habitats, species and ecosystems. It is noted in the guidelines for the Marine Natura 2000 network (Natura, 2000, 2007) that there is scope for implementation of a trans-boundary network but there is little obvious evidence of cooperation in the development of a coherent network between adjacent countries.

3.3.2. Development measures

The EU's Integrated Maritime Policy (IMP) seeks to provide a more coherent approach to maritime issues addressing topics

which do not fall within the remit of individual sectors, such as blue growth, marine data and knowledge and maritime spatial planning.

Marine spatial planning is defined as a public process of analysing and allocating parts of three-dimensional marine spaces (or ecosystems) to specific uses or objectives, to achieve ecological, economic, and social objectives that are usually specified through a political process (Ehler and Douvère, 2009). The MSPD, adopted in July 2014, was presented (EU, 2014) as:

“an important step in creating new growth opportunities across all maritime sectors by better managing our seas and ensuring their sustainability”.

This Directive mentions sustainability repeatedly, of which 33% of comments are allied to development (sustainable development), 22% are allied to growth (sustainable growth) and 22% are linked to some form of sustainable use (EU, 2014). The application of an ecosystem based approach is a central objective and there is a requirement for Member States to cooperate to ensure plans 'are coherent and coordinated across the marine region concerned' with such cooperation paying particular heed to issues of a transnational nature (EU, 2014).

The MSPD highlights energy, transport, fisheries and aquaculture, tourism and extraction of raw materials as areas offering significant scope for sustainable development (EU, 2014). All of these areas are of key significance in the English Channel area, as identified in the IMS, and so the importance of marine spatial planning to its management can be seen. For example, ocean energy, which refers to energy generated from marine wind farms and tidal and wave energy generation devices, is seen by both France and the UK as a significant opportunity for marine economic growth as well as contributing to the decarbonisation goals of the EU (EC, 2014). The UK and France hold 80% of the EU's potential tidal stream energy (CAMIS, 2013a). Over 100 million tourists visit the coastline of the English Channel each year and there are 145 marinas acting as a focal point for recreational sailing and many other water based sports. In an intensely used area such as the English Channel, the conflict between growth and sustainability is very marked and the success or failure of the MSPD may be pivotal in the future governance of this area.

3.3.3. Atlantic strategy

The Maritime Strategy for the Atlantic Ocean covers the waters around Ireland, the United Kingdom, France, Spain and Portugal, including part but not all of the English Channel. Through a consultation process with stakeholders across all these countries, five priority challenges were identified including applying the ecosystem approach, reducing Europe's carbon footprint and exploiting the seafloor resources sustainably (EC, 2013). A key element of this non-statutory plan approach is that it 'encourages' member states to work together, sharing data and best practice but there is no evidence that this will address any of these issues at the scale of the English Channel (Suarez de Vivero and Rodriguez Mateos, 2014).

3.4. National legislation and institutions

3.4.1. United Kingdom (England)

Table 2 lists the principal national legislation acting on the English Channel. There are a number of reviews which discuss the approach to management of UK and English marine areas. For example, Elliott et al. (2006) have used what they term 'horrendograms' to demonstrate the complexity of the UK legislative system. Considering the Severn Estuary as a case study, Ballinger and Stojanovic (2010), identified over 50 pieces of national and EU legislation and policy of relevance to the environmental management

of the area. This number of individual policies and directives makes integrated management very difficult although arguably more important. One purpose behind the introduction of the Marine and Coastal Access Act (MCAA, 2009) was the simplification of the system which has been successful to a certain extent (Boyes and Elliott, 2015). In particular the creation of the Marine Policy Statement provides clarity and greater certainty for all marine users, which will be enhanced with the publication of marine plans over the next few years (MPS, 2011).

The Marine Management Organisation (MMO), which was created in 2009 through the MCAA, has the responsibility to license and regulate the seas around England and Wales to ensure they are managed in a sustainable way. Likewise the Inshore Fisheries and Conservation Agencies (IFCAs) which were created in 2011, have sustainability as one of their core drivers and they highlight a need to balance social, economic and environmental benefits to ensure healthy seas and fisheries. Central to this are marine conservation zones (MCZs), which protect areas that are important to conserving the diversity of nationally rare or threatened habitats and/or species and those places containing habitats and/or species that are representative of the biodiversity in our seas. These sites in which different activities may be restricted depending on the features for which they are protected, form part of the UK's network of marine protected areas. The initial process for selecting England's MCZs involved extensive stakeholder engagement, which included representatives from France, working to implement guidance provided at a national level for an 'ecologically coherent and well-managed network' of sites. However, subsequently there was a marked shift from this bottom-up approach to a top-down process with different requirements for developing the network, particularly with regard to data. These changes undermined the stakeholder engagement process and caused negative feelings in the stakeholder community (Gaymer et al., 2014). There is nothing to suggest that there has been any engagement with French stakeholders in this revised MCZ selection process.

The MMO is responsible for introducing marine planning around England. On completion in around 2020, there will be 10 marine plans which will translate the marine policy statement into detailed policy and spatial guidance for each plan area. Five plans impinge directly on the English Channel including the southern inshore and offshore plans, the south west inshore and offshore plans and the south east inshore plan.

Working alongside these agencies there are a number of coastal partnerships in the UK, especially along the English Channel where the very busy coastal areas can be subject to many problems with high demands from conflicting activities. These partnerships facilitate discussions between stakeholders and have supported the initial consultation about the southern area marine plans. There are concerns about the representativeness of some of these partnerships and their long term viability given significant funding pressures (Kelly et al., 2012; Fletcher, 2003).

3.4.2. France

In France the legislation appears in Table 2 to be much simpler; however, underlying this apparent simplicity, there are numerous national policies and strategies dealing with individual sectoral activities. The principal marine legislation is based around the Grenelle de la Mer which was introduced in 2009 as a mechanism to bring together the relevant parties to identify actions required to enable sustainable development in the marine environment and as a result there have been changes in the governance structures. The state administration is responsible for establishing a national strategy for the seas and coasts and preparing a strategic planning document for each of four recently established areas called 'maritime facades'. Two of these areas, the Manche Est- Mer du Nord and the Nord Atlantique – Manche Ouest, split the English Channel. For

each of these areas a 'Conseil Maritime de Facades' has been established which is jointly chaired by the Maritime Prefet and the Prefet for the region, and is formed of representatives from many sectors. These will act as stakeholder forums to advise on the development of strategic documents for the use, protection and development of their area.

There are a number of existing planning instruments which will also be relevant to MSP including the Schemes for the Development of the Sea (SMVM) under the Coastal Law, which was introduced in 1986, and the Local Urban Plans (PLU) and Schemes for Territorial Coherence (SCOT) for which a maritime component is optional (Skinner et al., 2014). The Agence d'Aires Marines Protégées (AAMP) is responsible for coordinating the network of marine protected areas around France and providing technical support for new and proposed National Marine Parks and other MPAs. These areas are shown for the English Channel in Fig. 1.

In addition to these statutory organisations there are a number of relevant regional initiatives in France, such as the Regional Conference for the Sea and Coastline in Brittany. This consultation group provides opportunities to exchange information and to identify and evaluate possible strategic actions which may be undertaken in support of sustainable management of Brittany's coasts and sea (CRB, 2008).

3.5. Does English Channel scale governance exist?

The above question can only be answered with another question – what is the definition of the English Channel? The boundaries of the English Channel can vary, in much the same way the boundaries of the coastal zone vary, depending on the topic, issue or element of the region being considered. There is no agreed definition of the English Channel as can be seen from the different boundaries applied by OSPAR, the EU and others. This adds to the complexity of governing the area and makes relatively simple features, such as a single English Channel data management system almost impossible. International maritime political and administrative co-operation for shipping through the CNIS and MANCHEPLAN was recognised as necessary and implemented in the Channel nearly 50 years ago and led to some of the first sea use planning measures to manage navigation. However, such cooperative working at this scale has not been sustained. It is apparent from the foregoing discussion that none of the legislative measures presented in Table 2 act specifically at the English Channel scale. The marine plan areas in the UK waters and Les Conseils Maritimes de Facades in France have completely different boundaries. The nature of the regulatory institutions, their geographic scope and the range of their responsibilities (e.g. the MMO in the UK and AAMP in France) differ also making joint working problematic. None of these institutions work solely at the scale of the English Channel. In the same way the political institutions differ and relatively simple and expected dissimilarities can make joint working difficult. For example, national elections occur at different times which can impede or prevent formative discussions.

There is no joint action on overarching initiatives relevant to the English Channel even where opportunities exist. Although there are shared structures which apply to both countries, such as MSFD and OSPAR, the marine management of each 'side' of the English Channel differs. Nations implement EU/International legislation in their own manner which implies that management is not integrated nor necessarily coherent. Even under OSPAR the data collected do not provide the comprehensive and consistent data set required to estimate pollutant inputs to the Channel (Tappin and Millward, 2015) which makes subsequent decisions about management needs less clear.

Likewise consultation at an English Channel scale is not always successful in engaging the appropriate range of individuals. For

example, the process for defining MCZs within the UK employed International Liaison Officers but anecdotal evidence from Cross Channel Forums found that the stakeholders in France did not feel they had adequate opportunity to contribute their opinions. This may result from the fact that international stakeholder engagement for national processes is not driven by a desire for shared sea management but rather by a need for a clear picture of non-UK sea users interests in UK seas. In addition, the implications of decisions taken on one or other side of the English Channel for users from other nations are not always recognised. For example, when there was a change in the siting of Marine and Coastguard Agency tugs in UK waters just prior to the second Cross Channel Forum in 2011, individuals from the Maritime Prefecture attending highlighted the fact that they had not been informed about the move and this led to some animosity between the two agencies.

There is no statutory obligation for either France or the UK to work at a whole English Channel scale but there is a responsibility to take the needs of adjoining areas into consideration in many legislative processes (e.g. management of Natura 2000 sites or development of the UK South inshore and offshore marine plans). Where there is an opportunity to engage international audiences, such as through the marine planning process, it enables the construction of a complete picture of the implications of management measures on users of shared sea spaces. However, obtaining contributions from the appropriate individuals in another country can be very challenging and it is interesting to consider what sort of international approach would meet the stated aim of the EU to facilitate engagement in the process of governance of the English Channel.

Many of these issues were identified within the IMS developed through the CAMIS project (CAMIS, 2013a) which provides a blueprint for cooperation in the English Channel region. However, whilst stakeholders from multiple sectors across the region discussed the enabling factors which support collaboration across the English Channel it is difficult to see how such voluntary initiatives in isolation, can supersede the statutory responsibilities of nation states.

4. Applying the ecosystem approach in the English Channel

Having reviewed the different elements of governance relevant to the English Channel it is apparent that there is currently no mechanism to enable an integrated approach to governance and coherent management at this scale. The ecosystem approach (CBD, 1998) provides a framework which can deliver governance at the scale of the ecosystem and as noted previously, it proposes the scale of activity should be relevant to the issues being addressed. Therefore it can be posited that this EA framework could be used to assess how well the current approach enables the 12 principles of the EA to be met. The following section reviews the existing governance in light of the EA principles and a summary of this analysis is presented in Table 3.

4.1. Principle 1: the objectives of management of land, water and living resources are a matter of societal choices

Management objectives are not determined by societal choices at the English Channel scale; however, societal choices do determine management objectives at the national, regional and local scale in the UK and France through their independent democratic processes. There is currently no mechanism through which societal choices can be elicited at the English Channel scale. This creates the risk that the independently determined management objectives are not coherent across the shared space of the English Channel, which may detract from the delivery of an integrated EA.

Table 3

The 12 Malawi Principles with a summary of the assessment of whether they would be relevant for governance at the scale of the English Channel were the EA implemented and whether they are currently delivered at that scale.

Principle	Definition	English Channel scale	
		Relevant?	Delivered?
1	The objectives of management of land, water and living resources are a matter of societal choices.	Yes	No
2	Management should be decentralised to the lowest appropriate level.	Yes	No
3	Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.	Yes	No
4	Recognising potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should: <ul style="list-style-type: none"> • Reduce those market distortions that adversely affect biological diversity • Align incentives to promote biodiversity conservation and sustainable use • Internalise costs and benefits in the given ecosystem to the extent feasible 	Yes	No
5	Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.	Yes	Partial
6	Ecosystem must be managed within the limits of their functioning.	Yes	No
7	The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.	Yes	No
8	Recognising the varying temporal scales and lag-effects that characterise ecosystem processes, objectives for ecosystem management should be set for the long term.	Yes	No
9	Management must recognise that change is inevitable.	Yes	No
10	The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.	Yes	No
11	The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.	Yes	Partial
12	The ecosystem approach should involve all relevant sectors of society and scientific disciplines.	Yes	Yes

4.2. Principle 2: management should be decentralised to the lowest appropriate level

Within the English Channel there is clear evidence of decentralisation of management to the local level. For example, in France, there are detailed management plans under development in Marine National Parks. Similarly, in the UK there are local and regional bodies tasked with coordinating the management of relatively small areas of the marine environment. However, these are not examples of management decentralised from the English Channel scale to the lowest appropriate level. The decentralisation

in these cases is from the national or regional scale, with limited consideration of English Channel scale issues. Likewise although the Channel Navigation Information System and MANCHEPLAN exist to support navigation and safety at a Channel scale, they do not necessarily enable communication about significant changes in infrastructure probably because these decisions are made at a national level.

4.3. Principle 3: ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems

There are no mechanisms to consider the impacts of management interventions in the English Channel on nearby marine ecosystems, most notably the North Sea or the Atlantic Ocean. Similarly, there are no mechanisms (such as local area or Channel scale working groups) in either the North Sea Strategy or Atlantic Strategy at the correct scale to identify the impacts of management interventions in the English Channel. Effects on terrestrial ecosystems from activities in the Channel are considered through terrestrial planning systems, although their impacts are considered locally rather than at the Channel scale.

4.4. Principle 4: recognising potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should: (a) Reduce those market distortions that adversely affect biological diversity. (b) Align incentives to promote biodiversity conservation and sustainable use. (c) Internalise costs and benefits in the given ecosystem to the extent feasible.

Despite the significance of joint economic links, the absence of English Channel ecosystem scale management makes it impossible to effectively place the ecosystem in an economic context. Recent research linking ecosystem service assessment to marine governance in the Western English Channel through the VALMER project is beginning to develop an evidence base to better understand the links between biodiversity and economic (and non-economic) benefits to society (VALMER, 2014). The Blue Growth agenda advocated by the European Union may strengthen the identity of the English Channel as a distinctive economic space, but is unlikely to encourage recognition of the ecosystem. The potential mismatch between economic activity and biodiversity protection in the system highlights the need for an ecosystem approach in the English Channel.

4.5. Principle 5: conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach

Networks of Marine Protected Areas (MPAs) are under development in both the UK and France. The resultant Channel MPA network has not been designed to reflect English Channel scale conservation priorities, but is a result of simply combining the existing and independently designated UK and French MPAs. The extent to which this approach is likely to deliver an ecologically coherent English Channel MPA network is unclear.

4.6. Principle 6: ecosystems must be managed within the limits of their functioning

At present, there is limited understanding of what the functional limits of the Channel ecosystem might be. In addition, if the functional limits of the ecosystem were compromised, there is no unified approach to identifying those changes or implementing management measures to address English Channel-wide

problems. Whilst there is limited cooperation between the UK and France, the absence of an existing framework restricts opportunities for anticipatory and informed action.

4.7. Principle 7: the ecosystem approach should be undertaken at the appropriate spatial and temporal scales

Language, cultural and institutional differences between France and the UK can impede collaboration and arguably place a constraint on the development of a coherent governance system. Cross Channel connectivity is being promoted and is growing as a result of enhanced communication opportunities (such as the Cross Channel Forum) and France–UK projects focused on improving shared governance of the English Channel. As cooperation is strengthened through the consistency offered by the Cross Channel Forum and a growing group of English Channel governance projects (such as CAMIS, Channel Catchments Cluster (3 Cs) and PEGASEAS), longer term objectives may become viable as stronger foundations for the EA grow. However, this will need to be supported through ongoing and targeted resource allocation.

4.8. Principle 8: recognising the varying temporal scales and lag-effects that characterise ecosystem processes, objectives for ecosystem management should be set for the long term

There is considerable scientific research undertaken to improve our understanding of the English Channel ecosystem, and the varying temporal scales and lag-effects are largely known. However, the absence of an established system for long term English Channel scale ecosystem management means this understanding cannot readily be integrated into English Channel management. As reported under principle 7, present mechanisms to govern the English Channel ecosystem in an integrated manner over the long term are developing (such as the Cross Channel Forum) but are fragile, as a result of having to rely upon project funding for their continuation.

4.9. Principle 9: management must recognise that change is inevitable

In order to incorporate change into the management of the English Channel, it is important to have a management system that has an active monitoring framework which enables adaptive management. At present, it is not clear that this exists in the English Channel. Indicators developed under the MSFD will enable limited adaptive management in the English Channel ecosystem through their monitoring and refinement. However, the English Channel is not a distinctive region under the MSFD; therefore, the indicators may not be ideally suited to governing change in the English Channel.

4.10. Principle 10: the ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity

The English side of the English Channel is in the process of undergoing a comprehensive marine planning process. This system aims *inter alia* to balance the use and conservation of biological diversity within a framework of integrated marine governance. The balance between conservation and use of biological diversity is being addressed within the context of a range of uses and measures applied within the UK area of the English Channel including the designation of MCZs as part of the network of marine protected areas. Although, at present, there is not an equivalent system covering all French waters in the English Channel, the development of the national strategy for the sea and coasts and a strategic planning document for each façade and the designation and planning of a

network of marine parks (for example, the Golf Norman-Breton) also require a balance between conservation and use to ensure sustainability. However, there is very little evidence of collaboration and communication between the countries to make these initiatives coherent across the English Channel (Skinner et al., 2014).

4.11. Principle 11: the ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices

The need to include all relevant forms of information in ecosystem governance is well-recognised in the English Channel area. Many projects that seek to better understand and govern the English Channel ecosystem collect and store significant quantities of marine data from multiple sources. These data tend to relate to the ecological character of the English Channel and be themed around the topic of the specific project. However, most are available online and are increasingly being shared between projects. Furthermore, with the arrangements in place under the INSPIRE directive (which is driving common data standards in Europe), these data are largely compatible. There is a relative lack of data related to the human use and management of the English Channel, and little data reflecting local knowledge and practices.

4.12. Principle 12: the ecosystem approach should involve all relevant sectors of society and scientific disciplines

Prior to the establishment of the Cross Channel Forum there was no regular opportunity to bring together stakeholders at the scale of the English Channel. Forum meetings were funded and supported initially through the CAMIS project and since 2013 through the PEGASEAS project. However, it is important to recognise that there is no ongoing financial security for the Forum and its future is unclear. The mechanism to support ongoing stakeholder engagement in governance of the English Channel ecosystem at the English Channel scale is therefore absent.

Thus, as shown in Table 3, the majority of these principles are not met within the English Channel. Management is based firmly in national governance structures and cooperation and coherence are lacking.

5. Cooperation at the scale of the English Channel

5.1. Scientific requirements for English Channel governance

Effective marine governance must be informed by contributions from multiple scientific disciplines to enable a comprehensive understanding of the many factors which affect decision making processes (Hughes et al., 2005) and this is equally true for the English Channel. This includes expertise from natural sciences, such as those presented in this special issue, which enable understanding of physical, chemical and biological processes and the interactions between human activities and the marine ecosystem (e.g. Langston and Pope, 2015). Ecological research informs the understanding of ecosystem services provision (Fletcher et al., 2014), monitoring of commercially exploited populations (e.g. Revill et al., 2013) and identification of marine conservation priorities (McCellan et al., 2014). The physical sciences provide insight into sediment movements (Ruiz de Alegria-Arzaburu and Masselink, 2010), sea level rise (Haigh et al., 2011) and the interactions between marine developments and coastal impacts (Rendle and Davidson, 2013) whilst knowledge of the behaviour of chemical contaminants entering the marine environment and the associated physical processes explains much about their transport and possible impact (Tappin and Millward, 2015). Meteorological

research can provide predictions of the changing conditions in the English Channel over various timescales, such as information about climate change scenarios (Jenkins et al., 2009).

Beyond the natural sciences, the social sciences provide essential insight into the human components of the English Channel. Studies within human geography can inform tourism (Ireland, 1998) and understanding of people's connections with the sea (Jefferson et al., 2014) whilst archaeology can describe the long term social history (Loveluck and Tys, 2006). Economic analyses provide details of the financial impacts of particular activities, e.g. the Channel Tunnel (Anguera, 2006) and shipping (Baird, 2002). More recently different approaches to the use of ecosystem service assessment to inform decision making have been explored at different scales (Rees et al., 2010; Beaumont et al., 2008; Galparsoro et al., 2014).

These multi-disciplinary approaches support governance through providing insight into the people, places and nature of the English Channel which influence and are influenced by marine management. There are over 90 universities and research facilities around the region, and the research they conduct presents a considerable resource for marine governance. However, it is clear that the scientific findings from this work are not integrated into the decision making processes at the scale of the Channel as well as they could be.

5.2. Differences in practical application

Ideally large scale science should be embedded within an English Channel scale management structure where research had been conducted on all relevant natural and social aspects. To support delivery of an EA, a whole-Channel assessment of the ecological components and the impacts of human activities could provide an important foundation. Section 3 describes the various policies in France and the UK and illustrates one of the fundamental challenges of English Channel science. The marine priorities, governance processes and management structures differ between the two countries, meaning that in practice there are differences in monitoring the health of marine environments, managing activities and protecting features. The EU Marine Strategy Framework Directive (EU, 2008) requires all member states to define indicators of Good Environmental Status (GEnS). Whilst the 11 descriptors are the same for France and the UK, there is no requirement for the indicators to be the same across each country (Borja et al., 2010). Therefore, it is unlikely that the indicators for each country will be harmonised. Given that the UK and France both have sea borders with many other countries, this is understandable; the indicators are needed to report on the state of a country's seas within its national limits, not at an ecosystem scale. Efforts are underway to align some of the indicators between the two nations, but, their monitoring strategies and current data sets are not coherent. Thus, there are likely to be national differences between the GEnS assessments when monitoring begins in 2016. The consequence of this for science at the English Channel scale is that the statutory obligation to monitor GEnS will drive the collection of different natural science evidence by the two countries of the English Channel. This translates into each country developing independent data sets for its own purposes, and consequently an integrated, holistic assessment will be difficult to achieve. A more serious outcome could then arise in the form of a reinforcing of the national divide in English Channel science, which will have a knock on effect on the development of a coherent governance strategy.

5.3. Collation of expert knowledge for management

In the absence of a legislative driver for English Channel scale scientific programmes, the research from universities and research institutes in the region can be collated to provide as full a picture of the English Channel as possible. Although this special issue illustrates this point to a certain degree, collating existing knowledge requires institutions to collaborate in order to overcome barriers such as differences in language, culture, methods and resources. In any case, data sets and present research only provide partial coverage of the region and it is by no means holistic or sufficiently integrated. The INTERREG funded CHARM project (Channel Integrated Approach for Marine Resource Management; www.charm-project.org) illustrated the considerable value which can be gained from a collaborative approach to collating existing expertise. The project produced inventories of existing knowledge of various ecological and socio-economic components of the English Channel (e.g. [McCellan and Godley, 2012](#)). These authors identified gaps in knowledge of the region, highlighted priorities for future research and informed numerous additional actions which were completed by the project partners. Collating existing data sets from different sources can be difficult as data have often been collected using various methods, and for a range of purposes. EU initiatives such as European Marine Use and Data Network (EMODnet) and the INSPIRE Directive (2007/2/EC) are working to improve coherence in data management approaches but data protection and institutional constraints can still prevent the use of data for purposes beyond those initially specified. However, where these barriers can be overcome, the resulting outputs can be a powerful tool to support the development of governance for the English Channel.

5.4. Mechanisms for communicating, learning and networking

Collaborative research projects may deliver English Channel research at a suitable scale, supporting the governance processes, particularly by addressing gaps in existing data or gaps in knowledge about functions and processes. Connections between research organisations are essential in bringing together experts to collaborate, produce data and engage in its synthesis to publish research. This should breakdown the international boundaries thereby overcoming the language and cultural barriers and lead to harmonisation of methodologies. The VALMER project (www.valmer.eu) illustrates this concept, bringing together 11 institutions involved in scientific research and governance, within a partnership to assess innovative ecosystem service approaches in the valuation (economic or otherwise) of coastal and marine locations. In addition to connections between researchers, the connections between science and practice are essential. These connections enable policy makers and other stakeholders to access expert knowledge, and, equally important although often overlooked, this also enables researchers to access the 'on-the-ground' experts who are integral components of the governance of the systems being investigated. Whilst project based communication often works well this does not provide continuity and consistency in future joint initiatives.

Translating English Channel science into governance processes is likely to require particular mechanisms which facilitate science to be presented to and discussed by stakeholders and decision makers. The PEGASEAS project (Promoting effective governance of English Channel ecosystems; www.pegaseas.eu) is an example of such a mechanism, as it was designed to investigate the governance lessons from 12 previous INTERREG IVa projects. One of the key outputs of PEGASEAS is a policy guidance document ([Skinner et al., 2014](#)). The projects have been reviewed to identify examples of effective governance and the results have been translated into a

format which is accessible to a wider audience of policy makers and stakeholders.

An additional audience for engagement is the general public, including the many residents and users of the English Channel. Engaging public audiences is becoming an increasingly important component of marine management, with greater recognition of the potential for individual and community actions to influence policy processes and marine health ([Fletcher et al., 2012](#)). The Marinexus project (www.marinexus.org) is creating a network of research and outreach in the Western English Channel in order to better connect stakeholders and public audiences with information about the ecology of the English Channel and the impacts of human activities. The partnership includes marine science experts who provide a foundation of knowledge, alongside partners experienced in public engagement. A programme of events and materials has been developed to offer opportunities for a broad range of individuals to engage with marine life identification survey and skills courses, such as marine cookery, art sessions, beach cleans, family play sessions and snorkelling activities. These provide tailored opportunities to reach the targeted audiences, and connect them with expert knowledge of the region.

5.5. Complex and contentious issues

For science to fully support governance of the English Channel, the capacity to ask broad open questions is required. This is particularly true of contentious or complex issues which can impact on a multiplicity of sectors, both positively and negatively. National differences on priorities can create contrasting attitudes to key issues, making evidence collection, collation and synthesis difficult. Alternatively conflicting policies can stymie debate on some topics. For example, a current topical issue concerns marine renewable energy (MRE) developments, including offshore wind, tidal and wave installations. This is a growing sector, with the English Channel holding 80% of Europe's tidal stream energy potential. MRE offers numerous benefits, including fossil fuel free 'clean' energy, economic investment for the support and maintenance of infrastructure and employment for local communities ([MERiFIC, 2014](#)). However, there are ecological impacts which are, as yet, not fully understood ([Inger et al., 2009](#)), and aesthetic impacts which can lead to a lack of social acceptance ([West et al., 2010](#)). The MRE sector is receiving increasing attention from the UK and France and questions around the infrastructure requirements to construct, maintain and decommission large scale MRE developments have engendered interest from potential hub ports on both sides of the English Channel. Opportunities for Small and Medium-sized Enterprises (SMEs) to access this growth across the region are being investigated by the Channel Marine Offshore Renewable ([ChannelMOR, 2014](#)) project, building on work by previous cross Channel projects. This effort identifies strategies for SMEs to access the socio-economic benefits of MRE developments, delivering benefits more widely within communities and supply chains around the English Channel. English Channel science which can be used to inform MRE decision making processes includes investigations of the economic implications of MRE (e.g. [Bergmann et al., 2006](#)) device design and location to maximise the available renewable opportunities ([Mueller and Wallace, 2008](#)), and ecological assessments to reduce impacts on habitats and species ([Shields et al., 2011](#)). MRE decisions are made by nations, but within the region, there is potential for actions by either country to impact on the functions of both coastlines. Therefore decisions informed by English Channel scale scientific programmes can support outcomes which are of optimum benefit.

Moving away from an issue based approach, local coastal partnerships such as county partnerships in the UK, the Regional Conference for the Sea and Coastline in Brittany, and the Cross

Channel Forum provide a space for presentation and open discussion of contentious issues and some of the science involved. These structures are accessible to a wide diversity of stakeholders, and provide a variety of services which are valuable in discussion of information and in networking, thereby contributing to English Channel governance processes. However, forums and similar partnerships are often vulnerable to the vagaries of funding, for example, the Cross Channel Forum is currently maintained through short-term project funding, with no long term business model established. This leaves these important structures in danger of dissipating and the stakeholder opportunities being lost.

6. Conclusion

It is apparent that an English Channel scale identity is still a distant prospect. Research integration needs to be improved in order to address the needs of the region itself. Research funding and studies such as that reported in this issue are generally focussed at larger or smaller scales and integration across the Channel is often incidental. In contrast, INTERREG has facilitated cooperation through projects at a local scale but it struggles to influence what happens at a governmental level. INTERREG's funding of projects such as 3Cs and PEGASEAS demonstrates their recognition of the importance of the Channel scale but there is a need for this to be recognised at national government level as well.

In spite of the recent EU directives such as the MSFD and MSPD offering opportunities for coordination of management approaches as required by the EA there appears to be no proposal for holistic governance of the English Channel. The UK and France have fundamentally different approaches to their implementation of marine management. Likewise the research and monitoring in the two countries also lack the coherence which is necessary to enable the application of an ecosystem approach. This may be partly because there is no single definition of the extent of the English Channel or clarity about the concept of the 'English Channel scale'. The definition of the English Channel is problematic and flexibility is required given that the scale varies depending on what is being considered, for example, an industrial sector, an ecosystem type or a recreational pursuit. There does not appear to be any one organisation willing to take on the task of designing a suitably flexible model to enable coordinated governance such as that required by the EA.

There are no formal participative processes across the English Channel supporting governance at this scale. There is a need for stakeholder engagement in marine governance but it is not clear how this can be facilitated for the English Channel, or indeed other international marine areas, within the existing systems.

The collaborative activity which does exist is driven from the 'bottom up' and it is clear that any impetus for change is also going to come from local and sectoral participants in the governance hierarchy as there appears to be no enthusiasm for integration at a national level. The existing series of Cross Channel Forum meetings has supported the development of a strategy for the English Channel but this must be seen as a first step which requires the backing of regional and national actors to implement a coherent governance system.

Acknowledgements

This work for this article was supported by INTERREG IVa funding for the CAMIS and PEGASEAS projects which the authors gratefully acknowledge. The authors would like to thank the participants at all the Cross Channel Forums for their contributions to the workshops.

References

- Anguera, R., 2006. The channel tunnel – an ex post economic evaluation. *Trans. Res. Part A: Policy Pract.* 40 (4), 291–315.
- Baird, A.J., 2002. The economics of container transshipment in northern Europe. *Int. J. Maritime Econ.* 4 (3), 249–280.
- Ballinger, R., Stojanovic, T., 2010. Policy development and the estuary environment: a Severn Estuary case study. *Mar. Pollut. Bull.* 61, 132–145.
- Beaumont, N.J., Austen, M.C., Mangi, S.C., Townsend, M., 2008. Economic valuation for the conservation of marine biodiversity. *Mar. Pollut. Bull.* 56, 386–396.
- Bergmann, A., Hanley, N., Wright, R., 2006. Valuing the attributes of renewable energy investments. *Energy Policy* 34 (9), 1004–1014.
- Borja, A., Elliott, M., Carstensen, J., Heiskanen, A.-S., van der Bund, W., 2010. Marine management – towards an integrated implementation of the European marine strategy framework and the water framework directives. *Mar. Pollut. Bull.* 60, 2175–2186.
- Boyes, S., Elliott, M., 2015. The excessive complexity of national marine governance systems – has this decreased in England since the introduction of the Marine and Coastal Access Act? *Mar. Policy* 51, 57–65.
- Buléon, P., Shurmer-Smith, L., 2007. Channel spaces; a world within Europe. Espace Manche Development Initiative, INTERREG IIIB, NW Europe, Haut-Normandie Region, Rouen, France.
- CAMIS, 2013a. Integrated Strategy for the Channel Region: A Plan for Action. October 2013, p. 74. <<https://camis.arcmanche.eu/>>.
- CAMIS, 2013b. The Risk of Marine Pollution in the Channel. November 2013, p. 25. <<https://camis.arcmanche.eu/>>.
- CBD, 1998. Ecosystem approach: further conceptual elaboration. SBSTTA 5 Recommendation V/10 of the Convention on Biological Diversity. <<http://www.cbd.int/ecosystem/background.shtml>> (accessed 29.07.14).
- ChannelMOR, 2014. INTERREG IVa funded cluster project. <http://www.interreg4a-manche.eu/index.php?option=com_sobi2&sobi2Task=sobi2Details&catid=3&sobi2Id=3174&Itemid=39&lang=en> (accessed 13.12.14).
- CRB, 2008. For the durable development of the Breton Coastal Region: The Brittany Coast Charter. Conseil Region de Breton, Rennes, p. 52.
- Curtin, R., Prelezo, R., 2010. Understanding marine ecosystem based management: a literature review. *Mar. Policy* 34, 821–830.
- Dauvin, J.-C., 2012. Are the eastern and western basins of the English Channel two separate ecosystems? *Mar. Pollut. Bull.* 64, 463–471.
- Ducrotot, J.-P., Elliott, M., 1997. Interrelations between science and policy-making: the North Sea. *Mar. Pollut. Bull.* 34, 686–701.
- EC, 2001. European governance – a white paper, 428 – final. Official Journal of the European Commission, C 287, pp. 1–29.
- EC, 2013. Communication from the Commission to the European Parliament, the council, the European economic and social Committee and the committee of the regions – Action Plan for a Maritime Strategy in the Atlantic area Delivering smart, sustainable and inclusive growth. COM (2013) 279 final.
- EC, 2014. Communication from the Commission to the European Parliament, the council, the European economic and social Committee and the committee of the regions on action needed to deliver on the potential of ocean energy in European seas and oceans by 2020 and beyond. COM (2014) 8 final.
- Ehler, C., Douvère, F., 2009. Marine Spatial Planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53, ICAM Dossier No. 6. Paris: UNESCO.
- Elliott, M., Boyes, S., Burdon, D., 2006. Integrated marine management and administration for an island state – the case for a new Marine Agency for the UK. *Mar. Pollut. Bull.* 52, 469–474.
- EU, 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive; MSFD).
- EU, 2014. Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning (Maritime Spatial Planning Directive; MSPD).
- Fletcher, S., 2003. Stakeholder representation and the democratic basis of coastal partnerships in the UK. *Mar. Policy* 27, 229–240.
- Fletcher, S., Jefferson, R., McKinley, E., 2012. Exploring the shallows: a response to 'Saving the shallows: focusing marine conservation where people might care'. *Aquat. Conservation: Mar. Freshwater Ecosyst.* 22 (1), 7–10.
- Fletcher, S., Jefferson, R.L., Glegg, G., Rodwell, L., Dodds, W., 2014. England's evolving marine and coastal governance framework. *Mar. Policy* 45, 261–268.
- Galparsoro, I., Borja, A., Uyarra, M.C., 2014. Mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean. *Front. Mar. Sci.* 1 (23). <http://dx.doi.org/10.3389/fmars.2014.00023>.
- Gaymer, C.F., Stadel, A.V., Ban, N.C., Carcamo, P.F., Ierna Jr., J., Liebknecht, L.M., 2014. Merging top-down and bottom-up approaches in marine protected areas planning: experiences from around the globe. *Aquat. Conservation: Mar. Freshwater Ecosyst.* 24 (Suppl. 2), 128–144.
- Glegg, G.A., 1994. What's the point of monitoring? The issues surrounding the 1993 North Sea quality status report. *North Sea Monit.* 12 (2), 16–18.
- Haigh, I., Nicholls, R., Wells, N., 2011. Rising sea levels in the English Channel 1900 to 2100. *Maritime Eng.* 164, 81–92.
- Hughes, T.P., Bellwood, D.R., Folke, C., Steneck, R.S., Wilson, J., 2005. New paradigms for supporting the resilience of marine ecosystems. *Trends Ecol. Evol.* 20 (7), 380–386.

- ICZM, 2002. Recommendation of the European Parliament and of the Council of 30 May 2002 concerning the implementation of Integrated Coastal Zone Management in Europe. Official Journal L 148, 06/06/2002 P. 0024–0027.
- IMO, 2014. <<http://www.imo.org/About/Pages/Default.aspx>> (accessed 29.07.14).
- Inger, R., Attrill, M.J., Bearhop, S., Broderick, A.C., Grecian, J., Hodgson, D.J., Mills, C., Sheehan, E., Votier, S.C., Witt, M.J., Godley, B.J., 2009. Marine renewable energy: potential benefits to biodiversity? An urgent call for research. *J. Appl. Ecol.* 46 (6), 1145–1153.
- Ireland, M., 1998. What is Cornishness? The implications for tourism. *Tourism Cult. Commun.* 1 (1), 17–26.
- Jefferson, R.L., Bailey, I., Laffoley, D.d'A., Richards, J.P., Attrill, M.J., 2014. Public perceptions of the UK marine environment. *Mar. Policy* 43, 327–337.
- Jenkins, G.J., Murphy, J.M., Sexton, D.M.H., Lowe, J.A., Jones, P., Kilsby, C.G., 2009. UK Climate Projections: Briefing Report. Met Office Hadley Centre, Exeter, UK, p. 56.
- Jones, J., Irish, R., 2001. Monitoring and surveillance of non-radioactive contaminants in the aquatic environment and activities regulating the disposal of wastes at sea, 1998. Aquatic Environment Monitoring Report no. 53. CEFA, Lowestoft, UK, p. 75.
- Kelly, C., Essex, S., Glegg, G., 2012. Reflexive practice for marine planning: a case study of marine nature based tourism partnerships. *Mar. Policy* 36, 769–781.
- Langston, W.J., Pope, N.D., Davey, M., Langston, K.M., O'Hara, S.C.M., Gibbs, P.E., Pascoe, P.L. 2015. Recovery from TBT pollution in English Channel environments: A problem solved? *Mar. Pollut. Bull.* 95, 551–564.
- Loveluck, C., Tys, D., 2006. Coastal societies, exchange and identity along the Channel and southern North Sea shores of Europe AD 600–1000. *J. Maritime Archaeology* 1 (2), 140–169.
- MCAA, 2009. Marine and Coastal Access Act. London, UK Government.
- McCellan, C.M., Godley, B.J., 2012. Action 1 Data inventory. Compilation and treatment of marine mega-vertebrate and oceanographic datasets. University of Exeter, Penryn, p. 100.
- McCellan, C.M., Brereton, R., Dell'Amico, F., Johns, D.G., Cucknell, A.-C., Patrick, S.C., Penrose, R., Ridoux, V., Solandt, J.-L., Stephan, E., Votier, S.C., Williams, R., Godley, B.J., 2014. Understanding the distribution of marine megafauna in the English Channel region: identifying key habitats for conservation within the busiest seaway on Earth. *PLoS One* 9 (2), 1–16.
- MERiFIC, 2014. Strategic and economic study on the development of marine renewable energies in Brittany and Cornwall. A report prepared as part of the MERiFIC project "Marine Energy in Far Peripheral and Island Communities" April 2014. INTERREG IVA, p. 85.
- MPS, 2011. UK Marine Policy Statement. The Stationary Office, London, p. 51.
- Mueller, M., Wallace, R., 2008. Foresight sustainable energy management and the built environment project: enabling science and technology for marine renewable energy. *Energy Policy* 36 (12), 4376–4382.
- Natura 2000, 2007. Guidelines for the establishment of the Natura 2000 network in the marine environment. Application of the Habitats and Birds Directives. <http://ec.europa.eu/environment/nature/natura2000/marine/index_en.htm> (accessed 28.07.14).
- Oslo, 1989. A review of sewage sludge disposal at sea. Oslo Commission, London, p. 84.
- OSPAR Convention, 1992. The Convention for the protection of the marine environment of the North-East Atlantic. <http://www.ospar.org/content/content.asp?menu=0148120000000_000000_000000> (accessed 05.03.2015).
- OSPAR, 2009. Assessment of the impact of shipping on the marine environment. Monitoring and Assessment Series. OSPAR Commission, London, p. 34.
- PBO, 2009. New traffic separation scheme for Lands End. Practical Boat Owner, 28 January 2009. <<http://www.pbo.co.uk/news/405923/new-traffic-separation-scheme-for-lands-end>> (accessed 23.07.14).
- PEGASEAS, 2014. In: Petit, L., Carpenter, A (Eds.), Towards Better Governance of the Channel Ecosystem. Report from the Promoting Effective Governance of the Channel Ecosystem Project. <www.pegaseas.eu> (accessed 29.07.14).
- PISCES, 2014. Partnerships Involving Stakeholders in the Celtic Sea Ecosystem. PISCES is an EC LIFE + project delivered with the contribution of the LIFE financial instrument of the European Community. Project number: LIFE07/ENV/UK/000943. <<http://www.projectpisc.es>> (accessed 29.07.14).
- Raakjaer, J., Van Leeuwen, J., Van Tatenhove, J., Hadjimichael, M., 2014. Ecosystem-based marine management in European seas calls for nested governance structures and coordination – a policy brief. *Mar. Policy*. <http://dx.doi.org/10.1016/j.marpol.2014.03.007>.
- Ramsar Convention, 1974. The Convention on Wetlands. <<http://www.ramsar.org/about/the-ramsar-convention-and-its-mission>> (accessed 05.03.2015).
- Rees, S.E., Rodwell, L.D., Attrill, M.J., Austen, M.C., Mangi, S.C., 2010. The value of marine biodiversity to the leisure and recreation industry and its application to marine spatial planning. *Mar. Policy* 34, 868–875.
- Rendle, E., Davidson, M., 2013. An evaluation of the physical impact and structural integrity of a geotextile surf reef. *Coast. Eng. Proc.* 1 (33), 1–21.
- Revill, A.S., Broadhurst, M.K., Millar, R.B., 2013. Mortality of adult plaice, *Pleuronectes platessa* and sole, *Solea solea* discarded from English Channel beam trawlers. *Fish. Res.* 147, 320–326.
- Rhodes, R.A.W., 1996. The new governance: governing without governance. *Polit. Stud.* XLIV, 652–667.
- Ruiz de Alegria-Arzaburu, A., Masselink, G., 2010. Storm response and seasonal morphological change on a gravel beach, Slapton Sands, UK. *Mar. Geol.* 278, 77–99.
- Sands, P., 2003. Principles of International Law, second ed. Cambridge University Press, Cambridge, UK, p. 1116.
- Shields, M.A., Woolf, D.K., Crist, E.P.M., Kerr, S.A., Jackson, A.C., Harris, R.E., Bell, M.C., Beharie, R., Want, A., Osalusi, E., Gibb, S.W., Side, J., 2011. Marine renewable energy: the ecological implications of altering the hydrodynamics of the marine environment. *Ocean Coast. Manag.* 54 (1), 2–9.
- Skinner, J., Bailly, D., Le Coz, M., Dodds, W., Fletcher, S., Glegg, G., Glenn, H., Herry, L., Molfese, C., Sewell, J., McQuatters-Gollop, A. 2014. Pathways for effective governance of the English Channel. Sir Alister Hardy Foundation for Ocean Science, Plymouth, UK, p. 50.
- Smith, H., 2000. The industrialisation of the world ocean. *Ocean Coast. Manag.* 43, 11–28.
- Squire, D., 2003. The hazards of navigating the Dover Strait (Pas-de-Calais) traffic separation scheme. *J. Navigation* 56, 195–210.
- Suarez de Vivero, J.L., Rodriguez Mateos, J.C., 2014. Changing maritime scenarios. The geopolitical dimension of the EU Atlantic Strategy. *Mar. Policy* 48, 59–72.
- Tappin, A.D., Millward, G.E., 2015. The English Channel: Contamination status of its transitional and coastal waters. *Mar. Pollut. Bull.* 95, 529–550.
- VALMER, 2014. Valuing Ecosystem Services in the Western Channel. VALMER is co-funded by the INTERREG IV A Channel programme. <<http://www.valmer.eu/about/>>.
- West, J., Bailey, I., Winter, M., 2010. Renewable energy policy and public perceptions of renewable energy: a cultural theory approach. *Energy Policy* 38 (10), 5739–5748.