



WORKING TOWARDS PRODUCTIVE SEAS: A COMPARATIVE ANALYSIS OF THE MARINE MANAGEMENT REGIMES UNDER UK AND SCOTTISH LAW

*Danielle Lowther*¹

Abstract

This research presents a comparative analysis of the marine management regimes under the Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010. In light of the vision shared by both administrations to achieve 'clean, healthy, safe, productive and biologically diverse oceans and seas', the research focuses upon the tension between achieving 'productivity' in the marine area and ensuring the sustainable use of marine resources. In particular, it examines the differences in the way in which productivity is defined and measured under each regime, and provides a consideration of the extent to which an appropriate balance is struck between the social, economic and environmental aspects of those definitions: key indicators of sustainability.

Keywords: marine environment, sustainability, renewable energy

Introduction

The oceans are a vital component of life on earth. They are central to climate cycles, redistributing heat via ocean currents and holding more than 40 times the amount of carbon stored in the atmosphere.² The marine environment is host to a significant proportion of the planet's species, with over 44,000 species in UK waters alone.³ More than half of the world's population live within 60km of the coast⁴ and the oceans provide us with around 50% of our natural gas and 30% of our crude oil.⁵ Despite increasing understanding of the impact that

¹ Danielle is pictured after receiving the Gard & Co. Solicitors Prize for the Best Law Graduate and the Plymouth Law Society Prize for Best Student on Lawyers Skills with Phil Thorneycroft, president of the Plymouth Law Society. She is currently teaching law at Plymouth University International College and is preparing a proposal to study for a PhD. Her email address is danielle.lowther@plymouth.ac.uk

² Patterson, M., 'Towards an ecological economics of the oceans and coasts' in Glavovic, B., and Patterson, M., *Ecological Economics of the Oceans and Coasts*, (2008), p.2.

³ DEFRA, *Safeguarding our Seas: A Strategy for the Conservation and Sustainable Development of the Marine Environment* (2002)

http://archive.defra.gov.uk/environment/marine/documents/marine_stewardship.pdf p. 5

⁴ Ibid.

⁵ Patterson, 'Towards an ecological economics of the oceans and coasts', p.3.

human activity has on the marine environment, the oceans have historically been of secondary importance.⁶ It is argued that:

too often individual government decisions at all levels are made for short-term financial or political benefit... often premised on the promised benefits of ever-increasing levels of production, consumption and unbridled economic growth.⁷

The interrelationship between productivity and economic growth, and managing its impact upon the marine environment is a source of tension for marine managers. There is a significant threat to the long term health of marine ecosystems where the marine area is developed beyond its threshold for recovery in pursuit of economic gains. As sea levels rise⁸ and the impacts of climate change, pollution and over-development threaten to substantially deteriorate marine ecosystems,⁹ the pressure on governments to implement sustainable methods of marine management in order to reduce these impacts is increasing.

In 1987, the World Commission on Environment and Development (WCED) defined sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.¹⁰ The vision of 'clean, healthy, safe, productive and biologically diverse oceans and seas'¹¹ (The Vision) has evolved out of the principle of sustainable development and is shared by the United Kingdom government and each of the devolved administrations, including the Scottish Executive. This Vision has been a key driver for new primary legislation in the UK and Scotland:¹² the Marine and Coastal Access Act 2009 (MCAA) and the Marine (Scotland) Act 2010 (MSA).

The new legislative regimes are designed to reform the way in which the marine environment in their respective jurisdictions is managed, and both are intended to place the concept of sustainable development at the heart of marine policy.¹³ However, whilst the

⁶ Kenchington, R., *Managing Marine Environments*, (1990) p.2.

⁷ Ross, A., 'The case for a Sustainable Development Act', (2011) 143 *Scottish Planning and Environmental Law* at p.10.

⁸ National Environment Research Council, *The Rise and Rise of the Sea* (2010)

<http://www.nerc.ac.uk/publications/planetearth/2010/winter/win10-rise.pdf>

⁹ Marine Ecosystems at risk from climate, pollution: UN, *Reuters*, 19 October 2010,

<http://www.reuters.com/article/2010/10/19/us-biodiversity-seas-idUSTRE69I2P620101019>

¹⁰ World Commission on Environment and Development, *Our Common Future: Report of the World Commission on Environment and Development* (June 1987, A/42/427) <http://www.un-documents.net/ocf-02.htm#> at chapter 2, para. 1

¹¹ DEFRA (2002).

¹² In this study, reference to the UK marine area is to those areas that are not devolved for the purposes of the MCAA. Unless otherwise stated, this is the inshore and offshore waters up to 200nm around the English coast and all other waters seaward of the territorial limits. Reference to the Scottish marine area is that which is set out in s.1(1) MSA, which is the sea up to 12nm adjacent to Scottish land.

¹³ See, for example, HM Government, *UK Marine Policy Statement*, (March 2011), <https://www.gov.uk/government/publications/uk-marine-policy-statement> at para 2.1.

principle of sustainability is arguably intrinsic to achieving clean, healthy, safe and biologically diverse seas, productivity can, and often does, exist in isolation from sustainable principles. The WCED recognised that ‘high levels of productive activity... can endanger the environment’¹⁴ and, as the British economy struggles through a recession and the Scottish government pushes for independence, there is a risk that truly sustainable strategies for achieving productivity may be rejected in favour of economic progress and politically popular policies in both regimes. The resultant activities could significantly deteriorate the quality of marine ecosystems and their ability to recover from anthropogenic impacts. Inevitably, this outcome would reduce the intrinsic value of the marine environment as well as its capacity to provide the resources that are vital to human life in the long term. Consequently, the way in which productivity has been interpreted in each regime will become a crucial factor in the long term success of The Vision.

This article will explore the extent to which the definition of productivity adopted in each regime has remained true to the sustainable principles that were placed at the heart of The Vision. It will first set out the drivers behind The Vision, the MCAA and the MSA, which will enable an identification of the obligations that are common to both regimes. It will then explore the development of the working definition of productivity currently adopted by both regimes, and offer an alternative definition based upon a balance of social, economic, and environmental considerations, and within a framework of international and European obligations.

1 The Legislative Background to the MCAA and the MSA

The UK marine area¹⁵ is far greater than that of its land mass¹⁶ and it is estimated that around 70% of the area under UK control is seas.¹⁷ The social, environmental and economic value of such a vast resource cannot simply be defined in monetary terms. Our understanding of marine ecosystems is still far from complete¹⁸ and what we do not know about our marine resources may be as valuable to us as what we do know. It is suggested that up to half of the UK’s biodiversity may be found in UK waters¹⁹, and protecting these species whilst building upon the gaps in our scientific knowledge has a value that cannot be directly measured in terms of its monetary worth. Furthermore, human recreational activities

¹⁴ WCED (1987) at Chapter 2, para. 6

¹⁵ The UK marine area consists of the territorial seas which extend up to 12nm from the ‘baseline’ and the Exclusive Economic Zone (EEZ), which extends to 200nm, as prescribed in Art.55 and 57 UNCLOS.

¹⁶ Slater, A., ‘What is marine spatial planning’, (2012) 14(1) *Environmental Law Review* p.1.

¹⁷ Not including overseas territories: JNCC, ‘Marine’, <http://jncc.defra.gov.uk/page-3>

¹⁸ DEFRA (2002) at para.1.3.

¹⁹ *Ibid.*

may be carried out in the marine area that have some associated economic value but also carry a qualitative value pertaining to a person's enjoyment and/or physical wellbeing which results from that activity. Therefore, any marine management system that relies too heavily on achieving productivity by taking into account only the economic worth of an activity or area risks underestimating the true extent of the value that the marine environment has, both intrinsically and to society.

It may also be noted that 'marine areas' as defined by legislation consist of abstract boundaries that are imposed for the practical benefit of marine managers. However, the geographical boundaries of marine ecosystems are not stable; instead, the ocean may be described as one large ecosystem made up of an array of smaller ecosystems which are interconnected 'via energy, nutrient and material pathways'.²⁰ For this reason, marine managers must take into account the complexity of biological communities that exist within a moving water mass,²¹ whilst balancing 'the diversity and increasing variety of interests and users of the marine and coastal areas'.²²

Drivers for change

The UK marine management regime that existed before 2010²³ was complex and fragmented, and the system received criticism on a number of fronts. First, the sectoral approach meant that there was no overarching body responsible for implementing a wider sustainable agenda across all activities impacting upon the marine environment, which posed a significant threat to the achievement of The Vision.²⁴ Second, the lack of cohesion in the system created difficulties for potential developers, particularly within the emerging offshore renewables sector. For example, it was noted that in 2003 seven separate consents would need to be obtained for the development of a wind farm in English territorial waters.²⁵ This has been found to have adversely affected the rate of development in the marine area and, consequently, the achievement of renewable energy targets.²⁶ Third, there were some areas in which an applicable regulatory framework simply did not exist; a legislative deficit

²⁰ Vallega, A., *Sustainable Ocean Governance: A Geographical Perspective*, (2001) p.47.

²¹ Kenchington, *Managing Marine Environments*, at pp.28-29.

²² Slater, A., 'What is marine spatial planning', (2012) pp.4-5.

²³ The Marine Management Organisation has been effective from 1 April 2010.

²⁴ See, for example, Kidd, S., et al., 'The ecosystem approach and planning and management of the marine environment' in Frid, C., et al., *The Ecosystem Approach to Marine Planning and Management*, (2011), pp.3-4.

²⁵ Plant, G., 'Offshore wind energy development: the challenges for English law' (2003) Aug *Journal of Planning and Environmental Law* p.945.

²⁶ Gibson, A., and Howsam, P., 'The legal framework for offshore windfarms: a critical analysis of the consents process' (2010) p.2.

had been observed seaward of the territorial waters, partly as a result of the failure of the UK government to fully claim its rights within the EEZ.²⁷

In addition to these perceived issues within the domestic marine management system, the UK was under growing pressure to initiate change from both EU and international sources of law. UNCLOS is deemed to provide 'the legal basis for the protection and sustainable development of the marine environment',²⁸ and it is expected to play a central role in a global development agenda focused on sustainable resource use.²⁹ Under the OSPAR Convention,³⁰ the UK is committed to producing an ecologically coherent network of marine protected areas in the North East Atlantic,³¹ and Annex V provides for 'the adoption of programmes and measures to assist management of human activities that can have an adverse impact on the marine environment.'³² The UK is also a signatory to the Convention on Biological Diversity (CBD), which entered into force on 29 December 1993. Significantly for the UK, the CBD promoted an ecosystems approach³³ to marine management, which was endorsed in the 2002 World Summit on Sustainable Development (WSSD).

Meeting these international commitments necessitated a fundamental review of the way in which UK waters were managed. The result was the 2002 report, *Safeguarding our Seas*,³⁴ in which The Vision was first set out. The report recognised the need to move away from traditional sectoral planning systems and to give consideration to the role that spatial planning could play in integrating the various aspects of marine management. The UK declared an intention to adopt an ecosystems approach at the 5th North Sea Conference in March 2002.

A number of EU policies and directives have also shaped the development of the regimes under the MCAA and MSA. For example, the EU Maritime Policy provides for the delivery of a thriving maritime economy in an environmentally sustainable manner,³⁵ and the Water

²⁷ Plant, 'Offshore wind energy development', pp.953-954.

²⁸ UKMMAS, *Charting Progress 2: Productive Seas Feeder Report* (2010), <http://chartingprogress.defra.gov.uk/productive-seas-feeder-report> at p.398,

²⁹ At General Assembly, Ban calls for universal commitment to 'constitution of the oceans', *UN News Centre*, 10 December 2012 <http://www.un.org/ga/61/news/news.asp?NewsID=43729>

³⁰ The Convention for the Protection of the Marine Environment in the North-East Atlantic entered into force on 25 March 1998.

³¹ Warren, L., 'New approaches to nature conservation in the UK', (2012) 14(1) *Environmental Law Review* at p.51.

³² UKMMAS, *Productive Seas Feeder Report* (2010) at p.399.

³³ Defined by the CBD as 'a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way', see <http://www.cbd.int/ecosystem/description.shtml>

³⁴ DEFRA, (2002).

³⁵ UKMMAS, *Productive Seas Feeder Report* (2010).

Framework Directive (WFD),³⁶ Habitats Directive³⁷ and Birds Directives³⁸ set environmental protection objectives for the marine environment.³⁹ Most significant, however, is the Marine Strategy Framework Directive (MSFD),⁴⁰ which prescribes that member states must apply an ecosystem based approach to marine management⁴¹ and further that Good Environmental Status (GES) must be achieved in the marine area by 2020. It defines GES as

the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations.⁴²

Whilst it leaves the implementation strategy to the discretion of each member state, the MSFD therefore creates a legally binding obligation to achieve productivity in a way that is sustainable. It has been incorporated into domestic law via the Marine Strategy Regulations (MSRs) 2010: an instrument which is likely to strongly influence both regimes, and which will consequently require further detailed analysis.

The new regimes

The MCAA and the MSA are the foundations of the new marine management regime in the UK. The purpose of the MCAA is to establish a new framework for managing the marine resources of the UK,⁴³ including a new regulation, protection, planning and licensing system which is to be undertaken by the Marine Management Organisation (MMO). The MMO is an executive non-departmental public body that has taken on the responsibilities of a number of government agencies and has been tasked with adopting a more holistic approach to marine planning in order to balance the competing marine interests in any given area. The MSA is intended to achieve The Vision by 'putting in place a new system for improved management and protection of the marine and coastal environment'.⁴⁴ The body responsible for performing this role is Marine Scotland, a directorate of the Scottish government. This raises concerns about the extent to which it is more susceptible to political pressure and whether its regulatory functions could be destabilised as a result.⁴⁵

³⁶ Directive 2000/60/EC OJ L327.

³⁷ Directive 92/43/EC OJ L206.

³⁸ Directive 79/409/EEC OJ L103.

³⁹ UKMMAS, *Productive Seas Feeder Report* (2010), p.399.

⁴⁰ Directive 2008/56/EC OJ L 164/19.

⁴¹ MSFD Article 1(3.)

⁴² MSFD Article 3(5).

⁴³ Slater, 'What is marine spatial planning', at p.3.

⁴⁴ JNCC, Marine (Scotland) Act, <http://jncc.defra.gov.uk/page=5263>

⁴⁵ The Scottish Government, *Analysis of Responses to the Public Consultation on The Scottish Marine Bill* (Jan 2009) <http://www.scotland.gov.uk/publications/2009/01/22160605/10>

The remit of both organisations in the marine area is not total: the Crown Estate issues leases as owner of the territorial seabed, and oil, gas and larger offshore renewable projects (above 100 megawatts) are managed by the Planning Inspectorate and the Department for Energy and Climate Change with the relevant statutory authority for consents in the Planning Act 2008.⁴⁶ Half of the wind farms currently in operation or under construction have a capacity under 100 megawatts and only three of the 29 wind projects under development fall within this limit.⁴⁷ The decision to split control over developments in this way has been criticised for threatening the aim of creating an integrated marine management system⁴⁸ and it appears that the role of the MMO in managing the development of offshore renewables will be limited as the capacity of sites increases.

The ecosystems approach to marine management

In order to fulfil the obligations under the MSFD, regulation 5(2) of the MSRs imposes a legal duty upon the UK and devolved administrations to adopt an ecosystems approach to marine management. Arguably this approach is more suitable than a sectoral approach in pursuit of The Vision because it encompasses the need to identify and measure all social, economic and environmental impacts of a development, in the short and long term.⁴⁹ Therefore, it enables decision makers to better allocate human use of the marine area within the context of environmental limits. The DEFRA defines an ecosystems approach as a 'generic framework for incorporating the holistic considerations of ecosystems services and their value into policy, plan and decision making'.⁵⁰ However, Regulation 5(4) defines it as an approach which:

ensures that the collective pressure of human activities within the marine strategy area is kept within levels compatible with the achievement of good environmental status; and does not compromise the capacity of marine ecosystems to respond to human-induced changes.

This definition is arguably narrower than the definition adopted by DEFRA in that it applies specifically in the context of achieving GES. In contrast, this obligation has not been directly incorporated into the MCAA or the MSA, and the concept of ecosystems is missing from the MCAA altogether. The Secretary of State has issued guidance to the MMO on its

⁴⁶ As amended by the Localism Act 2011.

⁴⁷ The Crown Estate, *Offshore Wind Report 2012*, (2012)

<http://www.thecrownestate.co.uk/media/297872/UK%20offshore%20wind%20report%202012.pdf>

⁴⁸ Reeds, J., 'Seas face legislative split' (11 April 2008)

<http://www.planningresource.co.uk/news/801416/Seas-face-legislative-split/?DCMP=ILC-SEARCH>

⁴⁹ Beaumont, N., et al., 'Identification, definition and quantification of goods and services provided by marine biodiversity: implications for the ecosystem approach', (2007) 54 *Marine Pollution Bulletin* p.253.

⁵⁰ DEFRA, *What Nature Can Do For You: A Practical introduction to making the most of natural services, assets and resources in policy and decision making*, (2010)

<http://archive.defra.gov.uk/environment/policy/natural-environ/documents/nature-do-for-you.pdf>

sustainable development objective⁵¹ under section 2(4) of the MCAA, in which it is stated that ‘the MMO should adopt an ecosystems approach in its decision making and development of operational policies’.⁵² However, under section 38(2) of the MCAA, the MMO need only ‘have regard’ to this guidance, and it is not compelled to follow it. This is a missed opportunity to ensure that marine ecosystems are placed at the heart of all MMO functions.⁵³

There is no clear argument to suggest why an ecosystem based approach would not be adopted by the MMO and Marine Scotland in practice; it is required for the purposes of the MSFD, and the requirement to achieve GES applies in all of the same waters as are included under the MCAA and the MSA. The adoption of any other approach alongside the ecosystems approach would therefore create inconsistency: a disadvantage which could have been avoided entirely if the obligation to adopt an ecosystems approach had been included in both statutes.

The role of sustainable development

Sustainable development is a core environmental principle that bridges the gap between human activity and the natural environment. It is gaining increasing recognition as a key principle of good governance, and there are calls for a Sustainable Development Act to create a legal duty upon all levels of government to operate sustainably.⁵⁴ The principle of sustainability is expressly recognised within both the MCAA and the MSA. Section 2(1) of the MCAA places the MMO under a general duty to ensure that its functions are exercised with the objective of ‘making a contribution to the achievement of sustainable development’. In doing so, the MMO is under a duty to take account of all relevant facts and matters, such as scientific evidence or other evidence relating to the environmental, social or economic elements of sustainable development.⁵⁵ This objective indicates that The Vision is not a starting point or a general objective itself, but instead it should be taken simply as one element of the overall UK approach to fulfilling a broader sustainable agenda under international obligations such as UNCLOS.⁵⁶

⁵¹ This objective will be discussed in detail in section 2.

⁵² DEFRA, *Statutory Guidance to the Marine Management Organisation on its contribution to the achievement of sustainable development*, (October 2010) http://www.marinemangement.org.uk/about/documents/sd_guidance.pdf at p.5.

⁵³ Appleby, T., and Jones, P., ‘The Marine and Coastal Access Act – A hornet’s nest?’, (2012) 36 *Marine Policy* p.74.

⁵⁴ Ross, A., ‘The case for a Sustainable Development Act’, (2011) pp.10-11.

⁵⁵ MCAA ss.2(1)(b) and 2(3).

⁵⁶ At General Assembly, Ban calls for universal commitment to ‘constitution of the oceans’, *UN News Centre*, 10 December 2012 <http://www.un.org/ga/61/news/news.asp?NewsID=43729>

Similarly, there is a general duty under section 3 of the MSA for the Scottish Ministers and public authorities to act 'in the way best calculated to further the achievement of sustainable development'. The Scottish Executive has previously been criticised for its failure to successfully integrate sustainable development into its law and policy making processes.⁵⁷ In particular, the specific drafting of the sustainable development provision included in section 3 has been described as a 'catch-all' clause that does not go far enough in addressing specific sustainable issues that are raised by any given Act.⁵⁸ However, the drafting of this obligation in the MSA is arguably more consistent with the intended ecosystems approach to marine management than the definition under the MCAA because it implies that a consideration of all of the relevant outcomes must be undertaken, and that the chosen approach must be the one which is most capable of furthering the achievement of sustainable development. In contrast, the duty upon the MMO under the MCAA is simply to *make a contribution*, with all factors being taken into account, which is a comparatively lesser obligation to fulfil.

This factor may be mitigated by the guidance document issued to the MMO on its contribution to the achievement of sustainable development under section 2(4) of the MCAA, against which the MMO can be held to account.⁵⁹ In contrast, the position of Marine Scotland as a Directorate of Scottish Government dictates that there is no such duty contained within the MSA and consequently less transparency in its approach to its duty under section 3 of the MSA. Despite the differences in the drafting of these provisions, it is argued that 'the fundamental existence of this general duty to achieve sustainable development does hint at an organisation, which has the capacity to consider environmental as well as economic goals'.⁶⁰ The legal commitment to sustainability in both regimes provides an implicit recognition of the importance of balancing competing interests in the marine area, which may open up the possibility of challenging MMO and MS decisions if these duties are not adequately fulfilled.

The new system is in its infancy and both legislative regimes appear to have taken great strides towards integrating the various aspects of marine management. The MMO and MS are now under pressure to make a significant contribution to the achievement of The Vision in the face of the current economic climate and with fast approaching deadlines for

⁵⁷ See, generally, Ross, A., 'Sustainable development in Scotland post devolution' (2006) 8(1) *Environmental Law Review* pp.6-32.

⁵⁸ *Ibid*, p.22.

⁵⁹ DEFRA, *Statutory Guidance to the MMO*, (2010).

⁶⁰ Appleby, T., and Jones, P., 'The Marine and Coastal Access Act', at p.74.

renewable energy targets.⁶¹ Both regimes have the potential to ensure that economic growth takes place within environmental limits by considering environmental, social and economic interests holistically. In practice, the extent to which this aspiration is achieved will depend upon the way in which productivity is defined and measured in each regime.

2 Productivity in Theory: Exploring the Interpretation of ‘Productive Seas’

The Vision for a ‘clean, healthy, safe, productive and biologically diverse’ marine area was jointly adopted in 2002 in *Safeguarding our Seas*.⁶² For it to be concluded that the UK marine area is productive, there needs to exist a clear and coherent definition of productivity in the marine context. Any such definition would assist the MMO and Marine Scotland in setting targets against which progress towards achieving productivity, and The Vision generally, could be measured, and could form a basis for the strategies that are implemented in pursuit of those targets. Most obviously, a definition could be incorporated into statute to make clear the intention of the legislature, and to set a legally binding obligation for those organisations responsible for managing the marine environment. This approach would echo the legal duty that already exists in both statutes to pursue sustainable development.⁶³ As a result of the numerous drivers that are common to the MCAA and the MSA, and the intention shared by both administrations to ensure consistency on a national scale, it should not be possible to observe wildly varying interpretations. Instead, there appears to have been an increasing emphasis on economic growth in both administrations, as demonstrated by the Scottish Executive Purpose to create ‘a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth’.⁶⁴

A working definition of ‘productive seas’

The UK Marine Monitoring and Assessment Strategy (UKMMAS) community was set up in order to provide evidential reports on progress towards achieving The Vision in the UK. In 2010, UKMMAS delivered *Charting Progress 2*, a comprehensive assessment of the state of the UK and Scottish marine area which included, for the first time, a report on the ‘productive

⁶¹ Under the 2009 Renewable Energy Directive, the UK is committed to producing 15% of its energy consumption from renewable sources by 2020 and the Scottish Executive has set an ambitious target to satisfy 100% of its electricity demand from renewable sources by 2020, 60% of which will come from offshore renewables, see, for example, http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx and <http://www.scotland.gov.uk/Publications/2011/08/04110353/3>

⁶² DEFRA, (2002).

⁶³ See above.

⁶⁴ The Scottish Government, *Our Purpose*, (2007)

<http://www.scotland.gov.uk/About/Performance/scotPerforms/purposes>

use⁶⁵ of the seas. The investigation into marine productivity was carried out by the Productive Seas Evidence Group (PSEG), which is a sub-group of the UKMMAS consisting of scientists and other experts who are deemed to have relevant expertise. Whilst *Charting Progress 2* includes an assessment of Scotland's marine area, Marine Scotland has also produced its own assessment in the form of a 'Marine Atlas'.⁶⁶ The Marine Atlas was prepared by the same contributing Scottish scientists as for *Charting Progress 2*⁶⁷, so that the evidence base for both documents is essentially the same.

Charting Progress 2 and the Marine Atlas were intended to inform future policy decisions relating to marine management under both regimes.⁶⁸ Consequently, the approach taken to the assessment of productivity in *Charting Progress 2* provides a valuable insight into what factors will be considered productive in pursuit of The Vision. As part of its general approach to assessing productivity, the PSEG offered a Working Definition of 'productive seas':

those socio-economic activities that use the marine environment's natural goods and services to produce outputs of other goods and services that are owned and can be exchanged for payment.⁶⁹

This definition is moulded from the Office for National Statistics' definition of 'Gross Domestic Produce' as the sum of all economic activity.⁷⁰ In contrast, Scotland's Marine Atlas does not offer any equivalent working definition. Its assessment is based on the premise that 'the seas have generated a significant amount of economic output and, on this basis, are a valuable asset to the future of the Scottish economy'.⁷¹ It places a value on human activities occurring within the marine area based upon Gross Value Added⁷² or, where this cannot be applied, it relies upon the assessments made in *Charting Progress 2*.

Despite the differences in assessment methodology, it is immediately apparent that in both regimes the interpretation of productivity is anthropocentric. The Working Definition specifically entails the use of the marine environment for a social or economic benefit and it

⁶⁵ UKMMAS, *Charting Progress 2: The State of UK Seas*, (2010) <http://chartingprogress.defra.gov.uk/resources> executive summary, p.xvii.

⁶⁶ The Scottish Government, *Scotland's Marine Atlas*, (March 2011) <http://www.scotland.gov.uk/Publications/2011/03/16182005/0>

⁶⁷ *Ibid.*, at ch.1.

⁶⁸ DEFRA, *Government Commentary on Charting Progress 2: The state of UK seas*, (2010) <http://webarchive.nationalarchives.gov.uk/20130123162956/http://chartingprogress.defra.gov.uk/Government-Commentary-on-Charting-Progress-2.pdf>

⁶⁹ UKMMAS, *Productive Seas Feeder Report* (2010) at p. 3

⁷⁰ *Ibid.*

⁷¹ The Scottish Government, *Scotland's Marine Atlas*.

⁷² Gross Value Added measures the contribution to the economy of each individual producer, industry or sector. See The Office for National Statistics, 'The Relationship Between Gross Value Added (GVA) and Gross Domestic Produce (GDP)', <http://www.ons.gov.uk/ons/guide-method/method-quality/specific/economy/national-accounts/gva/relationship-gva-and-gdp/gross-value-added-and-gross-domestic-product.html>

can be assumed that Marine Scotland would be prepared to accept the same, or a very similar, definition as a result of its approach in the Marine Atlas. Both documents also provide a final chapter relating to the role of education in improving the marine environment, yet both also refer to the economic value of education in order to assess the productivity of that sector. The economic focus of the definition has a clear practical benefit for the purpose of assessing the marine environment as it enables a precise numerical valuation to be placed upon various activities. It follows that an increase in the economic value of a marine area would therefore equate to an increase in the productivity of that area under this definition.

However, creating a definition to fit the availability of data and for the purpose of enabling simpler measurements is arguably unnecessarily narrow. Economic growth is inevitably a vital component of effective marine management; yet a definition which encompasses the social, environmental *and* economic aspects of productivity is more useful for implementing an integrated ecosystems approach. This is because it enables a consideration of the value of the marine environment as a whole, rather than the value of individual sectors. Similarly, this approach enables non-monetary values to be taken into account, whereas the current approach in *Charting Progress 2* considers only monetary values. This is particularly relevant if *Charting Progress 2* is to be used to form the basis of marine policy or to inform secondary legislation under the MCAA and MSA.

Furthermore, a narrow interpretation of productivity risks enabling marine managers to demonstrate artificial success which is based purely on economic growth, yet does not take into account whether that growth has been achieved sustainably. The opening statement of the PSEG feeder report to *Charting Progress 2* states that 'although we have begun measurements of sustainability we do not yet know how sustainable our use of the seas is overall'.⁷³ Measurements of sustainability are fundamental to the achievement of The Vision and arguably should therefore be incorporated into the Working Definition of 'productive seas'.

Productivity under the MCAA and the MSA

The MCAA is described as providing 'the legal mechanism to help ensure clean, healthy, safe, productive, and biologically diverse oceans and seas by putting in place a new system for improved management and protection of the marine and coastal environment'.⁷⁴ However, the MCAA makes no direct reference to The Vision, nor does it offer a precise

⁷³ UKMMAS, *Productive Seas Feeder Report*, at p.6.

⁷⁴ JNCC, 'UK Marine and Coastal Access Act 2009', <http://jncc.defra.gov.uk/page-5230>

definition of the concept of productivity. Consequently, there is no direct legal obligation upon the UK government, the MMO or any organisation specified under the MCAA to contribute to the achievement of The Vision. Similarly, the MSA does not make any direct reference to The Vision or to the concept of productivity so that Marine Scotland is also not under any legal obligation to contribute towards the achievement of The Vision.

Arguably, the absence of specific legal obligations in either regime significantly reduces the severity of any breach of an institution's obligations under The Vision generally, and in turn may make those breaches difficult to prove.⁷⁵ The Vision can therefore be described simply as an aspirational tool which, in itself, is legally unenforceable. In contrast, it is suggested that the lack of a precise definition of productivity in either statute reflects that the binding nature of legislation limits the extent to which policy makers are willing to take risks or implement more ambitious strategies.⁷⁶ The process of adopting an ecosystems approach to marine management is likely to be a learning curve and marine managers may need to take risks in response to changes in scientific understanding of the marine area without fear of a breach of legislative duty. Further, the legislative culture in the UK is described as preferring to leave decision makers with ample discretion to ensure flexibility,⁷⁷ so that institutions providing marine management services are not unnecessarily inhibited by legislative boundaries.

Such concerns may be indicative of a misunderstanding of the nature and extent of legal obligations. Both the MCAA and the MSA provided an opportunity to create an explicit legal duty upon institutions to *contribute* to the achievement of The Vision. This duty could have imposed a minimum threshold of expected activity rather than inhibiting the adoption of ambitious strategies. It may be suggested that achieving productivity is a matter of degree, as what is productive at one time or in one place may not be comparatively productive in another.⁷⁸ Enforcing a legal obligation to achieve productivity would likely encounter difficulties in practice due to this variety in applicable circumstances. Consequently, it may not be appropriate to set fixed statutory targets for demonstrating that The Vision has been achieved. However, this factor should not prevent the adoption of a legal obligation to take part in a process, as opposed to achieving a particular outcome,⁷⁹ as the process itself can

⁷⁵ Tanaka, Y., 'A Dual Approach to Ocean Governance: The Cases of Zonal and Integrated Management in international Law of the Sea', (2008) p. 229.

⁷⁶ Ross, A., 'It's time to get serious – why legislation is needed to make sustainable development a reality in the UK' (2010) 2 *Sustainability* p.1116.

⁷⁷ *Ibid.*, p.1110.

⁷⁸ Barnes, R., 'Some cautions about integrated oceans and coastal management?' (2006) 8(4) *Environmental Law Review* p.253.

⁷⁹ *Ibid.*

provide the regulator with the requisite flexibility to adopt appropriate strategies and targets. This, in turn would ensure that the process contributes to the achievement of The Vision, and continues to sustain it once it has been achieved.

A failure to provide a legal definition is not always fatal to the effective implementation of policies. A successful model often adopted by the UK is a legal obligation to provide a strategy which includes a relevant definition, as opposed to including the definition in the legislation itself.⁸⁰ The provision that most closely fits this model is section 44 of the MCAA, which provides for the preparation of a Marine Policy Statement (MPS). The purpose of the MPS is to provide 'the framework for preparing Marine Plans and taking decisions affecting the marine environment',⁸¹ and it has been adopted jointly by the central UK government and each of the devolved administrations. Both the MMO and Marine Scotland have a legal duty to ensure that marine plans conform to the MPS unless relevant considerations indicate otherwise, as under section 51(6) of the MCAA and section 6(1) of the MSA respectively. Despite the centrality of the MPS to the planning frameworks adopted by Marine Scotland and the MMO, there is no legal obligation to offer any definition of the concept of productivity in the context of the marine area. Consequently, the MPS itself does not offer a definition, or even an exploration, of productivity. This is arguably a missed opportunity to establish explicitly the link between the functions of marine management organisations and the way in which they should contribute to each component of The Vision.

The concept of productivity in the context of The Vision

Safeguarding our Seas explored The Vision and marine productivity at a conceptual level only. It considered the threats facing the marine environment and the role that The Vision was intended to play in addressing and minimising those threats. Significantly, *Safeguarding our Seas* recognised that there is a tension between the human need to exploit marine resources and the need to protect and conserve the intrinsic value of marine ecosystems.⁸² Accordingly, it may be argued that any definition of productivity should account for a balance of the competing interests in the marine area, and arguably should not weight too heavily in favour of human needs to the detriment of the natural marine environment. The Working Definition is balanced very heavily in favour of economic factors, and therefore does not reflect the requisite balance identified in *Safeguarding our Seas*. However, this tension appears to be explicitly recognised under the MCAA, where there is a duty upon the MMO when exercising its functions to take into account relevant factors, including environmental,

⁸⁰ Ross, 'It's time to get serious' at p.1110.

⁸¹ HM Government, *UK Marine Policy Statement*, (March 2011).

⁸² DEFRA (2002) at para 1.15.

social and economic considerations under section 2(3). In contrast the general duty upon Marine Scotland under section 3 of the MSA includes acting in a way best calculated to protect and, where appropriate, enhance the health of the Scottish Marine area. Consequently, Marine Scotland need only consider the protection and health of the Scottish marine area in order to fulfil its legal duty, and there is no explicit legal obligation to consider social or economic factors under this provision.

The achievement of The Vision and its relationship to sustainable development as set out in *Safeguarding our Seas* can be described as circular. The document suggests that sustainable practices will facilitate the achievement of The Vision, whilst The Vision is a key component of ensuring the sustainable use of our marine area as a whole. Further, the elements of The Vision are not mutually exclusive, but are interdependent, so that achieving productivity should not hamper the achievement of clean, healthy, safe or biologically diverse seas. Despite these factors, the Working Definition of productive seas does not provide any recognition of sustainable principles at all.

Perhaps due to its broad, conceptual nature, *Safeguarding our Seas* did not attempt to offer any definitive explanation of what is meant by productivity in the marine area. The waters around the UK were described as 'incredibly diverse and productive',⁸³ and brief examples of food, trade, employment, energy and diversity of species were given in support. This lack of specificity provides scope for the UK and Scottish administrations to generate inconsistent definitions of productivity, and creates uncertainty for marine stakeholders when dealing with UK waters on a national scale. Consistency on a national scale is likely to be particularly relevant in regions such as the Solway Firth marine area, where it is intended that there will be cross-border cooperation in preparing a marine plan.⁸⁴ Similarly, developers could encounter uncertainty in the Scottish offshore region where Scottish Ministers carry out devolved functions such as marine planning under section 50(2)(c) MCAA, whilst reserved functions such as the licensing of oil and gas sites⁸⁵ are carried out by the central UK government.

Productivity in the High Level Marine Objectives

The importance of ensuring a degree of consistency on a national level was emphasised in the High Level Marine Objectives (The Objectives) set out in 2009 in a joint Government

⁸³ DEFRA, (2002) at para.1.2.

⁸⁴ HM Government, *UK Marine Policy Statement*, (2011), at para1.2.

⁸⁵ Reserved under Schedule 5 of the Scotland Act 1998, as in s. 113 MCAA.

document: *Our Seas – A Shared Resource*.⁸⁶ The Objectives evolved out of The Vision and are intended to act as a set of outcomes for marine governors to consider when drafting marine management legislation and policies. They are arranged under five headings: achieving a sustainable marine economy; ensuring a strong, healthy and just society; living within environmental limits; promoting good governance; and using sound science responsibly.

Whilst The Objectives offer no precise definition of productivity in the marine context, they do provide further insight into the types of activities that are considered 'productive' and there is an emphasis on anthropocentric, economically productive activities. The first High Level Objective is to achieve a sustainable marine economy, under which 'the marine environment and its resources are used to maximise sustainable activity, prosperity and opportunities for all, now and in the future'.⁸⁷ However, it is important that it is read within the context of the other Objectives. In particular, achieving a sustainable marine economy should be read within the context of The Objective of living within environmental limits. This Objective emphasises the importance of promoting conservation and biodiversity, as well as ensuring that marine habitats are healthy and resilient, and occur across their natural range.⁸⁸

In relation to the task of balancing The Objectives, *Our Seas* states that 'we recognise that individual decisions may have a negative impact on the achievement of some of our objectives – truly sustainable development will require difficult choices'.⁸⁹ This statement emphasises the need for a holistic approach to marine management: if the balance is struck too heavily in favour of any particular Objective, there is a risk that, in practice, individual difficult choices will consistently be made to the detriment of other Objectives. This may be a concern in cases involving marine developments where political and economic factors may create overwhelming pressure to disregard environmental considerations for the purposes of making short term economics gains or winning political popularity.⁹⁰ For example, the Scottish Executive has set an ambitious target to generate 100% of its energy demand from renewable sources by 2020, a vast proportion of which is to be achieved through the installation of offshore wind farms. This target reflects the fact that energy issues are central to the Scottish National Party's independence agenda.⁹¹ However, in October 2012 it was

⁸⁶ DEFRA, *Our Seas – A Shared Resource: High Level Marine Objectives*, (2009) <http://archive.defra.gov.uk/environment/marine/documents/ourseas-2009update.pdf>

⁸⁷ *Ibid*, p.6.

⁸⁸ *Ibid*, p.7.

⁸⁹ DEFRA, *High Level Marine Objectives*, (2009) at p 4.

⁹⁰ Ross, 'The case for a Sustainable Development Act', p.10.

⁹¹ Independence: a driving force in renewable energy, *SNP*, 24 January 2013

<http://www.snp.org/media-centre/news/2013/jan/independence-driving-force-renewable-energy>

suggested that environmentally sensitive marine sites are at risk of being subjected to large scale developments due to the delay in producing Scottish Government guidance in the form of a National Marine Plan,⁹² which puts The Objective of living within environmental limits at risk.

The precise mechanism by which The Vision and consequently The Objectives should be achieved is inevitably to be determined by each administration, which leaves open the risk that the marine management legislation itself has been developed as a result of popular consensus and consequently is formulated on political suitability rather than environmental ideals.⁹³ The Scottish Executive recognised the difficulty of creating an enduring legislative framework in 2007 in relation to its climate change agenda, when the Scottish Climate Change Minister stated that:

it is vital we ensure a broadly based consensus which transposes geography, politics and the whole of society. The decisions we take now must be deliverable for future generations.⁹⁴

This statement indicates that it would be unrealistic to legislate in a manner that ignores the fact that politically emotive issues such as the recession are likely to significantly alter the short term priorities of any given administration, which is ultimately accountable to the electorate. Therefore, in order for a legislative framework to be successful and capable of longevity, it appears to require not only clarity, coherence and enforceability, but it must also remain flexible and realistic in order to avoid repeal or significant amendments. In the context of achieving productivity, this poses a particular challenge for each administration as the most economically productive activities are often the most environmentally destructive.⁹⁵ For this reason, sustainable development policies must incorporate both ecological and economic sustainability.⁹⁶ This factor needs to be better reflected in the Working Definition in order to ensure the success of each marine management framework.

⁹² Fear planning limbo putting marine environment at risk, *Herald Scotland*, 11 October 2012 <http://www.arden.eveningtimes.co.uk/news/home-news/fear-planning-limbo-putting-marine-environment-at-risk.19126841>

⁹³ Carter, R.W.G., *Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines*, (1988) p.356.

⁹⁴ Climate Change Discussions, *The Scottish Government*, 18 June 2007, <http://www.scotland.gov.uk/News/Releases/2007/06/19080606>

⁹⁵ See, for example, Patterson, M., (2008), at p. 3-5, where factors such as the growth of coastal populations and consequent port developments are suggested to contribute to the loss of habitats and biodiversity.

⁹⁶ Vallega, *Sustainable Ocean Governance*, p.50.

Productivity in the Marine Strategy Framework Directive

In order to achieve productivity in the marine area in a way that incorporates both economic and ecological sustainability and thus enables each of the High Level Marine Objectives to be fulfilled, a definition of productivity should incorporate the intrinsic value of the marine environment. The basis for such a definition can be found within the requirement to achieve GES by 2020 under the MSFD, which includes the requirement that oceans and seas are 'productive within their intrinsic conditions'. DEFRA describes the MSFD as being intimately linked with The Vision and as bearing many common elements.⁹⁷ Further, it is described as 'a practical realisation of the interdependence of sea users and related resource exploitation, as well as the integrated nature of environmental impacts and marine nature conservation measures'.⁹⁸ Consequently, as with The Objectives, the MSFD supports a holistic approach to the management of the marine area. In order to assist states in preparing an appropriate marine management framework, the MSFD provides 11 indicators of GES,⁹⁹ all of which protect naturally occurring marine ecosystems and aim to limit the acceptable impact of human activity upon the marine environment. The concept of economic productivity is entirely absent from the MSFD. Instead, the primary focus is upon ecological productivity, and the ability of marine ecosystems to thrive within their intrinsic conditions.

Unlike either The Vision or The Objectives, the MSFD is a legally binding obligation upon the UK and Scottish administrations. Accordingly, the weight that it affords to ecological productivity should not be overlooked within the domestic marine management system. However, the MSFD and the requirement for GES may be criticised on a number of fronts. First, some of its terminology appears to give rise to uncertainty, such as the precise meaning of 'significant' or 'prevailing conditions'. This could give rise to legal vulnerability, whereby the law is instead undesirably developed through the courts.¹⁰⁰ Second, a lack of available scientific evidence creates difficulties in setting specific targets for achieving GES in the marine area, and there is a risk that any targets would be subject to change as new evidence arises.¹⁰¹ This creates further uncertainty for those who are subject to regulatory policies under any subsequent marine management system. Third, it is arguably unnecessarily restrictive upon economic productivity to the extent that it fails to emphasise the concept of ecosystem resilience,¹⁰² whereby an ecosystem is capable of recovering from anthropogenic impacts under a certain threshold. Furthermore, it may be unrealistically

⁹⁷ DEFRA, 'Next steps', (2010) <http://chartingprogress.defra.gov.uk/next-steps>

⁹⁸ Slater, 'What is marine spatial planning', at p.2.

⁹⁹ Set out in Annex 1.

¹⁰⁰ The Scottish Government, 'Marine Strategy Framework Directive', <http://www.scotland.gov.uk/Resource/Doc/295194/0116507.doc> at p.4

¹⁰¹ Ibid, p.3.

¹⁰² Ibid.

aspirational as unpredictable events such as the effects of climate change could undermine the results of otherwise successful marine management framework, which in turn has the effect of creating unrealistic expectations as to the outcome of such policies.

The MSFD has been implemented in the UK via the MSRs, with the purpose of developing a Marine Strategy to achieve GES for the UK marine area under Regulation 5. There is an express duty under Regulation 7 for the relevant authorities to cooperate in the development of a Marine Strategy in order to secure consistency on a national level. Significantly, Regulation 4 imposes a duty upon the Secretary of State and the Scottish Ministers to exercise their functions in a manner that will secure compliance with the MSFD. As under Schedule 2 of The Regulations, this duty expressly includes the exercise of functions under the MCAA and the MSA. Consequently, the way in which The Vision is to be achieved through the marine management frameworks in the UK and Scotland must not detriment the achievement of GES. This may be particularly significant for the application of the concept of productivity, as the MSFD is expressed in such a way as to give precedence to environmental considerations. However, Regulation 14 provides authorities with the opportunity to justify a departure from the application of measures to achieve GES. Regulation 14(2)(c) enables a relevant authority to *consider* the social and economic impact of any proposed measure to achieve or maintain GES, although it does not express a threshold at which such considerations would enable an abandonment of GES measures entirely. Regulation 14(6) provides that the relevant authority must satisfy itself that any measures are cost effective and technically feasible, and that a cost-benefit analysis must be undertaken. Similarly, Regulation 15 sets out a number of exceptions whereby targets set to indicate GES cannot be achieved. These factors appear to be broad enough to enable authorities to retain control over where the balance between social, environmental and economic interests should lie so that economic targets are not unnecessarily hampered. In practice, however, the threshold at which such exceptions become applicable may only be determined when the decisions of marine managers are challenged in court.

Despite the intention of the UK and Scottish administrations that the MCAA and the MSA would create a new marine management framework for the UK in pursuit of The Vision, the role of the MSRs may be vital in ensuring that The Vision is achieved in practice in the UK. This is because it provides the legal basis for the adoption of an ecosystems approach to marine management in both regimes, as well as placing a strong emphasis on the intrinsic value of the marine environment, rather than purely economic value derived from the use of the marine environment. Without the legal recognition of these factors provided by the MSRs, The Vision and in turn the concept of productivity would arguably remain aspirational

only. Further, the use of indicators in order to achieve GES is potentially a legal framework which could be replicated to apply to the achievement of productivity. This would enable economic, social and environmental aspects of productivity to be recognised and measured against a number of descriptors in any give marine area, which could be incorporated into each marine plan in order to ensure consistency and to provide a transparent account of the extent to which each marine plan contributes towards the achievement of The Vision.

An alternative definition of 'productive seas'

The Working Definition of productive seas provided in *Charting Progress 2* appears to be the most concise and explicit formulation of the concept of productivity in any of the relevant legislation, policies or drivers available in either regime. However, it appears to be a definition which is borne out of the necessity to create a system where progress towards achieving productive seas is easily quantifiable, and therefore relies heavily upon economic valuations. In order for the concept of productivity to be considered holistically within an integrated marine management system, and for the definition to remain in keeping with the spirit of the vision, it should arguably incorporate social, economic and environmental considerations, as well as principles of sustainability, and monetary and non-monetary values. Consequently, an alternative definition of productive seas could be:

The state of the seas whereby ecosystems thrive within their intrinsic conditions, and ecosystem goods and services are utilised by humans for economic and social benefits in a manner that is sustainable and respects the resilience and environmental limits of marine ecosystems

This is a broader definition than is provided for by *Charting Progress 2*. It recognises all perceived benefits to humans, including non-monetary benefits. It incorporates essential economic benefits so that the Working Definition falls within its scope. However, it also ensures that the vital concepts of sustainability and resilience are protected so that there does not have to be a trade-off between economic progress and environmental concerns.¹⁰³ This reflects the approach that has been taken by the MMO in relation to sustainable development. The MMO suggests that the objective behind sustainable development 'is to safeguard our natural resources and economy for future generations', which is important because it does not necessitate reconciliation between the economy and the environment:

rather, this definition focuses on the fact that sustainable use of our natural resources using an integrated approach across environmental, economic and social factors can benefit all three sectors in the long term.¹⁰⁴

¹⁰³ Ross-Robertson, A., 'Is the environment getting squeezed out of sustainable development', (2003) *Sum Public Law* at p. 250

¹⁰⁴ MMO, *Sustainable development in the Marine Management Organisation*, (2010) http://www.marinemanagement.org.uk/about/documents/sustainable_development.pdf

It follows that the alternative definition of productive seas offers a similarly integrated approach through which social, economic and environmental benefits can be achieved in tandem.

3 Productivity in Practice: Measuring Productivity and the Role of Science

A crucial element of the success of any definition of productivity is the extent to which it can be measured in practice. The concluding remarks in the Marine Atlas report¹⁰⁵ suggest that there is an opportunity to develop a new assessment model for the productivity of the marine environment, which could have the capacity to take into account factors beyond monetary values, such as sustainability and non-use values. Marine Scotland appears to have given greater recognition to this possibility than the UKMMAS as the Marine Atlas refers to the preparation of the UK National Ecosystems Assessment (UKNEA) as a potential source of alternative productivity measures.¹⁰⁶ The UKNEA was completed in 2011 and provides an analysis of the 'UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity',¹⁰⁷ which includes an analysis of the value of the marine environment. The assessment focuses specifically on the role of ecosystem services, which it defines as 'the benefits provided by ecosystems that contribute to making human life both possible and worth living'.¹⁰⁸ It identifies examples of services as including products, such as food and water, regulation, such as soil erosion and disease outbreaks, and non-material services, such as recreational and spiritual benefits in natural areas. Significantly, the UKNEA recognises that certain services are difficult to quantify, either because they are intangible or because they rely on an ecosystem process to occur and therefore do not give direct material benefits such as food. As a result, it warns that a system of measurement that is based too heavily upon easily quantifiable services risks giving inadequate consideration to those services that are in fact most beneficial to human well-being.¹⁰⁹

The UKNEA system of measurement will provide greater scope for activities that have a non-monetary value to be considered productive. However, the definition of ecosystems services is still anthropocentric. It is stated that 'ecosystems are abstract, human imposed units and do not exist to, nor strive to, deliver any particular suite of goods and services'¹¹⁰. This statement raises the question of the outcome where a particular marine environment is

¹⁰⁵ See below.

¹⁰⁶ The Scottish Government, *Scotland's Marine Atlas*.

¹⁰⁷ UK National Ecosystem Assessment, 'What is the UK National Ecosystem Assessment', <http://uknea.unep-wcmc.org/Home/tabid/38/Default.aspx>

¹⁰⁸ UK National Ecosystem Assessment, 'Ecosystem Services', <http://uknea.unep-wcmc.org/EcosystemAssessmentConcepts/EcosystemServices/tabid/103/Default.aspx>

¹⁰⁹ Ibid.,

¹¹⁰ Kidd, S., 'The ecosystem approach', p.95.

not perceived to have any associated benefit for humans. This is the essence of the intrinsic value of the marine environment as part of the global ecosystem, and can be described as a non-use value. However, it is suggested that the ecosystem services model, properly adopted, does not place an oversimplified monetary value on different elements of the marine environment, but instead it acts as a decision tool under which the limitations of this approach are acknowledged.¹¹¹ Therefore, the ecosystem services approach adopted by the UKNEA creates an appropriate compromise whereby there exists an effective decision tool which allows for measurements of productivity to be considered, whilst also recognising its own limitations so that non-use values are not ignored.

The role of science

The apparent benefits of measurements under the UKNEA approach are significantly hampered by a lack of available data. It is estimated that ‘the biodiversity and habitats of 80-90% of the UK’s marine seabed remains unmapped and is known only via interpolation from the sites that have been surveyed and sampled’.¹¹² Consequently, a much more comprehensive evidence base is required in order to quantify the marine area in a meaningful way and in order to support marine legislation and policy.¹¹³ The role of science in the MCAA and the MSA is consequently one that requires further exploration.

It may be noted that the two scientific documents responsible for assessing the state of the UK’s seas, *Charting Progress 2* and the *Marine Atlas*, are subject to limitations which are set out within the respective documents. *Charting Progress 2* states that ‘as yet there is little primary research on the economic value of ecosystems goods and services and the non-use value of the marine environment’.¹¹⁴ Consequently, the assessment only provides a description of the ‘use value’ of particular activities and, until such data becomes available, the assessments will only provide a partial overview of the productivity of the UK marine area, even from a purely economic perspective. Similarly, the *Marine Atlas* concludes its report on productivity by stating:

This analysis... does not fully assess the value of economic activity or whether the seas are being used sustainably, nor does it assess the economic value of all activity. Answering these questions would require additional information on the environment or on activities that are currently difficult to quantify using official data. A more detailed assessment will only be possible if more data and information becomes available.¹¹⁵

¹¹¹ Ibid, p.95.

¹¹² UK National Ecosystems Assessment, *Technical Report*, (2011) at p.489.

¹¹³ Ibid.

¹¹⁴ UKMMAS, *Productive Seas Feeder Report* (2010), executive summary.

¹¹⁵ The Scottish Government, *Scotland’s Marine Atlas*, conclusion.

This statement demonstrates that there are significant gaps in the current assessment of the productivity of the marine area which will require further research in order to fulfil.¹¹⁶

The lack of relevant data affects both reports and demonstrates the central role that scientific research should have in the creation and implementation of effective marine management frameworks. It is argued that an important underlying issue for marine management law is 'the paucity of our knowledge of marine ecosystems and the environments that support them'.¹¹⁷ This is because effective legal measures for marine management cannot be created without accurate scientific data to rely upon, and therefore 'scientific research is a foundation of ocean governance'.¹¹⁸ For example, a recent survey in Scottish waters commissioned by Marine Scotland led to the discovery of a reef of over 100 million flame shellfish.¹¹⁹ In order to plan for this marine area, Marine Scotland would need to take into account factors such as the sensitivity and resilience of this habitat to human impacts. Therefore, a legal obligation upon marine managers to undertake, or make use of, scientific research would help to ensure that marine plans continued to reflect the most recent and accurate data.

Section 24 of the MCAA provides that the MMO *may* undertake research to assist in the exercise of its functions, which is an optional, rather than mandatory, power. The MCAA does however provide that the MMO must take scientific research into account as part of its general obligation. It also gives recognition to the importance of scientific research under Schedule 1(15), which provides that the MMO *must* appoint a Chief Scientific Advisor. The role of the Chief Scientific Advisor is to provide 'independent, objective advice and challenge to the MMO about the quality, objectivity and coherence of evidence and scientific analysis on which the MMO bases its strategy and decisions'.¹²⁰ Whilst this arrangement does not place the MMO under a legal duty to carry out research, it does demonstrate that the MMO is expected to use research to inform its decisions and that measures are in place to ensure that the research is of a high quality and, significantly, that it does not purely support a particular political or other purpose.

¹¹⁶ UK National Ecosystems Assessment, *Technical Report*, (2011) p. 462.

¹¹⁷ Tanaka, Y., 'A Dual Approach to Ocean Governance', p.229.

¹¹⁸ Ibid.

¹¹⁹ Flame Shell reef off Scotland could be world's biggest, *The Guardian*, 27 December 2012, <http://www.guardian.co.uk/environment/2012/dec/27/flame-shells-reef-scotland-biggest>

¹²⁰ HM Government, *Her Majesty's Government and the Marine Management Organisation: Framework Document 2012*, (2012) <http://www.marinemangement.org.uk/about/documents/mmo-framework.pdf>

In contrast, there is very little recognition in the MSA of the role of scientific research in marine management. It appears in relation to specific functions, such as the variation of licenses where it is a factor to be taken into account under section 30(3)(b) of the MSA, but there is no general legal duty to consider scientific research in the exercise of all of its functions. However, this approach is countered by Marine Scotland's aim of 'enhancing the science and evidence base' in order to achieve 'impartial, high quality, respected and responsive science [which] is crucial to policy development, planning, delivery and decision making'.¹²¹ In pursuit of this aim, a division named Marine Scotland Science was set up in 2009, with the specific purpose of undertaking research to support the decisions made by Marine Scotland. In order to maintain the integrity of its research, Marine Scotland has established a Science Advisory Board which is constituted of independent members with three principal functions: to ensure the independence and objectivity of science; to oversee the quality of the science; and to provide independent advice to Marine Scotland on scientific priorities. In addition, the 2010 UK Marine Science Strategy is intended to enhance and co-ordinate marine research and will consequently supplement the work of the MMO and Marine Scotland.¹²² In practice, therefore, the different emphasis placed upon scientific research in the MCAA and the MSA may have little effect as the role of science has been explicitly addressed by both organisations. Conversely, in terms of sustainability, a legal duty to undertake or to make use of scientific research may become relevant in the future, particularly if a lack of funding forces administrations to prioritise those issues for which it has a legal obligation over those for which it does not.

There are, however, some cautions about the role of science in marine management. It is clear that a marine management approach which places science at the heart of its decision making is inevitably based upon incomplete information, and any system making use of such data must therefore note its limitations.¹²³ As a result, it is suggested 'there is a real risk of unrealistic expectations being formed about the capacity of scientists to inform decision makers'.¹²⁴ In practice, there is a risk that a lack of available data could be used by marine managers as a means of avoiding the decision making process altogether. In relation to the designation of Marine Conservation Zones in England, it is argued that the MMO are guilty of

¹²¹ Marine Scotland, *Strategic Plan 2010-2013*, (2010).

<http://www.scotland.gov.uk/Resource/Doc/309760/0097695.pdf>

¹²² Marine Science Co-ordination Committee, *UK Marine Science Strategy: shaping, supporting, co-ordinating and enabling the delivery of world class marine science for the UK 2010-2025*, (2010) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69293/pb13347-mscc-strategy-100129.pdf

¹²³ Barnes, R., 'Some cautions about integrated oceans and coastal management?' (2006) 8(4) *Environmental Law Review* 249.

¹²⁴ *Ibid.*

'moving the goalposts' and creating an unattainable threshold for certainty in relation to scientific data.¹²⁵ This issue is exacerbated by the cost of data collection, and it is argued that the current scarcity of data is, in part, due to the level of expense involved in research and collection.¹²⁶ The combination of fear of legal proceedings, budget cuts¹²⁷ and requirements for scientific certainty have been blamed for the MMO's hesitance to designate Marine Conservation Zones. In contrast, Marine Scotland has been praised for plans to designate an area the size of Scotland as a Marine Protected Area in Scottish waters.¹²⁸ Aside from the conservation benefits, it is also suggested that the plans are worth £10 billion to the Scottish economy,¹²⁹ which demonstrates that marine protection measures are not always the compromise to the economy that they are often perceived to be.

Whilst it is generally accepted that the advancement of science and an increase in our understanding of marine ecosystems will play a central role in the decision making process, there is also a significant risk that lack of available data could stall the implementation of marine plans and conservation measures, which does little to address the impacts that human activity continues to have on the marine environment in the meantime. The UK Marine Science Strategy and the National Ecosystem Assessment provide a useful opportunity to ensure that these issues are addressed in the long term. However, by far the largest limitation upon both regimes in practice is economic: there is pressure to create economic growth and to spend as little as possible in the process. It is precisely this interpretation of productivity which puts the achievement of The Vision at greatest risk.

Conclusion

Can the new marine management frameworks achieve sustainable productivity? Since the formation of The Vision in 2002, the UK economy has been through a significant downturn. There have been two general elections and three Scottish parliamentary elections which has significantly altered the national political landscape. The failure to commit to The Vision on a legislative scale, as has been demonstrated, may therefore represent a shift in the priorities of governments in favour of restabilising the economy. As a result, the role of The Vision at

¹²⁵ UK sea protection plans floundering, *The Guardian*, 11 April 2013

<http://www.guardian.co.uk/environment/2013/apr/11/uk-sea-protection-plans-floundering>

¹²⁶ Appleby, T., and Jones, P., 'The Marine and Coastal Access Act', at p.75

¹²⁷ Cash shortages stretch to sea bed, *BBC News*, 9 April 2013 <http://www.bbc.co.uk/news/science-environment-21967189>

¹²⁸ Scottish Marine Protected Areas to be unveiled, *BBC News*, 14 December 2012, <http://www.bbc.co.uk/news/uk-scotland-20721875>

¹²⁹ Marine protection network could be worth £10bn says report, *BBC News*, 3 December 2012, <http://www.bbc.co.uk/news/uk-scotland-20575345>

the heart of each marine management regime appears to have been diluted since its adoption in *Safeguarding our Seas* in 2002.

Despite this lack of legislative commitment, it appears that both regimes have taken significant strides towards adopting a more integrated approach to marine management in practice. The calls for a 'one-stop shop'¹³⁰ approach to marine management were symbolic of the perceived issues with the regimes that existed prior to the enactment of the MCAA and the MSA. Most notably, the sectoral approach to marine planning and licensing created a system of mutually exclusive regulators with little regard for the overall impact upon the ecosystem in which they operated. The ecosystems approach to marine management, endorsed in the CBD and the MSFD, provided an imperative to adopt a more integrated approach. However, both the central UK government and the Scottish Executive missed the opportunity to formally adopt this approach within the MCAA and the MSA. Whilst it will necessarily be adopted by the MMO and Marine Scotland in pursuit of GES, it demonstrates that there are gaps within each regime that put into question the long term effectiveness of the new marine management systems.

Importantly, sustainable development is an underpinning legal obligation upon the MMO and Marine Scotland, which is essential in light of the economic focus that both regimes have placed upon the interpretation of 'productive seas'. The alternative definition of 'productive seas' offered by this study reflects that a balance of social, economic and environmental considerations should be achieved in the context of the environmental limits of marine ecosystems. In contrast, the Working Definition is focused too narrowly upon economic use of the seas and reflects the current lack of available data and the lack of a mechanism for measuring non-use and non-monetary values of the marine area. As such, both the MMO and Marine Scotland are at risk of breaching their legislative duty to carry out their functions in a way that contributes to the achievement of sustainable development until an alternative interpretation and measure of productivity is created.

As a result, the role of science is essential to the long term success of both regimes. First, more data is needed in order to better understand the marine ecosystems in UK waters. This data can be used to help inform the decisions made in pursuit of The Vision and sustainable development. Second, a new system of measuring the value of the marine environment, and the extent to which it is used sustainably can be incorporated into future reports on the

¹³⁰ See Zeuschner, R., 'Pipelines and cables—the offshore transportation of oil, gas and renewable energy' (2011) 8 *International Energy Law Review* at p.319, and Seaton, R., 'Marine Licensing' (2011) 146 *Scottish Planning and Environmental Law* at p.83.

progress towards achieving The Vision. The UKNEA provides a useful starting point for taking into account ecosystems services that do not have an obvious market value, although it is still heavily anthropocentric. Similarly, the approach taken under the MSFD, whereby indicators are provided for States to measure progress towards achieving GES, could be incorporated into the requirements for marine plans, which would also assist marine managers in the decision making process. Whilst the MCAA places greater emphasis on the role of science than the MSA, there is significant scope under both statutes for further obligations to be included, and for greater clarity to be provided on the role that science should play.

It can be concluded that both legal frameworks have the capacity to achieve productivity in a manner that is sustainable. However, in both regimes the detail of how this is to be achieved is found primarily within policy. As a result, the MMO and Marine Scotland are likely to be subject to political and economic pressures, the consequence of which has already been observed in the shelving of the Scottish National Marine Plan,¹³¹ and the reduction in the number of proposals for Marine Conservations Zones from 127 to 31.¹³² Despite the legislative commitment in each regime to achieving sustainable development, it is likely to be the requirement to achieve GES under the MSFD that imposes the most explicit legal duty. Therefore, whilst the MMO and Marine Scotland are at the heart of marine management for each regime, the MSRs will have a pivotal role in ensuring that the marine environment is protected from significant deterioration by human activity, and that productivity is achieved in the context of the environmental limits of marine ecosystems.

¹³¹ Fear planning limbo putting marine environment at risk, *Herald Scotland*, 11 October 2012 <http://www.arden.eveningtimes.co.uk/news/home-news/fear-planning-limbo-putting-marine-environment-at-risk.19126841>

¹³² Cash shortages stretch to sea bed, *BBC News*, 9 April 2013 <http://www.bbc.co.uk/news/science-environment-21967189>