

Climate change impacts on marine species, communities and habitats: Implications for managing conservation features, marine protected areas and the implementation of marine biodiversity legislation

Paul Buckley
Cefas, MCCIP programme manager



Centre for Environment
Fisheries & Aquaculture
Science

World Class Science for the Marine and
Freshwater Environment



MCCIP

Marine Climate Change
Impacts Partnership

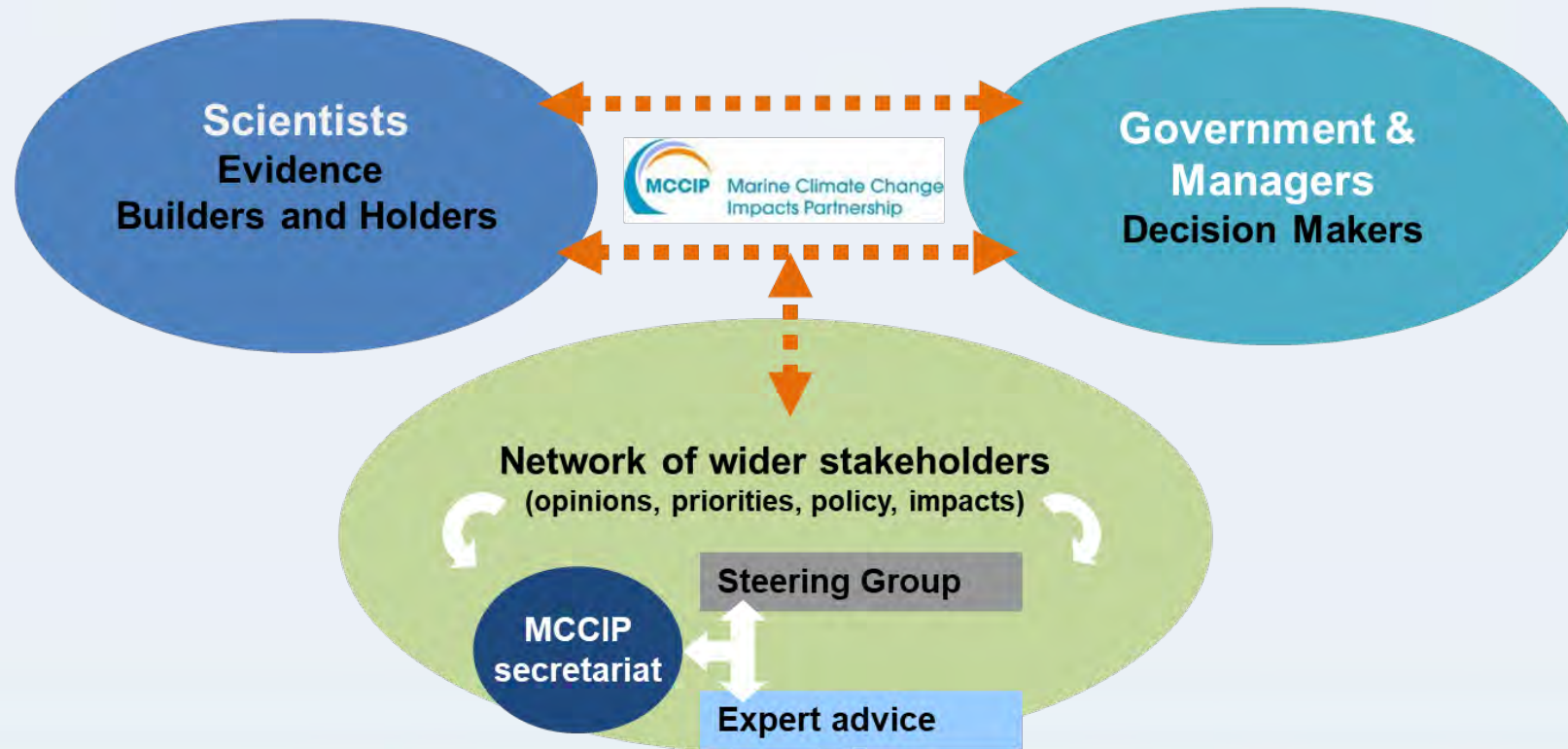
Overview

- Changes in sea temperature, storms and waves, salinity, stratification, acidification, oxygen levels and nutrients / pollutants from land are having significant impacts on habitats and species.
- These changes may compromise effectiveness of legislation.
- Use UK as a case study to:
 - Review relevant legislation, and how it does, *or could*, account for climate change.
 - Look at UK MPAs (and network) as a case study.
- Whilst focus is on work in UK through MCCIP, principles discussed have wider applicability.



Marine climate change impacts partnership (est. 2005)

“to provide a **co-ordinating framework for the UK**, so as to be able to **transfer high quality evidence** on marine and coastal climate change impacts, and **guidance on adaptation** and related advice, to policy advisors and decision-makers”



Considered 21 'obligations' relevant to UK marine biodiversity since 1966

- Inc. international conventions, EU directives & UK Acts.
- Only 3 make specific reference to climate change and none before 2008.
- 10 reference natural variability / environmental change.
- All include formal review and reporting cycles *and* secondary legislation / complementary policy development where climate change impacts could be considered.

Frost et al (2016) Climate change and the implementation of marine biodiversity legislation in the UK.

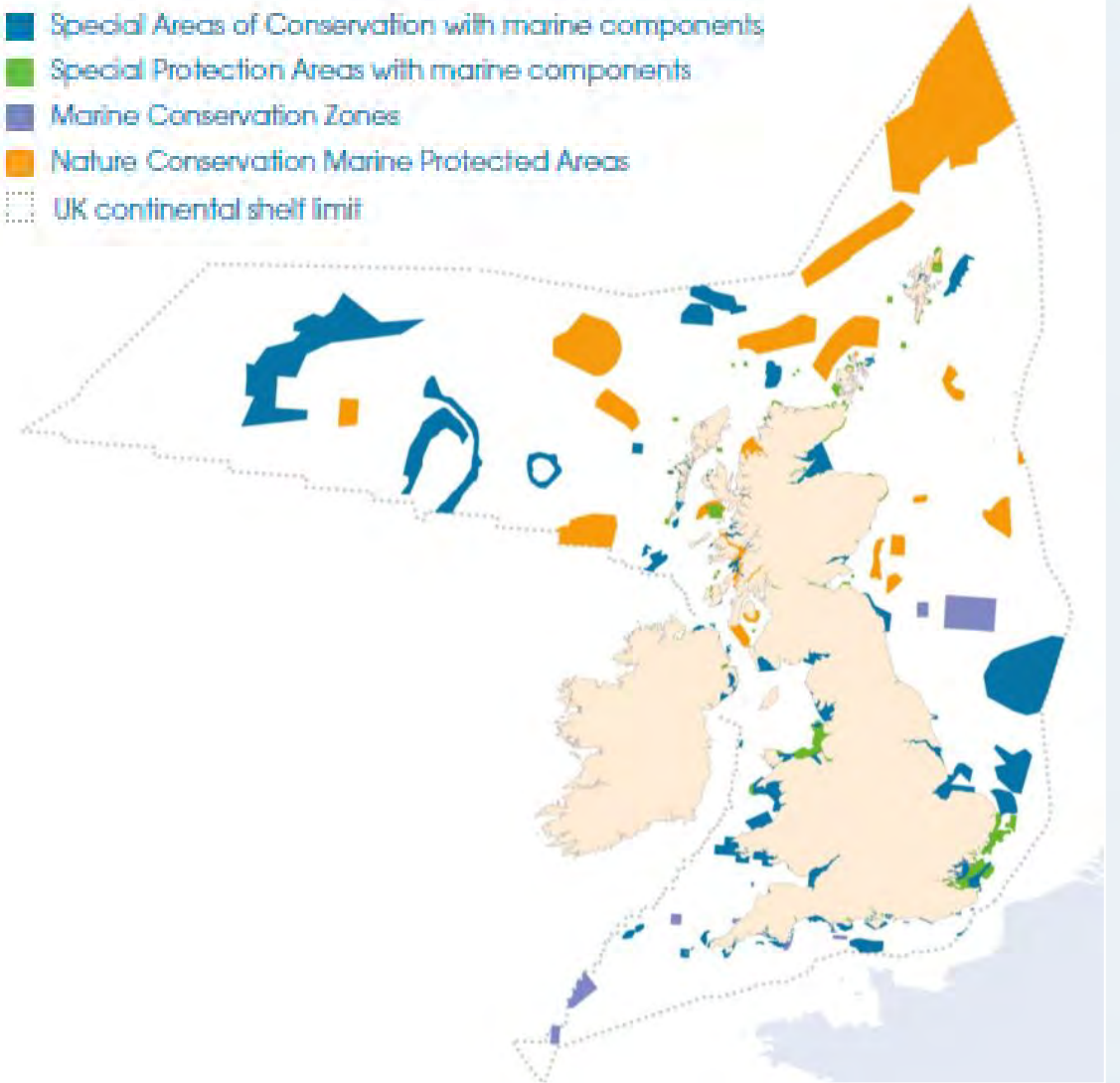
Obligations (in chronological order)	Does the text of the original legislation explicitly mention climate change?	Does the text of the original legislation include reference to natural variability or broader environmental change?	Is there a review and reporting cycle? And how frequently?	Are there mechanisms within the obligation framework that might allow for impacts of climate change?
International Convention for the Conservation of the Atlantic Tuna (1966)	NO	NO	YES (2-8 years)	YES
EU Common Fisheries Policy (1970, 1983, 1987, 2002, 2013)	NO	NO	YES (annual)	YES
Ramsar Convention (1971)	NO	YES	YES (3 years)	YES
CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)	NO	NO	YES	YES
Bern Convention (1979)	NO	NO	YES	YES
Bonn Convention (Conservation of Migratory Species) (1979)	NO	NO	YES (3 years)	YES
EU Wild Birds Directive (1979, 2009)	NO	NO	YES (3 years)	YES
UK Wildlife and Countryside Act (1981 and subsequent amendments)	NO	NO	YES (5 years)	YES
Convention for the conservation of salmon in the North Atlantic Ocean (1982)	NO	YES	YES (5 years)	YES
Straddling Fish Stocks and Highly Migratory Fish Stocks Agreement (1982)	NO	YES	YES	YES
OSPAR Convention-The Convention for the Protection of the Marine Environment of the North-East Atlantic (1992)	NO	NO	YES (annual & 10 years)	YES
EU Habitats Directive (1992)	NO	NO	YES (6 years)	YES
Convention on Biological Diversity (1992)	NO	NO	YES (10 years)	YES
EU Water Framework Directive (2000)	NO	YES	YES	YES
International Maritime Organisation - Ballast Water Convention (2004)	NO	NO	YES	YES
EU Marine Strategy Framework Directive (2008)	NO (in preamble only)	YES	YES (6 years)	YES
Climate Change Act (2008)	YES	YES	YES (5 years)	YES
Climate Change (Scotland) Act (2009)	YES	YES	YES (5 years)	YES
Marine & Coastal Access Act (2009)	NO	YES	YES (6 years)	YES
Marine (Scotland) Act (2010)	YES	YES	YES (5 years)	YES
Marine Act (Northern Ireland) (2013)	NO	YES	YES (6 years)	YES



Marine and Coastal Access Act 2009
& Marine Act (Northern Ireland) 2013



- Special Areas of Conservation with marine components
- Special Protection Areas with marine components
- Marine Conservation Zones
- Nature Conservation Marine Protected Areas
- UK continental shelf limit



UK marine protected areas are...

Within networks

Individual marine protected areas contribute to broader networks (e.g. Natura 2000, OSPAR).

Multiuse

Marine protected areas are multiuse, rather than closed areas.

Feature led

Across the marine protected area network there are 1,253 designated features, comprising 105 different species (mostly birds) and 74 different habitats.



What could happen to designated UK features?



- The **quality** of the feature changes in a marine protected area.
e.g. Ocean Acidification and cold water coral reefs.
- The **composition** of the feature changes in a marine protected area
e.g. Sargassum muticum with increased CO2 and warming.
- A feature is **lost or gained** to a particular marine protected area
e.g. southern vs northern species of kelp (Laminaria ochroleuca vs hyperborea).
- A feature is **lost from, or expands** within, the UK marine protected area network
e.g. Loss of horse mussel beds (Modiolus modiolus) / expansion of little egret.



What are the management implications for marine protected areas?



Where an MPA is designated for **multiple features** and some are lost *designation orders may need to be revised (e.g. Small Isles NCMPA).*



Where a protected area is designated for a **single feature that is lost** *areas may need to be abandoned / alternative sites designated (e.g. sandeels).*

Where a **feature expands** in range (for southern species, e.g. pink sea fan / red sea fingers) *may want to add to / create new MPAs.*

What are the management implications for marine protected areas?



Where **quality changes** for a species (e.g. for seagrass)...or its prey (e.g. for waterfowl) *adaptive management needs considering within existing MPAs.*



Where a species **moves out of an MPA**, but still exists in UK waters (e.g. Maerl) *feature may need to be added to existing MPAs or alternative MPAs may need to be designated.*

Summary

- Climate change is rarely explicitly considered in marine biodiversity legislation, but mechanisms generally exist that could enable climate change issues to be addressed.
- Impacts on MPAs include features being gained to or lost from sites and, in certain cases, the entire UK network.
- Flexibility is required in responding to these impacts, so options such as designating new sites, abandoning old sites and revising management measures may all need to be considered.
- Conservation targets and objectives for MPAs may need reviewing more regularly to ensure best management at the site level in the face of climate change.
- Identifying which features could be most affected by climate change (and where) through predictive modelling (e.g. VoCC) could help support effective MPA management.

Next steps...

- Asked to investigate selected climate sensitive features in more detail to develop guidance for conservation managers.
- Will look at:
 - Feature summary and distribution / designation maps.
 - Evidence for climate change impacts (and research needs).
 - Role of climate change vs natural variability and other stressors.
 - Regional / site specific examples of change.
 - What is being done / could be done to support management?
 - Practical actions / steps for managers to take forward.
- Phased publication before end of 2018.



Thankyou

For more details go to www.mccip.org.uk

