MCCIP Marine Climate Change Impacts Partnership

Climate change and the UK marine leisure industry

Adapting to a changing world

The UK boating, superyacht and small commercial marine industry is worth £3 billion a year and employs over 30,000 people. This guide summarises, for the first time, how marine climate change could affect this important sector of the UK economy.

It is intended to support single and multi-site operators of boatyards, marinas and support services in thinking through the challenges that climate change presents to them. It builds on and helps develop the industry code of practice, specifically in the area of climate change, and provides a blueprint for inland operators to consider the same issues.

This guide is not just about 'climate-proofing' the marine leisure industry for future decades; it is also about building resilience to current weather extremes, such as storms and flooding, and unseasonal warmth and cold. It will help the industry take a balanced, pragmatic view of climate change impacts in the context of other industry risks, exposing risks that may not have been considered before and alleviating concerns in other areas.

This work is the product of an initiative between the Marine Climate Change Impacts Partnership (MCCIP), the British Marine Federation (BMF) and the Environment Agency's "Climate Ready" support service, and includes examples provided by BMF members.

Three big issues identified by the marine leisure industry...

1. Impacts of sea-level rise, winds and storm surges on site infrastructure.
2. Impacts of changing weather conditions on participation levels.
3. Environmental legislation and awareness (including carbon emissions).

British Marine Federation

CLIMATE READY

www.mccip.org.uk/adaptation

A brief word on terminology...

The terms **'impacts', 'adaptation'** and **'mitigation'** are often used in relation to climate change. The main focus here is on the **'impacts'** of climate change on the industry (e.g. flooding and changing temperatures) and how the industry might need to respond or **'adapt'**. However, there is some discussion on reducing greenhouse gas emissions to help **'mitigate'** the industry's contribution to climate change where relevant.

The key difference between **climate** and **weather** is primarily timescale. A weather event (e.g. passing storm or a hot dry spell) may persist for a few days or weeks in the UK, whilst our climate is based on average conditions over a 30 year period. It is often said that climate is what you expect and weather is what you get. Our baseline climate is changing, affecting the frequency and severity of short-term weather events.

How is weather already affecting the marine leisure industry?

Globally, insurers have observed an upward trend in weather-related insured losses due to an increase in the frequency and intensity of extreme weather events and the increasing economic costs associated with them.

A market research study by MORI in 2010 found that 31% of all UK companies were affected by weather in the previous year. The proportion of the marine leisure industry affected is likely to be much greater, given the general reliance on favourable weather conditions for participation and the vulnerability of coastal sites.

Understanding how weather events have already affected the industry is a critical first step in building resilience to future change. The table below lists examples of weather events and their impacts at various UK locations.

WEATHER EVENT	PHYSICAL IMPACT	BUSINESS CONSEQUENCES
Windstorm	In winter 2012, a windstorm destroyed a marina and boats at a site which has been affected three times since 2000.	Reputational and insurance impacts. Strengthened breakwaters at significant cost.
	In winter 2006, gusts of almost 100 mph piled up 20-30 yachts against each other.	Insurance claims have led to increased premiums.
Storm surge / high tide	A sea defence breach in autumn 2009 led to significant boat damage at a marina through inundation.	Significant insurance claims and reputational impacts, as well as time taken to address the problems.
	Flooding of low lying car park at spring and autumn high tides.	Operational costs associated with cordoning off the car park, moving cars and use of sand bags. Long term consideration to move car park.
	In 2012, a bridge to a pontoon was cut off with no access to boats.	Disruption to business through temporary closure of pontoons.
Wet summers	Recent wet summers have affected levels of participation and ability to hold events during the May to October peak season.	Disruption to business operations and reduction in revenues.

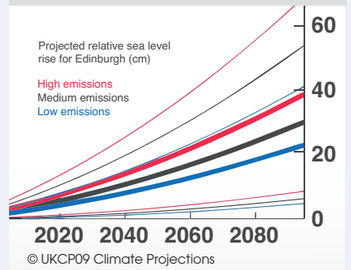
Five reasons why climate change is relevant to the marine leisure industry

1 THE MARINE LEISURE INDUSTRY IS A HIGH VALUE SECTOR OF THE UK ECONOMY

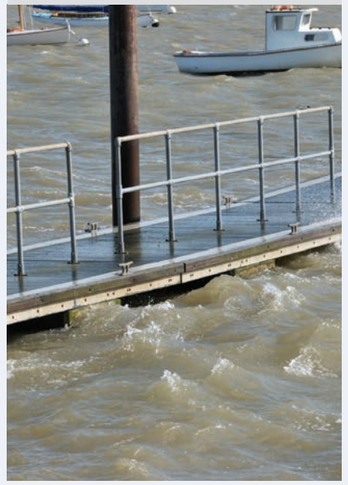
2 HIGH VALUE ASSETS ARE IN A VULNERABLE LOCATION BETWEEN LAND AND SEA

3 WEATHER EVENTS ARE ALREADY AFFECTING OPERATIONS AND OPERATING COSTS (E.G. THROUGH INSURANCE PREMIUMS)

4 CLIMATE CHANGE PROJECTIONS INDICATE FURTHER THREATS (E.G. SEA-LEVEL RISE), BUT ALSO INCREASED OPPORTUNITIES FOR THIS SECTOR



5 PROPORTIONATE ACTION IS NEEDED TO MAINTAIN AND INCREASE LONG TERM CONFIDENCE IN THE SECTOR



How is our climate changing and what are the business consequences?

The UK Met Office has stated that **"there is unequivocal evidence from observations that the climate is changing, and there is evidence that humans are contributing to some of these changes"**.

Since 2005, MCCIP has been collating evidence from over 150 scientists on the impacts of marine and coastal climate change on the UK. Based on these findings from MCCIP, published as 'report cards', as well as other recent national assessments*, the following issues could be important for the marine leisure industry.

Note: Unless otherwise stated, the projected future changes described in this table are based on UKCP09 climate projections, using the central estimate under a 'medium' (A1B) scenario of future greenhouse gas emissions.

CLIMATE CHANGE IMPACT	HOW MUCH CHANGE?	BUSINESS CONSEQUENCES
Sea-level rise **High Confidence**	Over the past century, sea level around the UK has risen by an average of 14 cm. This 14 cm rise has significantly increased (as much as doubled) the risk of flooding at many locations around the UK coastline. A further 12 to 76 cm rise is projected by the end of this century around the UK. Slightly larger sea-level rise projections are anticipated for southern parts of the UK where land is subsiding.	• Flooding of site infrastructure and storage, as well as access routes. • Overtopping quays / defences with surges due to their fixed elevations. Sites in the southern North Sea and Bristol Channel are particularly vulnerable due to the funnel shape of the coastline. • Interruptions to services, with associated costs and reputational impacts.
Increasing air temperatures **High Confidence**	Over the past century, central England temperatures have increased by about 1 °C. Whist warming has been greatest in summer, the odds of a cold winter like 2010/11 have also halved and the likelihood of warm European spring and autumn seasons has increased. By the end of this century, mean UK summer air temperature is projected to increase by just over 4 °C in the south, and 2.5 °C in northern Scotland. Winter increases are slightly lower. A Met Office projection suggests the high temperatures experienced in the European summer heat wave of 2003 could become the norm by mid-century under a medium-high emission scenario. Summer mean cloud amount could decrease by up to 20% in southern UK.	• Warmer summers lead to an extended UK tourist season, especially at the coast. Research in the south-west suggests benefits could be most pronounced in June and September. • Conditions in the UK become more comfortable than an increasingly hot Mediterranean, increasing revenues. Within the UK, the customer base could increase at more northerly sites. • Safety risks from heat for staff and visitors in summer, although with milder winters, there will be reduced safety risks at marina sites with less frost and ice. • Need to consider infrastructure capacity to support any increase in visitor numbers with warmer summer weather (e.g. to ease congestion and avoid boat collisions).
Increasing sea temperature **High Confidence**	Coastal sea temperature around the UK has risen by between 0.5 and 1 °C over the last century. General increases in coastal sea temperature of between 2.5 and 3 °C are projected by the end of century, with greatest increases in autumn off the south and south-east coasts.	• Lengthened season for water contact-sports (e.g. water skiing, windsurfing and dinghy sailing). • Increase in non-native species (e.g. sea squirts) fouling structures and boats.
Changing rainfall patterns **Medium Confidence**	Annual UK rainfall is projected to be about the same, or slightly higher, in the future; but with drier summers, especially in the south and south-west, and wetter winters, especially in the west. Extreme rainfall events are generally projected to increase, particularly during winter, with changes during summer more uncertain. Droughts and water stress in the south and south-east are projected to increase this century.	• Flood damage to sites and boats. • Heavy rain disrupts on-site logistics or leads to temporary closures. • Changes in sediment supply from changing rainfall patterns affects the dredging or fill required at sites for navigation. • Drier summers lead to water restrictions and hosepipe bans for washing down.
Changes in storms, winds and waves **Low Confidence**	Storminess around the UK has varied markedly from decade-to-decade over the last century and there is little historical evidence of a change in the incidence of high winds. There is evidence for an increase in wave heights in the North-East Atlantic. UK climate projections suggest the storm track may weaken slightly this century, and move further south, although there is high uncertainty. A more southerly storm track would also increase wave heights in the south. The risk from UK storm surges is likely to increase in the future, but largely as a result of sea-level rise rather than the storm component.	• Closures from high tides and storm surges. • Wave height affects safety. • Damage to boats stored out of season from winter storms. • Interruptions to services due to high winds. • Damage or disruption to services leads to higher insurance premiums. • Winds become more, or less, favourable for sailing events, affecting scheduling.

*For further information on these issues please see MCCIP Report Cards and UKCP09 climate projections. Also see the UK Climate Change Risk Assessment (2012) and adaptation reporting power reports from UK industry (2012), including ports, and Charting Progress 2: The state of UK seas report (2010); and, the Met Office reports 'Our changing climate: Trends, extremes, attribution and projections' (2012) and 'Climate: Observations, projections and impacts' (2011).

Identifying business-related climate change threats and opportunities

A structured (BACLIAT*) workshop exercise was undertaken with BMF members representing almost 50 geographically spread marina sites, as well as the insurance industry. The aim was to provide a thorough analysis of climate change related threats and opportunities to the sector across six key business areas (markets, finance, premises, people, process and logistics).

*BACLIAT (Business Areas Climate Impacts Assessment Tool) is available on the Environment Agency's Climate Ready support service website. To undertake your own BACLIAT exercise, go to the workspace on pages 10 and 11.

Markets (Changing demand for goods and services) and **Finance** (Implications for investment, insurance and reputation)

Examples of threats

Coastal marinas are multi-faceted profit centres that are potentially highly vulnerable to climate change impacts (e.g. storms, sea-level rise and flood risk affecting asset values and occupancy).

Sites are not really built for extreme events. This could be an issue for older sites if they become unleasable due to adverse weather events.

Risk assessments become more difficult due to greater uncertainty from climate change.

Operating costs increase, even if income does not.

Insurance costs get higher, and could mean that getting cover for both site and boat owners becomes more difficult.

Whilst the season could extend, a persistent run of bad summers could affect peak demand and turnover.

Examples of opportunities

Longer season and potential for better weather (hotter, drier summers) increases demand.

Marketing (good deals) encourages people to use facilities earlier in season.

Upgrading club facilities as 'a nice place to go to' increases income as a multi-faceted centre.

Excessive summer temperatures overseas helps strengthen the UK's position as a 'destination'.

Mitigation: threats and opportunities

Whilst the focus of this BACLIAT exercise was on adapting to climate change impacts, a number of issues relating to mitigation (i.e. reducing carbon emissions) were raised, examples of which include:

Threat: Shift to use of more environmentally-friendly biodiesel would be inconvenient and expensive.

Opportunity: Pressure to holiday in the UK, to reduce carbon footprints, benefits UK operators.

Opportunity: Demonstrating awareness of environmental impacts to show 'green credentials' (e.g. move to solar power with government assistance at sites and use of eco-boats).

Premises (Impacts on building design, construction and maintenance and facilities management) and **People** (Implications for workforce, customers and changing lifestyles)

Examples of threats

Costs of maintaining or redeveloping flood barriers increase due to rising tidal heights.

Supporting infrastructure (e.g. substations, control systems and storm drainage) becomes increasingly vulnerable to storms, sea-level rise and surges.

Rising temperatures could lead to increased fouling from nuisance species (e.g. Harmful Algal Blooms and worm growth on propellers). Higher costs might mean customers give up boating.

Increased UV degradation could lead to increased costs (e.g. for signage).

Planning climate change adaptation measures may lead to further conflicts with other interest groups (e.g. local and national government, industry, conservation bodies and local action groups).

Managing the increased physical risk to clients and staff from more extreme weather events (e.g. storms or heatwaves), especially for more vulnerable marine leisure users.

Managing site safety if demand increases at peak times.

If summers do get hotter, there are challenges on how to expand in the future, especially if already at full occupancy.

Changing boating season impacts on availability of student and temporary workforce. May also be a skill shortage for operations required more regularly in the future (e.g. hoist operating).

Examples of opportunities

If overseas temperatures get too hot in the peak summer season, there could be opportunities for increased revenues in the UK.

For overseas operators, in the longer term there may be opportunities to increase participation in spring and autumn with higher temperatures.

Develop a more flexible workforce (e.g. make more use of multi-skilled staff or have apprenticeships) to deal with emerging risks.

Increasing need for boat lifts and anti-fouling services with more nuisance species could be a business opportunity.

Milder winters could reduce access disruption (e.g. reduced risk of icing on piles).

Use low interest rates now to increase site resilience to risks.

Process (Impacts on production processes and service delivery) and **Logistics** (Vulnerability of supply chain, utilities and transport arrangements)

Examples of threats

If boats stay longer in the water, craneage and yard storage income could be reduced.

Climate change impacts on transport routes to the sites (e.g. flooding) could disrupt services.

Onshore storage needs to be adequately protected against climate change risks.

Increased high intensity and changing water flows leads to changes in sedimentation and higher operation costs.

Drought and water stress could affect water extraction for washing down.

Examples of opportunities

Wider window of opportunity for customers to come in and out of marinas and keep their boat in the water for longer.

Setting the course for the future through collective action

Alongside actions that can be taken individually, the workshop identified a range of other important issues that should be addressed collectively by the sector.

It is often more efficient to take action in this way (e.g. development and dissemination of best practice through trade association help with contingency planning).

Some specific collective actions include:

- Understanding the potential implications of any increase in fouling from non-native species through advice from trade associations.
- Understanding the challenges presented by increased sedimentation and siltation from heavy rainfall (e.g. difficulties in getting dredging licences).
- Providing leisure industry input to both terrestrial and marine planning initiatives (i.e. through representative bodies for regional and national planning).

The diversity of the industry and presence of so many small operators requires a co-ordinated approach to handling these issues in the future.

What does the BMF plan to do next?

The BMF will consider which responses will be of most value to its members, both in the short term and for longer term planning, and devise an appropriate action plan. Through its regional associations, the BMF will also engage with the devolved administrations on climate change adaptation and mitigation.

Responding to key threats and opportunities

BMF members at the workshop identified three key areas within which to develop adaptation and mitigation responses. These are:

1. Impacts of sea-level rise, winds and storm surges on site infrastructure.

2. Impacts of changing weather conditions on participation levels.

3. Environmental legislation and awareness (including carbon emissions).

A first step in developing responses has been to identify actions that the marine leisure industry should take both individually and in partnership with industry trade associations, government agencies, marine planners and local communities.

1 IMPACTS OF SEA-LEVEL RISE, WINDS AND STORM SURGES ON SITE INFRASTRUCTURE

- Take local sea-level rise into account in any new design work (e.g. how much quay heights need to increase by) www.mccip.org.uk/uk-marine-projections.aspx
- Sign up to the Environment Agency's flood warning service (England and Wales) www.environment-agency.gov.uk/homeandleisure/floods; or SEPA (Scottish Environment Protection Agency) floodline service (Scotland) www.sepa.org.uk/flooding/sepas_floodline_service.aspx
- Develop a site contingency plan for flooding and ensure staff are trained to respond.
- Ensure site infrastructure is regularly maintained and in good working order to increase resilience to extreme events.
- Share best practice through your trade associations.
- Look to include practical advice as part of the TYHA code of practice.

2 IMPACTS OF CHANGING WEATHER CONDITIONS ON PARTICIPATION LEVELS

- Promote a longer season through information, campaigns and special offers, including actively engaging younger people through the use of social media.
- Develop a long-term strategy based on understanding customer behaviour preferences in response to different weather conditions (e.g. how do numbers vary with temperature and rainfall?).
- Undertake an assessment of the carrying capacity of sites to ensure that increased usage would not have a detrimental impact on existing infrastructure.
- Report incidences of non-native species to your local conservation office (i.e. Scottish Natural Heritage, Natural Resources Wales, AFBI and Natural England) as these can have a detrimental effect on boats (fouling) and the spread of non-native species. See the GB non-native species secretariat for more information: www.nonnativespecies.org

3 ENVIRONMENTAL LEGISLATION AND AWARENESS (INCLUDING CARBON EMISSIONS)

- Undertake an energy audit of the marina to reduce carbon footprint, costs and build resilience to future legislation.
- Consider using new innovations in green marine technologies to improve your sites' and boats' environmental credentials.
- Engage in general planning consultations (e.g. on development of marine renewables).

Applying the learning process from this guide to your own business

The BACLIAT exercise used here is easily replicated by anyone, at any location, wishing to examine threats and opportunities to their own business and identify key areas of action required.

A workspace is provided on pages 10-11 to help you work through threats and opportunities to your own business.

What are related businesses already doing?

Port of Felixstowe

Working with a related organisation (UKCIP), the Port of Felixstowe pre-empted legal obligations and undertook a climate risk assessment in 2008, using similar approaches to this work, which identified a number of capacity-building actions.

This resulted in:

- The incorporation of climate risk into flood management and business continuity plans
- Further examination of current high-wind thresholds
- Maintaining a watching brief on the latest information on climate change of relevance to the port

For more details on risks identified, search the internet for 'Felixstowe Case Study'

Courtesy of the Port of Felixstowe

Brighton Marina

Brighton Marina commissioned a modelling study from HR Wallingford to help understand the implications of future scenarios on waves and water levels and their impact on the marina's sea defences.

This identified future options to reduce the threats to their breakwaters over the next 120 years.

Adaptation support from government

England, Scotland, Wales and Northern Ireland each provide a support service to help organisations adapt to climate change. These are:

England: Climate Ready support service

climate.ready@defra.gsi.gov.uk

Key learning tool: EA - BACLIAT

Scotland: Adaptation Scotland

adaptationscotland@sniffer.org.uk

Key learning tool: Climate Risk Management Plan template

Wales: Preparing Wales for a changing climate

climate-change@wales.gsi.gov.uk

Key learning tool: Preparing for a changing climate

Northern Ireland: Climate Northern Ireland

patrice@climatenorthernireland.org.uk

Key learning tool: Helping businesses adapt to climate change

Marine planning

UK and devolved administration marine planning bodies are required to address climate change in the development of marine plans. This will provide the marine leisure industry with an opportunity to engage in the process that will oversee sustainable management of our seas. Plans to designate marine protected areas / marine conservation zones, as well as meet climate change targets though the use of marine renewable energy means that engagement in the marine planning process is necessary to ensure that the marine leisure industry voice is heard.

Under the UK Marine Policy Statement, detailed marine plans are now being developed by the MMO (for English waters), Marine Scotland, the Welsh Government and the Department of Environment, Northern Ireland.

Climate change adaptation workspace

Use the **BACLIAT** (**B**usiness **A**reas **CL**imate **I**mpacts **A**ssessment **T**ool) to brainstorm potential impacts on your own business:

- **Markets:** Changing demand for goods and services
- **Finance:** Implications for investment, insurance and reputation
- **Premises:** Impacts on building design, construction and maintenance and facilities management
- **People:** Implications for workforce, customers and changing lifestyles
- **Process:** Impacts on production process and service delivery
- **Logistics:** Vulnerability of supply chain, utilities and transport arrangements

No answers are 'wrong'. Think creatively and record all of your answers. Consider both short and long term impacts on your business, as well as direct and indirect impacts (e.g. knock-on effects on supply chain or transport links for customers and goods).

If you are using the online (pdf) version of this report card, you can type responses directly into the spaces below. You could then save the responses for your records and send to the BMF for their database (see the 'learning from you' section). Download the latest version of Adobe Reader for best functionality.

Markets and Finance

Threats	Opportunities

Premises and People

Threats	Opportunities

Process and Logistics

Threats	Opportunities

Your priority threats and opportunities

Use the adaptation checklist below to help you identify the top three threats or opportunities to your business.

How soon? | How likely? | What are the possible consequences / costs? | How long will it take to start adapting? | Why is this risk significant to me?

Top three threats or opportunities

1.

2.

3.

Developing adaptation actions

For your top three threats / opportunities, consider the following to develop an adaptation plan:

- What actions could you take to enhance the resilience of your site? Temporary or permanent?
- Think about past experiences to draw on and be practical, think about how your business works.
- Explore technical, operational and strategic options.
- Would these changes benefit your business anyway?

Adaptation actions

Learning from you...

Providing useful climate change and adaptation advice to the industry relies heavily on understanding the full range of issues that individuals are concerned about.

The BMF would very much like to hear about your top three issues to help create a database of risks, opportunities and proposed actions that they can collate and use as a shared learning resource for you.

Please contact environment@britishmarine.co.uk to get involved.

Other key sources of information on climate change impacts

MCCIP report cards provide a good starting point to learn more about UK marine climate change impacts. Over 150 leading scientists contribute to these regularly updated reports, which include topics on tourism and marine recreation, sea-level rise, flooding, erosion and ports and shipping. Go to www.mccip.org.uk/arc.

Other recent UK reports of interest include the 'UKCP09 marine and coastal climate projections', 'Charting Progress 2: The State of UK Seas', 'UK Climate Change Risk Assessment (CCRA)' and the linked 'Adaptation Reporting Power (ARP)' reports from specific UK industries (e.g. ports authorities).

What is MCCIP?

The Marine Climate Change Impacts Partnership (MCCIP) brings together scientists, government, its agencies, non-governmental organisations and industry. The principal aim is to provide a coordinating framework for the UK, to transfer high quality evidence on marine climate change impacts, and guidance on adaptation to marine stakeholders.

MCCIP (2013). Climate change and the marine leisure industry: adapting to a changing world (Eds. Buckley PJ, Bayliss-Brown GA, Cox M, Laffoley D, Withers Harvey N and Wright JP) Climate Smart Working Report Card, MCCIP, Lowestoft, 12pp.

MCCIP partners

Agri-Food and Biosciences Institute; Centre for Environment, Fisheries and Aquaculture Science; Department of Energy and Climate Change; Department for Environment, Food and Rural Affairs; Department of the Environment for Northern Ireland; Environment Agency; Isle of Man Government; International Union for Conservation of Nature; Joint Nature Conservation Committee; Marine Institute, Ireland; Marine Biological Association and Marine Environmental Change Network; Marine Management Organisation; Marine Scotland; Met Office; National Oceanography Centre; Natural England; Natural Resources Wales; Royal Society for the Protection of Birds; Scottish Environment Protection Agency; Seaweb Foundation; Scottish Natural Heritage; Sir Alister Hardy Foundation for Ocean Science; States of Guernsey; States of Jersey; University of East Anglia Climatic Research Unit and Welsh Assembly Government.

Adaptation learning resources on the MCCIP website

The MCCIP website has an adaptation section that includes the overview presentation from the BMF workshop day, with more detailed information on how our climate is changing, as well as a step-by-step guide to the adaptation process.

The MCCIP site also provides a regularly updated overview of how other related organisations are approaching climate change adaptation.

Go to
www.mccip.org.uk/adaptation

The Yacht Harbour Association code of practice

The Yacht Harbour Association (TYHA) code of practice for the Design and Construction of Marinas and Yacht Harbours does not explicitly consider climate change. This report card provides a valuable companion piece to the code of practice by introducing climate change issues that may need to be factored into long term planning.

Contact MCCIP and Climate Ready

If you would like to learn more about marine climate change impacts and adaptation, or feel that your concerns have not been addressed here, please contact:

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Suffolk, NR33 0HT, UK

paul.buckley@mccip.org.uk
Tel: +44(0)1502 524314
www.mccip.org.uk

Climate Ready
climate.ready@defra.gsi.gov.uk

Marine leisure sector contacts

Contact the following organisations to learn more about what the sector is doing to address climate change issues.

British Marine Federation (BMF)
www.britishmarine.co.uk
environment@britishmarine.co.uk

The Green Blue
www.thegreenblue.org.uk

The Royal Yachting Association (RYA)
www.rya.org.uk

The Yacht Harbour Association (YHA)
www.tyha.co.uk