

Barometer

Magazine issue 32 | www.metoffice.gov.uk



Building the future

How our work supports the UN's
Sustainable Development Goals



For many organisations, ‘sustainability’ means being a responsible employer and a good neighbour; minimising environmental impact, promoting employee wellbeing and supporting projects in the local community. These things are important for the Met Office too, as well as being at the very core of our purpose to enable protection, prosperity and well-being, says **Chief Executive, Rob Varley**.

At the very core of our mission

This edition of Barometer explores how working at the forefront of weather and climate, our work promotes sustainability in everything we do. Our work with the environment, customers and suppliers, people, and community was acknowledged in 2014 when we won the Platinum Award in the UK Public Sector Sustainability Awards. We recognise that sustainability goes beyond simply how our business operates; it is integral to our work around the globe, helping people make sustainable decisions.

With each year, the work of the Met Office seems to gather significance and urgency. 2015 ended with an historic agreement at the UN Climate Conference, COP21 in Paris, limiting warming to below 2 °C compared to pre-industrial times, or 1.5 °C if possible, to avoid widespread and dangerous impacts of climate change.

This agreement was reached in the context of the warmest year on record globally, the peak of one of the strongest El Niños ever recorded, and record-breaking rainfall leading to devastating floods across North Wales, Northern England and Scotland (page 5). Throughout, we were actively involved, deploying our world-class science, technology and operations, helping decision makers when and where it mattered most. From warnings of floods, to helping communities plan for and reduce the impacts of climate change, our work is helping shape a more sustainable world.

Looking further afield, our work is supporting the UN’s Sustainable Development Goals (page 11). For example, on my recent trip to South Africa, I discovered first-hand how our partnership with the South African Weather Service is helping to protect life and property, and boost economic development (page 19).

Clearly, sustainability is not just about being a good citizen. Although it generates an enormous amount of goodwill, it also makes sound business sense. Working with Business in the Community (page 15) over recent years, I have seen many successful companies embracing sustainability to benefit the bottom line.

It makes good sense for us too. In working for a more sustainable world, the Met Office delivers tangible financial benefits to the UK. A recent review, by the Department for Business, Innovation & Skills and the Met Office, concluded that we will deliver £30 billion of value to the UK over the next ten years – a benefit-cost ratio of around 14:1.

Yet the benefits of sustainability cannot be measured in money alone. It’s also a great staff motivator, helping build loyalty and engagement. Our people are essential to our life saving work and it matters a great deal to them that we’re passionate about such things as recycling and biodiversity (page 17). Many of our staff are actively involved in community engagement through Science, Technology, Engineering and Maths (STEM) outreach. Our STEM Ambassadors work with schools to promote STEM subjects and careers and the Met Office as a future employer.

Sustainability is at the very core of our mission, both in how we work and in the services we provide – working in the UK to keep people safe through the extremes of the British weather, and around the world with partners such as the Department for International Development, the World Meteorological Organization and the World Bank. And, as environmental risks continue to increase, our work becomes ever more vital – ultimately helping to support a more sustainable global future. 🌱

March 2016

Barometer is a controlled circulation magazine distributed free of charge to decision-makers in government, science and commerce, for whom weather and climate information has an impact.

Product information is correct at the time of publication but may be subject to change.

For queries about Barometer contact:

Jon Stanford

Met Office, FitzRoy Road,
Exeter, Devon, EX1 3PB, UK

For any queries about Met Office products or services, contact our Customer Centre (24 hrs):

enquiries@metoffice.gov.uk

Tel: 0370 900 0100

Fax: 0370 900 5050

From outside the UK:

Tel: +44 1392 885 680

Fax: +44 1392 885 681

www.metoffice.gov.uk



Keep your eye out for the new Mostly Weather podcasts

www.metoffice.gov.uk/mostly-weather



Download the FREE Met Office weather app



/metoffice



@metoffice

www.metoffice.gov.uk/barometer

© Crown copyright 2016 15/0592 Met Office and the Met Office logo are registered trademarks.

In this issue...



11

COVER STORY:

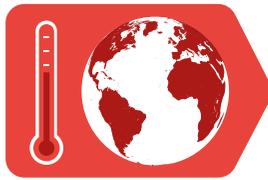
Working together for a resilient future

We take a look at the UN's Sustainable Development Goals to 2030 and the Met Office's involvement and support in achieving them.

05

Meteorological historical

Records were set as 2015 was the warmest year on record globally.



09

It's all about the people

One of the Met Office's greatest strengths is its people.



17

Global Citizen

The Met Office takes its environmental responsibilities very seriously.



07

Managing supply and demand

From salads on hot summer days to soups when it's chilly outside, the weather plays a huge role in what food we buy – and when...

15

Business in the community

With all the challenges faced by society today, collaboration between big companies and local communities has never been more relevant.



21

Food insecurity and climate change

An interactive online map created by the Met Office and the UN World Food Programme paints a picture of how climate change may affect global hunger in the future.



In brief

- 03 Naming storms
Seven days ahead
Met Office weather app
- 04 HeliBrief®
Saving lives at sea



Science focus

- 19 Strong, strategic, sustainable

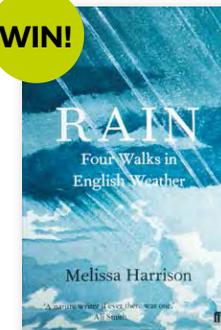


People

- 20 **Science profile:**
Tamara Janes
- 22 **Celebrity weather:**
Charlotte Church

Competition

WIN!



Win a copy of *Rain* by Melissa Harrison



In brief

A quick look at the news and updates from around the world of the Met Office.

Naming storms

Throughout autumn and winter we have been collaborating with the Irish national meteorological service, Met Éireann, to name wind storms.

This joint initiative is a pilot project that is bringing greater public awareness of windstorms affecting Ireland and the UK. Until now there has been no official system for naming storms, and it is hoped that this might help raise awareness of severe weather when it's on the way and encourage action to help save lives and livelihoods.

Dee Cotgrove, Executive Head of Media and Communications said: "It's been great to see the level of public and media engagement in this joint storm naming pilot. Around 4,000 ideas for names were



sent in by email, Facebook and Twitter, and a list created with names common to Ireland and the UK. Storm names such as Abigail, Desmond, Clodagh, and Henry have been used alongside official warnings, and have been widely shared by word of mouth, in the media and Twitter."

Gerald Fleming, Head of Forecasting with Met Éireann, said: "By working together



we have increased the public awareness of severe weather and ensured greater public safety. Naming storms using a single system has helped to better communicate forecasts

and warnings, and their likely impact, through the media and government agencies in both nations. In turn this has meant the public has been more aware of approaching weather enabling them to keep themselves, their property and businesses safe."

i For the latest information on storms see www.metoffice.gov.uk/uk-storm-centre



Seven days ahead

Responding to public demand, we've extended our routine location forecasts from five to seven days ahead.

A week is a natural period of time for planning and many of us start to plan for the weekend early in the week. Now around 7,500 locations across the UK, and a similar number overseas, benefit from this extension to seven days.

The first phase of the development included the Met Office website, mobile website and the webmaster widget. Our new app, Met Office Weather, also includes the seven-day forecasts so you can start planning your weekend now!

i For more details and a video describing the changes see: www.metoffice.gov.uk/news/whats-new



Met Office weather app

Stay one step ahead of the weather with forecasts straight from the source.

Wherever you are in the world, our app can help you plan your day with the latest most up-to-date and accurate weather forecasts and UK National Severe Weather Warnings available for the next seven days.

Our app has been co-designed with users and delivers official forecasts and warnings faster than ever before. With a honed user experience and simple design, the app is being continuously developed in line with user suggestions.

Please share your feedback with us at enquiries@metoffice.gov.uk

i Find out more at: www.metoffice.gov.uk/app





HeliBrief®

Our new HeliBrief® service is helping to keep emergency response helicopter operators safe.

For many years, the Met Office has provided a helicopter briefing service, known as OHWeb, for offshore helicopter operators to ensure effective planning to mitigate the effects of weather and maximise safety.

This product has been redesigned and renamed HeliBrief® and now tailors information for a wider audience including emergency response helicopter operators such as UK Search and Rescue, the Helicopter Emergency Medicine Service and the National Police Air Service. With new features, new technology, and content accessible by phone, tablet and desktop, HeliBrief is also easier to use thanks to a user driven design approach.

We are the designated provider of a regulated weather briefing service to the aviation community, including offshore helicopter operators, on behalf of the Civil Aviation Authority (CAA).

“Extending our remit and services to increase the safety of emergency response groups is an example of how we are working with CAA and NATS to keep air transport safe,” says Ian Cameron, Executive Head of Aviation Business at the Met Office. 🌩️



Saving lives at sea

The Royal National Lifeboat Institution and the Met Office already have strong bonds which are being reinforced with growing links between the organisations.

The Royal National Lifeboat Institution (RNLI) is a household name, a familiar charity that saves lives at sea. As its work is often intertwined with the weather, the RNLI and Met Office have close ties. That could be why Met Office staff voted for the RNLI to become our official charity for three years.

Both organisations complement each other, protecting lives. Lifeboat crews check forecasts before putting out to sea, however, as Ros Whitlock, Corporate Partnerships Manager from the RNLI describes, connections between the two organisations run even deeper:

“We both have proud histories and are trusted leaders in our fields. RNLI volunteers are always ready to answer the call and, like the Met Office, the RNLI is a 24/7 organisation.”

‘All-weather’ lifeboats

Similar to the Met Office, technology plays a big part in RNLI’s work. For example, the new Shannon Fleet, the latest ‘All-weather’ lifeboats capable of operating in all conditions, are currently being produced to help reach casualties 50% faster.

The boats are being built in-house at RNLI’s new All-weather Lifeboat Centre. “It was a big investment but is an example of innovation that will help save lives, plus the organisation will be able to save at least £3 million each year once fully up and running,” explains Ros.

The RNLI strives for continual improvement, challenging, creating, innovating and integrating sustainable ways of working as well as saving lives.

High standards

“We want to give more back, to people, the society and the environment, than we take out,” says Ros. “For instance, we have reduced our environmental impacts, installing ground source heat pumps in lifeboats stations and solar collectors on lifeguard units.”

Once deployed, the RNLI Flood Rescue Team aims to be on location within 24 hours. Ros explains, “At our head office in Poole, we use the Met Office Hazard Manager service during flooding to prepare rescue teams and let volunteers and staff know about weather risks. Storms and floods can create terrifying conditions so we rely on forecasts to make decisions on how to carry out rescues, manage risks and be available at the right time, considering tides and weather.”

Sharing expertise

Katie Hickmott, Met Office Partnership Communications Manager says, “It’s early days but our joint objectives include fundraising campaigns, increasing reach of messages to different audiences, utilising weather information, general collaboration, and sharing expertise.”

A closer connection will see both organisations help and learn from each other. “We want to communicate messages to keep people safe, working together to reach as many people as possible,” says Ros. “The RNLI gets access to weather expertise while we can help the Met Office reach different audiences. We have 237 lifeboat stations, over 210 lifeguarded beaches, and 1,110 branch networks, all of which represent opportunities.” 🌩️

At the heart of local communities

The RNLI relies on volunteers and support from local communities. Met Office employee Peter Kerr is a volunteer lifeboat crew member in Lerwick in Shetland.

“The RNLI is held in high regard in Shetland. Deep sea and coastal fishing are an important part of the community here, the offshore oil industry employees many people, while ferries to Aberdeen face a voyage of at least 12 hours. The RNLI is funded by voluntary donations – last year around £100,000 was raised for the Lerwick lifeboat, with the vast majority raised in Shetland.”

“We’re on call 24/7/365. When my pager goes off, I have 10 minutes to get to the station. Like a few of the crew, I had no sea-going experience, but RNLI trained us in all aspects of the job. The Met Office and my workmates are very accommodating when I need time off or shift swaps for training, and I’m hugely appreciative of that.”

Meteorological historical

For the UK, a record-breaking mild and wet December 2015 will go down in history. But it wasn't just here that records were set as 2015 was the warmest year on record globally.

The UK was in a warm, moist tropical air mass for most of December as unseasonably mild winds came from the south or southwest carrying very high levels of moisture.

It was extraordinarily wet and often windy, with frequent storms including Desmond, Eva and Frank delivering record-breaking rainfall over Scotland, Wales and northern England. Records were broken across Europe and North America in very warm temperatures for the time of year which were more like spring than winter.

Remarkably warm

The UK mean temperature for December was record breaking at 7.9 °C, which is 4.1 °C above the long-term average. The previous record was 6.9 °C in 1934. In the Central England Temperature series, the December value of 9.7 °C was 5.1 °C above the long-term average. This is by far the largest difference above average for any month in the series, which extends back to 1659.

The UK mean temperature for 2015 overall was a notably warm 9.2 °C compared to the warmest year of 2014 which was 9.9 °C.

Along with remarkable warmth, there was almost a complete lack of air frost across much of England. Although there were frosts in places, particularly over high ground and Scotland, the UK had fewer than three days of air frost on average which is eight days below the long term average.

It was not only the wettest December for the UK on record, but also the wettest calendar month overall on record in our archive which goes back to 1910. Several stations recorded over 1 metre of rain in December, and Capel Curig, in Snowdonia, recorded over 2 metres for November and December combined.

December 2015

Temperature difference above 1981-2010 average

5 °C
4 °C
3 °C
2 °C

December 2015

Rainfall percentage of 1981-2010 average

300%
250%
200%
175%
150%
125%
75%

2015 overall was provisionally the sixth wettest year for the UK in the series and notably 2012, 2014 and 2015 all fall into the top six. 2015 was also the second-wettest year for Scotland and equal third-wettest for Northern Ireland in series back to 1910.

Incredibly wet

Severe flooding affected Cumbria in early December, and became widespread across North Wales, northern England and Scotland after Christmas, impacting many people and their homes. November was also a very wet month in the flood-affected areas, and the saturated ground conditions greatly contributed to the severity of the flooding in December.

We supported partners and government to ensure warnings and advice were consistently communicated. Our National Climate Information Centre confirmed the wettest 24 hour period ever of 341.4mm recorded at an observing station in Honister, Cumbria.

We are now contributing to the National Flood Resilience Review, due to report to Parliament in June 2016, which is considering future flooding impacts to help inform risk assessments of critical infrastructure to better protect the country from flooding and extreme weather.

Links to El Niño

El Niño – a natural intermittent warming of the Pacific Ocean – was very strong in 2015 which meant that the air contained more moisture than usual. This atmospheric moisture fed storms that formed on a stronger than normal jet stream.

The potential for December to be stormy and wet was picked up in our three-month outlook and was consistent with what we expect when there is a strong El Niño. However, analysis suggests that December's extreme weather might be linked to the detailed structure of this El Niño, the warmth of the north-east Pacific Ocean and their combined effects on atmospheric circulation.

In addition, climate change could have intensified the naturally arising period of very wet and stormy weather. Warming of the oceans due to climate change increases the moisture content of the atmosphere. This extra moisture provides additional energy to weather systems, enabling more moisture to be drawn into systems therefore increasing rainfall over the UK. 🌧️

2015 warmest year on record

The average global temperature in 2015 was 0.75 °C higher than the long-term average between 1961 and 1990. It was also considerably higher than the previous record of 0.57 °C in 2014.

2015 was 0.75 ±0.1 °C above the long-term (1961-1990) average, a record since at least 1850. When compared with the pre-industrial period, the 2015 average global temperature was around 1 °C above the long-term average from 1850 to 1900.

2016 forecast to be among warmest years

The global mean temperature for 2016 is expected to be between 0.72 °C and 0.96 °C above the long-term (1961-1990) average of 14 °C, with a central estimate of 0.84 °C. The forecast considers man-made global warming, combined with the effect of El Niño from unusually warm waters in the tropical Pacific Ocean.

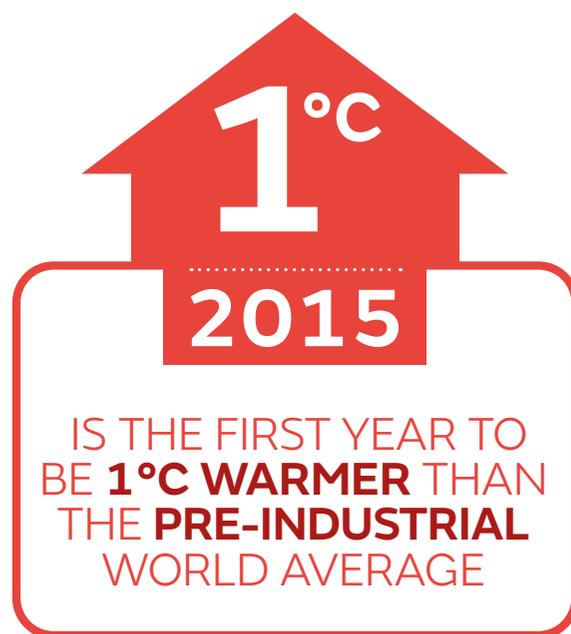


**2015 WAS THE
WARMEST YEAR
GLOBALLY**

BEATING PREVIOUS
RECORDS BY A
LARGE MARGIN

15 OF THE
16

HOTTEST YEARS
ON RECORD HAVE
ALL OCCURRED
SINCE 2000



IS THE FIRST YEAR TO
BE **1°C** WARMER THAN
THE **PRE-INDUSTRIAL**
WORLD AVERAGE



Managing supply and demand

Come rain or shine

From salads on hot summer days to soups when it's chilly outside, the weather plays a huge role in what food we buy – and when...

At the same time, weather can influence every part of a supply chain, from sourcing and manufacturing to product delivery to stores and homes. With that in mind, the Met Office set out to examine how weather forecasts can help food suppliers and retailers plan effectively and operate efficiently.

What shoppers want

After the 2008 financial crisis, the retail landscape shifted. Increasingly, shoppers kept a close watch on food bills and their eyes peeled for bargains. Many families swapped the traditional 'big shop' for frequent, smaller, grocery trips, branching out from the 'big four' to competitors such as Lidl and Aldi – while an increase in online shopping led to round-the-clock demand. Paired with the country's notoriously changeable weather, this presented a big challenge to UK supply chains.

To thrive in this environment, today's food suppliers and retailers need to be able to anticipate what consumers will want to buy and when. More often than not, that comes down to the weather.

What supply chains need

In 2015, the Met Office launched a research project to understand the impact of the weather on food retailers and suppliers. "We spoke to over 200 UK businesses to find out who consults weather information, what they use, and how the weather influences the way their supply chains operate," says Barbara Napiorkowska-Dickson, Met Office Retail Business Manager.

Published in the Met Office's *Understanding the role of the weather in the supply chain* report, the results revealed just how weather-sensitive the food sector is, with conditions affecting everything from logistics to sales. It's perhaps unsurprising that the main forecast users are supply chain managers. However, Barbara was surprised by how few retailers and suppliers, overall, currently use weather forecasts – with only 16% of respondents saying they use commercial weather data. Yet, for those who do use paid-for weather services, the benefits were clear: 62% felt they're able to offer improved customer service, 57% can forecast sales more accurately, 51% reported better on-shelf product availability and 43% have seen cuts to waste.

A service to suit

Drawing on the research results and working closely with some of the UK's major food retailers and suppliers, has made it possible to enhance the Met Office DemandMet™ weather service.

“The research helped us to better understand the specific weather information our customers need,” Barbara explains. “For example, instead of providing forecasts for uninhabited areas, like on top of mountains, we’ll give a weighted calculation of weather parameters for highly populated areas that are relevant to suppliers and retailers. And we can alert individual customers when the threshold of those parameters will breach so that they can plan product quantities. For example, a temperature rise from 20 °C to 24 °C can see the sales of burgers increase by more than 40%.”

Met Office forecasts are also helping companies transporting light cargo in high trucks. Gusts above 50mph can pull their vehicles off the roads, put their drivers at risk of injury and delay or even prevent their products being delivered to stores. “One day last winter, we were 100% confident that wind gusts would breach one particular customer’s 50mph threshold,” Barbara remembers. “Our Hazard Forecast alerted them and they actually suspended operations. Later, we heard that seven other trucks were involved in accidents due to the conditions that day.”

As well as Hazard Forecast, the service includes a 14-day national forecast with detailed daily breakdowns to give a clear picture of the weather in the long- and short-term. This enables users to see how conditions will change during the course of a day, and help to plan appropriate food stocks when weather conditions change within hours.

“ Better tracking and understanding of weather conditions is essential to meet consumer demand, ensure the timely and safe delivery of goods and reduce unnecessary inventory and waste. ”

They can compare the current temperature with the same day in a previous year, as well as running like-for-like comparisons using a ‘model day’ – a date in the past that had similar conditions to today. Customers also receive targeted information ahead of major trading events, such as Christmas or Easter. What’s more, DemandMet™ comes with a direct line to a Met Office forecaster should any questions crop up.

Forward planning

Managing supply and demand is vital for retailers and suppliers. But as supply chains grow in complexity and climate change brings about seasonal weather extremes, it’s a challenging balancing act. In fact, 67% of respondents to the Met Office research survey say that forecasting demand is becoming harder.

A key date in the food retailer’s diary is the first hot weekend of the year, when BBQ fare is high on most people’s shopping lists and product availability is crucial. Get that right and the benefits to the bottom line are clear. Get it wrong, however, and costs can spiral. “Retailers aim for 97–98% on-shelf product availability,” explains Barbara. “If on-shelf product availability increased in the UK by 1%, it would create an additional £1.1 billion in revenue.” At the other end of the scale, the cost of waste is similarly staggering. In fact, WRAP (Waste & Resources Action Programme) estimates waste within the UK food supply chain at approximately 6.5 million tonnes a year – equating to around £6.7 billion annually.

However, by harnessing weather data, businesses can forward plan – scheduling marketing campaigns, delivering goods efficiently, cutting waste and meeting consumer demand. In fact “by having the right levels of products available to their customers, some retailers can actually see sales uplift of around 600%” Barbara points out. For retailers in today’s competitive market, keeping prices low has never been more important. 🍴

i To read the report visit: www.metoffice.gov.uk/retail

What are the external factors that drive end consumer demand for the UK’s major food retailers and suppliers?



80%

Events / holidays / seasonality



70%

Competitor activity



60%

The economy



47%

The weather



26%

Media influences



5%

Legal / regulatory / political



4%

Environmental / ethical changes



4%

Other

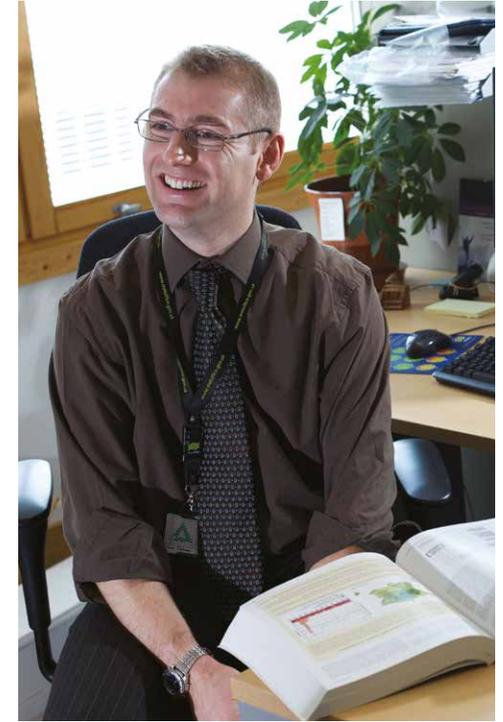
About DemandMet™

DemandMet™ is a specialist weather service that harnesses the Met Office’s advanced forecasting capabilities to provide accurate, industry relevant data, including:

- National forecasts
- 14-day regional forecasts
- A clear executive summary of the weather
- Access to forecasters for advice
- Weather warnings and alerts
- Hazard Forecast

Following our *Understanding role of the weather in the supply chain* report, we were able to enhance and adjust our product portfolio, introducing features and parameters to suit the current needs of customers.

Today, DemandMet™ helps supply chains forecast product demand, in-store footfall and likely online traffic – as well as to transport goods safely. In doing so, businesses can streamline their operations, boost customer satisfaction, maximise profits and minimise waste.



It's all about the people



One of the Met Office's greatest strengths is its people. The organisation is passionate about supporting everyone who works at the Met Office to lead a happy, healthy and fulfilling work life.

As a world-leader in meteorology and climate science, the Met Office relies on attracting the best minds from a huge variety of different backgrounds. As Met Office Diversity and Policy Consultant, Lorraine Croome, points out, a vital part of this is making sure people feel the organisation is a great place to work:

“We want to make sure our people are happy when they’re here. And if they’re well and motivated in their work, our partners and customers benefit too, because they know they’re working with a team that’s committed to doing a great job.”

A supportive environment

From sports clubs and flexible working hours, to recognising employee achievements through events such as the annual Chief Executive’s Awards, the Met Office takes a ‘big picture’ approach to wellbeing. One area of focus is the Mental Wellbeing Initiative, which aims to support staff experiencing mental health conditions such as stress, anxiety and depression.

Together with Workways, a service run by the NHS Devon Trust, the Met Office held a series of workshops to raise awareness of these common conditions and their relationship with work life. These included ‘Being Mindful’, a workshop for line managers, and ‘Being Resilient’, which gave staff practical tips for looking after their mental wellbeing both at home and in the workplace.

The ‘Being Resilient’ workshops were followed up with a video, produced with Workways, covering the techniques discussed. This is available online as a permanent resource for all Met Office staff – providing guidance whenever it’s needed.

A Mindful Employer

These workshops are examples of how committed the Met Office is to supporting mental wellbeing – a commitment that Chief Executive Rob Varley has made public by becoming a signatory to the Mindful Employer Charter. The charter, set up by Workways, encourages employers to demonstrate positive attitudes towards employees and job applicants with mental health issues.

Sharing new ideas

The Met Office’s dedication to creating a supportive working environment has also sparked a host of staff-led groups. For example in 2014, Met Office employee Mary Sherwood launched her initiative to make the Met Office a Dementia Carer Friendly workplace. By raising awareness and understanding of dementia and creating a Dementia Carer Network

“ A crucial part of balancing your work and home life is to be able to share with people who are going through the same experience and to feel there’s a support network around you. ”

with Carer Buddies, colleagues have been able to share experiences and support a better carer/work/life balance for those affected by dementia. This pioneering approach has been so successful that Mary is retiring to concentrate on developing Dementia Carer Friendly Workplaces in other organisations. You can find out more at www.4dementiacarers.org.uk.

Every so often, Met Office groups such as the Dementia Carer Network, the Parenting Network and the Accessibility Network meet as part of the Diversity Action Forum to share news and ideas and discuss how they could support each other. Lorraine is very proud of this sharing culture at the Met Office, explaining the benefit it has to employees:

“These groups are doing so many great things. A crucial part of balancing your work and home life is to be able to share with people who are going through the same experiences and to feel there’s a support network around you.”

As wellbeing at work can cover so many different areas, Lorraine explains that the Met Office is always happy to hear ideas from staff about creating a sustainable, supportive working environment. “It’s really important for people to feel empowered to have a positive effect on the workplace. If people have ideas about how they could support others, we can help them achieve their aims.”



Above: Met Office STEM Ambassadors enthuse Year 7 students at Met Office Science Camps.

Planning for the future

The Met Office is dedicated to supporting people from all backgrounds to pursue careers in Science, Technology, Engineering and Maths (STEM) subjects.

As part of this, the Met Office has signed up to the Athena SWAN charter, and is pleased to be applying for an award. Athena SWAN promotes gender equality in employment in higher education and research institutions, and awards member organisations that demonstrate a commitment to advancing women and trans people’s careers. As well as the Met Office, signatories to the charter include a host of UK universities, the British Antarctic Survey and the Natural History Museum, among others.

Having signed the charter in June 2015, the Met Office is currently in the early stages of applying for an award. This involves carrying out a detailed self-assessment of the organisation’s work to promote diversity and equality, which could take into account everything from inspiring young people through the STEM ambassador programme, to career advancement. A team of 20 volunteers, both men and women, has been selected from across the Met Office to begin putting together the application.

i You can find out more about Athena SWAN at www.athenaswan.org.uk



Working together for a resilient future

The UN's Sustainable Development Goals (SDGs) reflect the key aims of the Met Office to increase protection, prosperity and well-being – and our international activity often supports UN development objectives.



In 2000, the United Nations hosted a Millennium Summit with the aim of defining a blueprint for action, agreed by all the world's countries and leading development institutions, to galvanise efforts to stop or reduce a range of development challenges. This summit culminated in the creation of eight development goals with targets designed to support action from 'halving extreme poverty' to 'halting the spread of HIV/AIDS', with the end date of 2015.

While the Millennium Development Goals are acknowledged to have made huge positive strides – for example, global poverty continues to decline and investment to fight malaria, AIDS and tuberculosis is saving millions – the results of a two year UN member led review highlighted the need for governments and development agencies to shift towards a 'sustainable' approach to development.

'Transforming our world: the 2030 Agenda for Sustainable Development' consists of 17 goals which extend beyond the original goals and address new challenges which we face as a global community. For example, number 13 is a call to 'take urgent action to combat climate change and its impacts.'

From aid to ownership

The UN's Sustainable Development Goals (SDGs) reflect the key aims of the Met Office to increase protection, prosperity and well-being – and our international activity often supports UN development objectives.

"Key to this [new approach] was the idea of moving away from development programmes as aid," explains Nyree Pinder, Senior International Development Manager at the Met Office, "but rather as a means to empowerment. Countries can and should take ownership of development initiatives to understand how they can invest their resources in future to drive their own progress."

Built around the number one goal 'No poverty' – a top priority shared by the World Bank, other development banks and aid agencies – the 17 SDGs (see panel) take an empowerment angle that also aims to target hunger, health, education, gender equality, water, climate and more. Ratified by the UN in September 2015, the goals represent an action plan focused on five pillars – People, Planet, Prosperity, Peace and Partnership. These integrate the economic, social and environmental dimensions of sustainable development.

“ With poverty, hunger, health and well-being so closely linked to handling weather and climate effects, the Met Office is well-placed to play its part in helping support the UN's sustainable development goals. ”

With poverty, hunger, health and well-being so closely linked to the impacts of weather and climate events, the Met Office and National Meteorological and Hydrological Service partners have a key part to play in helping ensure the SDGs are another UN development success.

"There is nothing more important than communicating with people and organisations in hazard prone areas to ensure they are fully informed in a timely manner, to take action to protect life and livelihoods and assets," says Margareta Wahlstrom, previously Special Representative of the Secretary-General for Disaster Risk Reduction.

"Meteorological and climate services have a pivotal role in delivering this information from Early Warning Systems through to longer term climate adaptation advice for planning and anticipation for resilience. They are a crucial delivery mechanism for supporting UN global policies and standards such as the Sendai Framework for Action, the Sustainable Development Goals and the Global Climate Agreement. It is essential that Governments bring these national services squarely into their National Decision making processes."

Bringing the SDGs into focus

2015 marked an important year for global sustainable development not just because of the introduction of the SDGs, but also due to two other events; the UN's Sendai Framework for Disaster

Continued overleaf



“The Rwanda project demonstrates exactly the approach the SDGs are advocating”

Risk Reduction agreed in March and the agreement on climate change agreed at the United Nations climate conference (COP21) held in Paris in December.

“Paris provided a great opportunity to understand how these critical global policies interconnect,” explains Nyree Pinder. “For example, participants came to understand that Disaster Risk Reduction straddles both immediate severe weather events and longer term climate adaptation development approaches. So it is essential targets from the Sendai Framework are also connected to those of the SDGs and the Paris Agreement for improved resilience across all timescales.”

The ability to predict weather and climate events is essential expertise which connects to many of the targets indicated in the SDGs. The Met Office understands the importance of continuing to evolve its portfolio to support meteorological and climate services partners to deliver these targets.

Empowerment in action

Many of the Met Office international projects have involved long term engagement to support the development of our partner National Meteorological and Hydrological Services and enhance sustainability. The 15-year relationship with Rwanda’s Meteorological Service is a particularly good example of this. The project began with a partnership between Meteo Rwanda and the Met Office (through the UK contribution to the WMO Voluntary Cooperation

Programme) which included installing a TV presentation studio in Rwanda (a useful project to improve the visibility of a met service within a country), training, and grant funding from the UK to embed a Met Office expert at Meteo Rwanda to understand their challenges and the opportunities for their development.

Met Office then worked with Meteo Rwanda to submit a proposal to the (United Nations Development Programme) UNDP for an Early Warning System (EWS) pilot in a specific region of the country. Following the success of this programme the Rwandan government recognised the importance of directing development funds to specifically invest in Meteo Rwanda so they can continue to improve their services to the public. This will inevitably impact the country’s economic and social prospects for the better.

“The Rwanda project demonstrates exactly the approach the SDGs are advocating and there is growing recognition in the development community that sustainability is more achievable through long term consistent engagement,” says Nyree.

Ending poverty is half the battle

The Rwandan programme delivers against many key SDGs. By reducing loss of life and danger to valuable livestock, the EWS contributes to the ‘prime mover’ Goal 1 (‘End poverty’). In turn, this supports goals 2 (‘Zero hunger’) and 3 (‘Good health and well-being’). By understanding the local importance of women in protecting homes and livestock – the work also supports Goal 5 (‘Gender equality’).

The gender goal is a key priority for development agencies such as the UK’s Department for International Development (DFID), the Nordic Development Fund and the World Bank who understand this is not a standalone but a cross cutting issue. The Met Office aims to share best practice from its own gender equality initiatives, both at national level through the Met Office Science, Technology, Engineering and Mathematics (STEM) ambassadors speaking in schools on the importance for girls to have access to the academic streams; and also through our development activity in ensuring our ‘user focussed’ activity is inclusive. We are still learning how we can improve our own approach to gender equality and will continue to engage with our partners in the meteorological and development communities to share knowledge and improve. Our work with Meteo Rwanda encompassed an understanding of the importance of engaging with women as ‘users’ of weather and climate information.

On target

Met Office projects embracing UN SDGs extend from Malaysia, Myanmar, Singapore and the Philippines to South Africa, Rwanda and Kenya as well as the developed world. The selection below reflects their diversity:



Strengthening Adaptation and Resilience to Climate Change in Kenya (StARCK): SDG 13: 'CLIMATE ACTION'

This multi-partner project organised through the DFID-funded ADA Consortium aims to boost food security in five arid to semi-arid areas of Kenya by working with the Kenyan Met Service to disseminate climate information in a user friendly format to help vulnerable communities to better plan their planting and other agri-activities. Longer term, the objective is to help affected countries access climate finance to fund adaptation initiatives themselves.



Hunger and Climate Vulnerability Index: SDGS 2: 'ZERO HUNGER' and 13: 'CLIMATE ACTION'

This pioneering website – at www.metoffice.gov.uk/food-insecurity-index – was launched at Paris COP21. It enables governments and organisations to explore how different scenarios of global greenhouse gas emissions and adaptation to climate change could alter the geography of food insecurity in developing and least-developed countries. Partners include the Met Office Hadley Centre and the World Food Programme. Find out more on page 17.



Health Protection Research Unit (HPRU) in Environmental Change and Health: SDG 3: 'GOOD HEALTH AND WELL-BEING'

Led by the London School of Hygiene and Tropical Medicine in partnership with Public Health England, this unit brings together experts across disciplines – including the Met Office – to explore possible impacts around three key themes: climate resilience, healthy cities, and health and natural environment. One of 13 funded HPRUs, this is the first of its kind to focus on environmental change in public health.



Renewable energy services: SDG 7: 'AFFORDABLE and CLEAN ENERGY'

Met Office renewable energy services support onshore and offshore wind, as well as solar energy initiatives – using data to optimise infrastructure location in the UK, Europe and potentially as far afield as Myanmar.



Memorandums of Understanding with ADB and World Bank: SDG 17 STRENGTHEN THE MEANS OF IMPLEMENTATION and REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

Met Office agreements signed with the Asian Development Bank and World Bank have led to increased development opportunities through strong partnerships. The Met Office works with multiple international and national meteorological and hydrological services to support the development of improved services to the public to save lives and protect property.



The Government of Rwanda's investment into their Meteorological service to improve weather and climate understanding across sectors is a good baseline to embedding these services into long term strategic plans, such as National Climate Adaptation Plans or Frameworks. There is therefore potential here for Meteo Rwanda to deliver in future to the targets of Goal 11 ('Sustainable Cities and Communities') and Goal 13 ('Climate Action').

One world, one shared purpose

Rwanda is just one project which shows how Met Office activity harmonises with the UN SDGs (see the box out for examples of others). As the goals continue to focus governments and other development organisations over the next 15 years, they will continue to inform and guide the Met Office's future strategy.

For Met Office Chief Scientist Julia Slingo, the significance of meteorological and climate services engagement to enable the global community to deliver to the targets of the SDGs cannot be overstated: "We have made significant strides in our ability to predict weather and climate events in recent years, and much of our ongoing international work maps onto the SDGs. This highlights the role that weather and climate science and services have in saving lives and livelihoods, which is at the heart of everything we do in the Met Office." ☞

i For further information visit:
www.un.org/sustainabledevelopment

Business in the community

In the past, big companies and local communities haven't always seen eye to eye. But some organisations believe that, by working together, businesses can have a positive impact on society – and the environment. With all the challenges faced by society today, including recent weather events, this kind of collaboration has never been more relevant.



Back in 1982, the Business in the Community (BITC) story started with an Anglo-American conference which provided the opportunity to explore the idea of corporate social responsibility and exchange experience between the two countries.

The conference, jointly hosted by the then Minister for Local Government, and the US Ambassador to the United Kingdom, was attended by senior executives of major firms in the US and the UK.

Against a backdrop of economic depression, the conference took place a few days after rioting in Bristol, and early 1980s inner-city riots in places such as Toxteth and Brixton stimulated the responsible business movement, and creation of BITC.

Founded, funded and fronted by business

It was agreed that the private sector could play a bigger role in revitalising communities so BITC was formed for business to contribute resources to urban renewal.

“Leaders from a range of businesses came together to engage with the issues in a more creative way than simply condemning them,” explains Patrick O’Meara, BITC Membership Director. Just three years later, the 30 founding companies had grown to a network of 108 businesses, with HRH The Prince of Wales as President.

While the issues it focuses on have shifted over the years – most recently following the 2007 global financial crisis – BITC has always had a clear goal: a fairer society and a more sustainable future. “We see it as our responsibility to help businesses understand the societal landscape in which they operate, and to challenge, inspire and support them to make a positive difference to it,” says Patrick.

A positive difference

Today, BITC is made up of more than 800 core member businesses, including the Met Office. For Patrick, its success lies in the way it brings companies, including competitors, together: “One organisation can make a change, but when you get a group of businesses collaborating to act responsibly, pool resources and swap ideas, you can quadruple the effect – because you have a movement.”

At its most effective, BITC is mutually beneficial for both corporations and the communities they’re part of. Business Connectors is an excellent example. Through this initiative, BITC takes talented people



“ The Met Office has been tremendous – not only with the provision of data, but with an in-depth understanding of how the weather affects businesses and communities. ”

from big businesses and trains them to work with local communities in a form of secondment. They give their expertise and knowledge to communities that need it most, but benefit themselves by returning to their employer with new skills and better understanding.

The Prince’s Seeing is Believing programme and Business Class work in similar ways. The former gives business leaders a first-hand look at a side of society they probably haven’t seen before. Following Seeing is Believing prison visits, one company re-thought its recruitment policy to support applications from ex-offenders. At the same time the Business Class scheme has created links between 450 UK schools, each facing specific challenges (such as recruiting staff or boosting students’ aspirations), with 1,000 businesses that have the skills to help.

As well as the chance to engage with community-based projects, BITC offers businesses practical, commercial support. For example, its Corporate

Responsibility Index benchmarking tool gives companies a responsibility and sustainability health check – including the impact their operations have on the environment. The Met Office took part in 2011 and was delighted to achieve a gold standard.

The Business Emergency Resilience Group

BITC’s commitment to the business community comes to the fore in its Business Emergency Resilience Group (BERG) – a collective in particular demand in recent months. Made up of 20 organisations and drawing on the support of the Met Office, BERG enables big businesses to help smaller companies and communities prepare for emergencies – and recover when they happen. The situations they cover include civil unrest, cyber attacks and natural disasters.

When severe flooding hit the UK in winter 2015, BERG swiftly mobilised. The Group partnered with government teams, environment agencies, local authorities, and recovery and voluntary groups to provide on-the-ground assistance to those affected – while liaising with insurers. “Companies needed all sorts of help with their supply chains, from logistics to move their goods, through to finding a spare space in which they could temporarily reopen their business,” Patrick remembers.

“The Met Office has been tremendous – not only with the provision of data, but with an in-depth understanding of how the weather affects businesses and communities.”

But BERG doesn’t just act in times of crisis. Day to day, the Group encourages businesses to understand how their operations affect the ecosystem, examine their waste levels and explore ways to tackle climate change. In fact, environmental sustainability is something Patrick believes corporations can make a tangible difference to.

“The ball is in their courts,” he says. “It’s a challenge, because it can involve changing business models, but companies are now thinking about the long-term environmental impact of their products or services – and seeing their role as one of stewardship.”

i To learn more, visit www.bitc.org.uk



The Met Office operates an Environmental Management System (EMS) certified to the internationally recognised ISO14001:2004 standard of excellence. Met Office Environmental Advisor Kathy Gray explains, “Our EMS is designed to help us identify and manage our environmental impacts as effectively as possible. It provides us with a framework from which to improve our environmental performance through monitoring and effective target setting.”

Keeping the lid on consumption

90% of our GHG emissions result from our supercomputer and associated IT infrastructure at Exeter HQ but this is offset by significant socio-economic benefits that the supercomputer enables.

The Met Office participates in the government initiative: ‘Greening Government: ICT’. Launched in 2011, the initiative aims to deliver ‘cost-effective

Global citizen



and energy efficient ICT estate’ to enable new ways of working in the public sector.

As IT Infrastructure Manager Alan MacKay explains, “The Met Office is being used as an exemplar in many areas including energy management of our data centre which covers the management of all IT equipment located in our IT Halls. We also achieve an exceptional PUE well below the industry average. PUE (Power Usage Effectiveness) is the standard term for measuring the efficiency of data centres.”

The massive cooling requirements of the Met Office supercomputer mean that water consumption is another area which is monitored closely. We reduce our mains water consumption by mixing and treating water from our bore hole so that it can be used safely in our cooling systems. Water from the cooling process is then re-captured and used to flush the toilets. This has resulted in a reduction in mains water usage, in an environment of increased water requirements.

Making use of our waste

A key area of focus at the Met Office has been waste management and, working closely with Facilities Management company G4S and Devon-based Coastal Recycling, an encouraging 80% recycling rate has been achieved in recent years.

- Green waste is shredded and screened before being transported to farms across Devon for free organic fertiliser. Over a 14 week period, the compost is turned three times then nutrient levels are checked and recommended dosage is calculated.
- Food waste is passed through an anaerobic digester in Bridgwater to produce biogas and bio-fertiliser for use on local farms.
- Residual waste is taken to an incinerator in Plymouth where the heat created by incineration is used to generate electricity.

Working with Insurgo Media Services, the Met Office disposes of old computers and other IT infrastructure in ways that enable as much reuse as possible, as well as complying with the Data Protection Act. For example, once data cleansed, used PCs and laptops are resold to local small businesses while obsolete items are broken down and processed via recycling channels.

Building on sustainability

A new supercomputer building that's currently being built by Willmott Dixon Construction Limited for the Met Office at the Exeter Science Park is further pushing the boundaries of sustainability – even before it's completed.

“At its heart is the company's award-winning strategy to reduce onsite waste by up to 50%,” explains Alex Roberts, Willmott Dixon's Sustainability Manager. “We incentivise sites

The Met Office takes its environmental responsibilities very seriously. Whether managing waste more effectively or reducing greenhouse gas (GHG) emissions, the organisation is always striving to improve – which is where our Environment Management System (EMS) comes into play.

“ Our work enhances the site for native species and makes for a more pleasant environment for staff. It's great that the Biodiversity Benchmark officially recognises an activity that's so important, but so easily overlooked. ”

Professor Adam Scaife, Chair,
Met Office Biodiversity Working Group

by monitoring and recording all waste against specific targets that are set for each trade, encouraging better management and use of materials to prevent them becoming waste.”

Where waste is unavoidable, Willmott Dixon uses its well established links with community wood re-use and recycling charities which aim to save resources and create work and training for local disadvantaged people.

Environmental concerns are at the heart of the Met Office ethos. But critically, these concerns are turned into real, measurable actions and results right across the organisation. 🌿

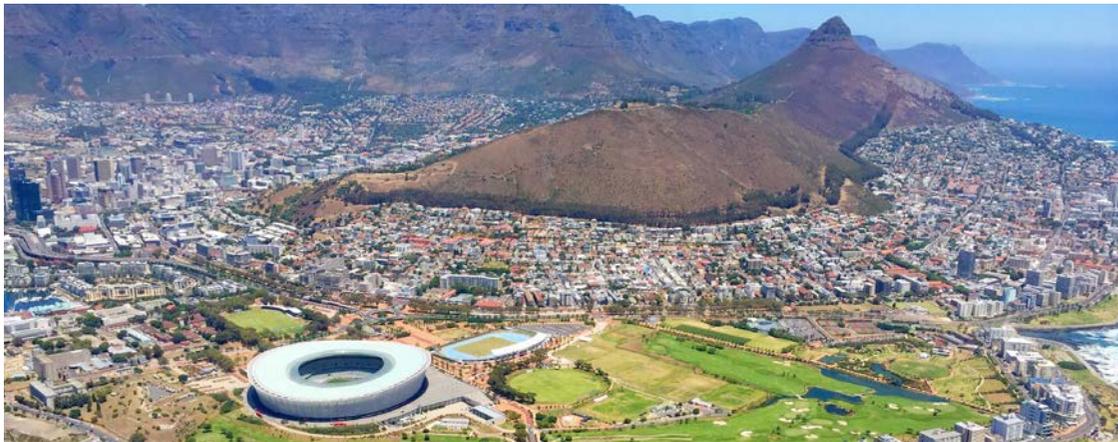


Biodiversity working group

Staff volunteers make up the Met Office Biodiversity Group which works to enhance biodiversity at the Exeter HQ site for which we hold the Wildlife Trusts' Biodiversity Benchmark. Only a handful of companies have met this standard – and the Met Office is the first public sector body to do so.

Highlights:

- A local roundabout provided a dazzling spring and summer display, having been sown with wildflower seeds in a joint project involving the Met Office, Devon Wildlife Trust and Exeter City Council.
- Our hedgehog survey established that these increasingly rare animals are visiting our site.
- 103 slow worms were moved to Met Office grounds from a local site where they were threatened by construction work.
- 'Bee hotels' were built for solitary bees using old marine Stevenson screens – located in a sunny spot on the edge of the Met Office's meadow.



Strong, strategic, sustainable

Weather and Climate Science for Service Partnership (WCSSP) South Africa

John Faragher, Head of International Development, describes how a partnership between the Met Office and the South African Weather Service is turning science into practical products and services to help protect lives and livelihoods.



The Weather and Climate Science for Service Partnership (WCSSP) South Africa is a strategic collaboration between the Met Office and the South African Weather Service (SAWS). It is an integral part of the Met Office's portfolio of work within the Newton Fund – part of the UK Government's official development assistance (ODA). The aims of the Newton Fund and WCSSP South Africa are to develop science and innovation partnerships that promote the economic development and welfare of collaborating countries.

This partnership builds on the existing relationship between Met Office and SAWS founded on weather forecasting using the Met Office Unified Model (MetUM). SAWS is the first national meteorological service on the African continent to join a global group of operational and academic centres working together to further develop the MetUM.

Key areas of focus for WCSSP South Africa include developing applied weather and climate services, improving high-resolution weather forecasting capabilities, enhancing training, and Disaster Risk Reduction (DRR) through impacts-based weather forecasting.

Increasing resolution

As part of the work, SAWS intends to upgrade and improve the quality of its weather forecasting by implementing high-resolution numerical weather prediction (NWP) models. Crucially this will enable more detailed and regionally accurate short-range weather forecasts, improving guidance to help protect lives and property. It also supports further NWP model improvements in South Africa and the UK, as the improvements are incorporated into the MetUM.

Sharing knowledge and experience

Another facet of the partnership has involved SAWS scientists visiting the Met Office to carry out verification and model evaluation alongside Met Office scientists. On their return to South Africa, the SAWS scientists have shared their knowledge of model verification techniques to other SAWS staff to promote an increased capability in local verification activities, leading to improvements in the quality and accuracy of weather guidance provided to government, businesses and communities within South Africa.

Exchanges have also improved the Met Office's understanding of NWP model performance over tropical and southern hemisphere regions.

The WCSSP enables SAWS to enhance its regional responsibility within the Southern African Development Community (SADC) region by providing weather warnings at a higher resolution as well as enabling the SAWS Regional Training Centre to provide courses that are relevant to the region.

Training trainers

As regional centres of education on weather and climate science, SAWS and the Met Office have important responsibilities to train the weather forecasters of the future. 'Train the Trainer' exchanges have captured successes at both training centres, and facilitated learning from different methodologies and practical applications.

Dr Nhlonipho Nhlabatsi, Senior Manager: Science at SAWS, comments on how the WCSSP South Africa is laying the groundwork for long-term collaboration around weather science and service development, strengthening links between the UK and South Africa:

"This bilateral provides a springboard for the development of sector specific products (Agriculture, Health, Energy & Hydrology) for the betterment of the social and economic challenges that arise from weather and climate related events in the region. Clear demonstrations of the positive socio-economic impact SAWS can make in monetary terms will help to measure its worth, something that we hope this partnership will further develop".

In future the partnership is keen to expand and draw on the breadth of UK expertise and capability to underpin services for protection, prosperity and well-being. The Met Office will soon announce funding opportunities for the UK research community. 📌

i See the next page for a profile on **Tamara Janes**, a **Met Office Applied Scientist** involved in **WCSSP South Africa**

Science profile

The Met Office employs professionals and experts who are constantly expanding the boundaries of weather and climate prediction. Here we meet one of them...



Tamara Janes

Climate Scientist for International Development

When Tamara Janes was completing her masters in atmospheric sciences at the University of Alberta, Canada, there was one institution that stood out for her as an employer to target when she graduated. The international reputation of the Met Office's climate research made it the perfect choice for Tamara, who wanted to apply her skills to a career in climatology. So she packed her bags and headed for the UK.

"The first thing I did when I moved to the UK was to write a letter to the Met Office," Tamara remembers.

A few months later, she had her first position in the Met Office as a monsoon scientist. Over the next 18 months, she worked on projects to help India and Bangladesh – two countries particularly vulnerable to monsoons – develop their capacity to adapt to regional climate change.

"For a year and a half I was solely focused on producing and interpreting regional climate model output to inform decision making in India and Bangladesh."

Communication is key

One of the biggest challenges of this project was making sure complicated weather information was communicated effectively. Tamara and her team learned to use innovative presentation methods and, for Bangladesh, developed an interactive web-based tool. The visually-focused information was a big hit with the audience.

"The Bangladeshi government didn't want a long report. They liked the fact they could explore the results across the regions for themselves while still having the data available."

After two productive years working on projects focused on climate change projections forecasts in South Asia, Tamara set her sights on a new challenge. It came in the form of seasonal forecasting in Kenya and centred on the difficulties of reporting forecasts for a rural, farming community, as Tamara explains:

"For the farmers we met, climate change wasn't a debate. They'd been observing it during their rainy seasons and living with it for years."

Working with the farmers was a real eye-opener for Tamara. Here were communities who had contributed little to climate change but were subject to the harshest of its realities.

“Half my time is science-based and half is spent in a relationship management role, ensuring work is delivered.”

"The experience helped me get to grips with why we do what we do. When I came back, I really felt that every climate scientist should experience something similar, and base their science on helping the people most affected."

A pattern emerges

There's a pattern to Tamara's career to date in her ability to draw together disparate aspects of a project. Sometimes this means creating links between different cultures and ways of working. At others it's striding between short-, medium- and long-range forecasts. In a similar vein, her current role as Climate Scientist for International Development involves bringing together different aspects of the Met Office's work.

As project lead for the Weather and Climate Science for Service Partnership (WCSSP) project in South Africa (that you can read about on page 19), Tamara helps bridge the gap between the science of short-range weather forecasting and the all-important business development functions at the Met Office, as she explains:

"Half my time is science-based and half is spent in a relationship management role, ensuring work is delivered and that we're working closely with the South African Weather Service."

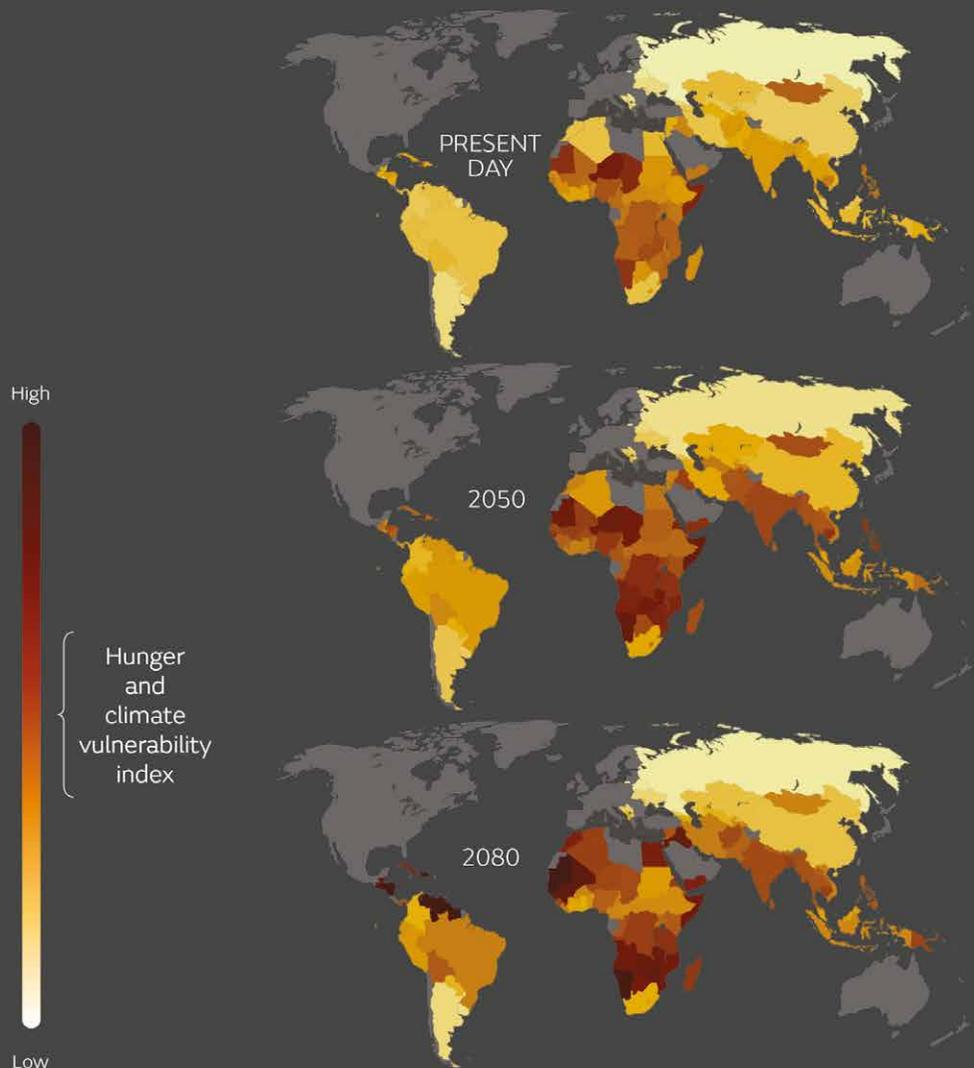
This kind of role is vital for the Met Office, as it provides the link between pure scientific work and practical applications that make such a difference to businesses – and ultimately to people's lives around the world.

If Tamara's career to date has been very varied her next role is no exception, as she takes a break from work and goes on maternity leave in the coming months. Undoubtedly she'll be keeping a keen eye on the weather until she returns. ☁

Food insecurity and climate change



An interactive online map created by the Met Office and the UN World Food Programme (WFP) paints a picture of how climate change may affect global hunger in the future.



Impacts of climate change can increase hunger by destroying land, livestock, crops and food supplies, and make it harder for people to access markets and food networks. Climate disasters affect hungry and vulnerable people disproportionately so even a minor weather event can cause a food crisis for vulnerable households.

The Food Insecurity and Climate Change map shows how adaptation and mitigation could prevent the worst impacts of climate change on hunger globally and help make people less vulnerable to food insecurity.

The interactive online map is the result of five years collaborative research between WFP's food security experts and the Met Office Hadley Centre. The map details how climate change affects vulnerability to food insecurity in developing and least-developed countries today and, thanks to sophisticated projections, the extent climate change will affect global hunger in the future, right up to the 2080s. Currently the highest levels of vulnerability to climate-related food insecurity are in sub-Saharan Africa, medium levels across much of Asia, and lower levels in South and Central America.

Kirsty Lewis, Climate Security Science Manager at the Met Office, said: "Our joint research shows how climate change can affect the scale and geography of food insecurity, and how adaptation and mitigation can address the challenges of future food insecurity in developing and least-developed countries."

Launched at the UN climate conference, COP21, held in Paris last year, the Food Insecurity and Climate Change map enables people to explore different scenarios of global greenhouse gas emissions and adaptation to climate change. The map also sheds light on how these different scenarios could change the geography of food insecurity in developing and least-developed countries.

Ertharin Cousin, WFP Executive Director said: "This map paints a stark picture of how climate disasters drive hunger. This research also reveals a more hopeful future depending on the choices we make - we must help vulnerable people adapt and build their resilience to climate change, while also investing in a low carbon future." 

 Find out more at: www.wfp.org or www.metoffice.gov.uk/food-insecurity-index

Lightning strikes twice

Welsh singer-songwriter **Charlotte Church** delights in open skies and the simple beauty of weather, but she is also increasingly aware of the impacts and complexity of climate change – especially after meeting Met Office climate scientist, Dr Richard Betts.

Starting as a classical singer as a child, Charlotte has ventured into pop music, as well as becoming an actress and television presenter. Success at a young age brought international fame, and lots of travel.

“Because I’ve been in aeroplanes so much, I’ve seen some incredible storms from the air,” Charlotte recalls. “One that sticks in my mind is a massive electrical storm when we were flying over Texas. One of my favourite things is watching storms.”

Enjoying weather from a young age, Charlotte is drawn to storms, and it seems they are drawn towards her as she has nearly been hit by lightning twice.

“Once was in south Wales when I was about seven,” she remembers. “We were in an outdoor pool when a big storm came in. Everyone left the pool so there was a traffic jam and this bolt of lightning struck very close to the car which was terrifying but brilliant. Then I was struck by lightning in a plane on the way to Dublin. There was a big flash of light, massive noise, and everybody screamed. So, I’m hoping that the third one doesn’t come!”

Elemental beauty

Despite close encounters with lightning’s raw power, Charlotte loves the elemental beauty of nature. “I remember being in Singapore during the monsoon and going outside and standing in the rain and thinking, this is amazing! I’ve visited Iceland in the last couple of years. The weather there is extreme so I really enjoy that.”

As a mother of two, Charlotte is conscious of weather and the environment. As she explains, “Since I’ve had kids I’m a lot more aware of the weather, but I don’t let it put me off – unless it’s really extreme when you have to pay attention – we go into the outdoors as much as possible. For my littleuns I think that’s immensely important. While if it’s a dreary rainy day it’s lovely to be inside somewhere warm, it’s also exhilarating to be outside.”

Great outdoors

Being a parent and thinking of the future, Charlotte is aware that climate change is shaping our world. Appearing on BBC’s Question Time, Charlotte referred to how climate change may have contributed to the conditions that led to civil unrest in Syria.

As Charlotte explains, “Before the show I read up on different subjects, including Syria because the situation is so complex. I found a study on the drought in Syria, how it possibly contributed to the overall situation, and whether it was linked to climate change. I thought it was an important issue, so I mentioned it. Unfortunately I got quite a lot of ridicule afterwards – people accused me of saying the conflict in Syria was caused by climate change, but that’s not what I said. I said that climate change had been a contributing factor to the situation, and is something that is going to affect that region for a while longer.”

After seeing her on Question Time, Dr Richard Betts, Head of Climate Impacts at the Met Office, invited Charlotte to the Met Office. As Charlotte puts it, “I jumped at the chance to meet some of the scientists who have made climate research their life’s work and educate myself about climate change. A lot of the work at the Met Office is about climate change, trying to understand why it’s happening, and finding ways to educate people about it.”

Sense of wonder

Charlotte was not only struck by the climate research, but also the Met Office Operations Centre. “The forecast room was amazing, looking at live pictures of the sun a million miles away – monitoring space weather – it was all very exciting. There are so many things I didn’t know the Met Office does.”

Although Charlotte is learning more about the science of weather and climate, when it comes to natural elements she retains a sense of wonder. “One of my biggest joys in life is just the sky and how it changes,”



she says. “What the sky has to offer – the cloud formations – that’s what I find most thrilling. One of my favourite things is being in an open space and being able to see totally uninterrupted sky, how clouds are forming, and the colours.” 🌩️

Whatever the Weather

This artwork by Julian Grater forms part of the impressive Whatever the Weather exhibition at the Royal Albert Memorial Museum & Art Gallery (RAMM) in Exeter.

Running from November 2015 to April 2016, the show explores humanity's relationship to the elements, drawing from the collections of the Met Office, National Trust, Arts Council, Royal Meteorological Society and RAMM.

As well as work from contemporary artists, the exhibition includes rain gods from the Americas, paintings by William Blake and Samuel Palmer, stormy seascapes and ships in distress, private weather diaries, weathervanes, barometers, thermometers and various recording instruments.

The Met Office National Meteorological Library and Archive contributed Admiral FitzRoy's first ever weather forecast issued by the Met Office in 1861 and Beaufort's original table of wind strength (the Beaufort Scale) dating to 1810. The Met Office is also involved in the exhibition's wide-ranging programme of events, including family days and talks.

The exhibition's curator, Julien Parsons, explained: "It seems as if the weather is never far from our thoughts. We have tried to combine art and science to tell a tale of our, sometimes, uneasy relationship with the weather and our quest to explain, understand and predict it over the millennia. We hope it inspires our visitors and encourages them to think about the future and what it may bring." 🌩️

