

Environment: Climate Change

February 2016



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What this briefing is for:

This briefing brings together selected statistics on Wales' environment, focussing on climate change in particular. It uses key indicators to give an overview of how activity in Wales is protecting and polluting the environment.

This briefing covers the following indicators:

- Emissions
- Ecological footprint
- Forecast changes
- Flood risk

We have sourced a range of data on key areas falling under these indicators to provide an overview of Wales' environmental challenges, successes and trends.

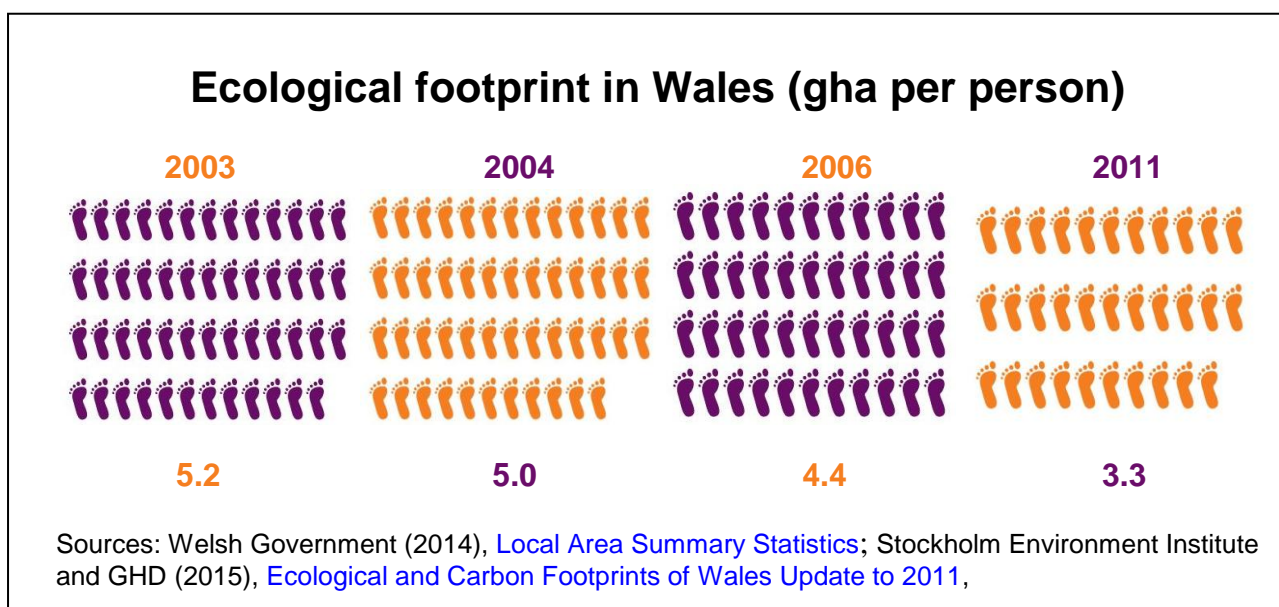
Key messages for Wales:

The information gathered in this briefing shows that:

- From the data available, Wales' ecological footprint is shrinking.
- Since 2000, greenhouse gas emissions have been decreasing.
- CO² emissions make up more than three quarters of all of Wales' greenhouse gas emissions.
- There is a 50:50 chance that the mean summer daily maximum temperature for Wales will increase by up to 6.1 degrees C by the 2080s.
- On average, people in Wales use almost twice the amount of resources than is sustainably available.
- Winter mean precipitation is predicted to rise by as much as 26% by the 2080s.
- The largest increases in temperature are projected to be in south east Wales.
- The biggest increases in rainfall are projected for Wales' west coast and the hills of south Wales.
- Approximately 90,000 people in Wales live in homes at risk of flooding.

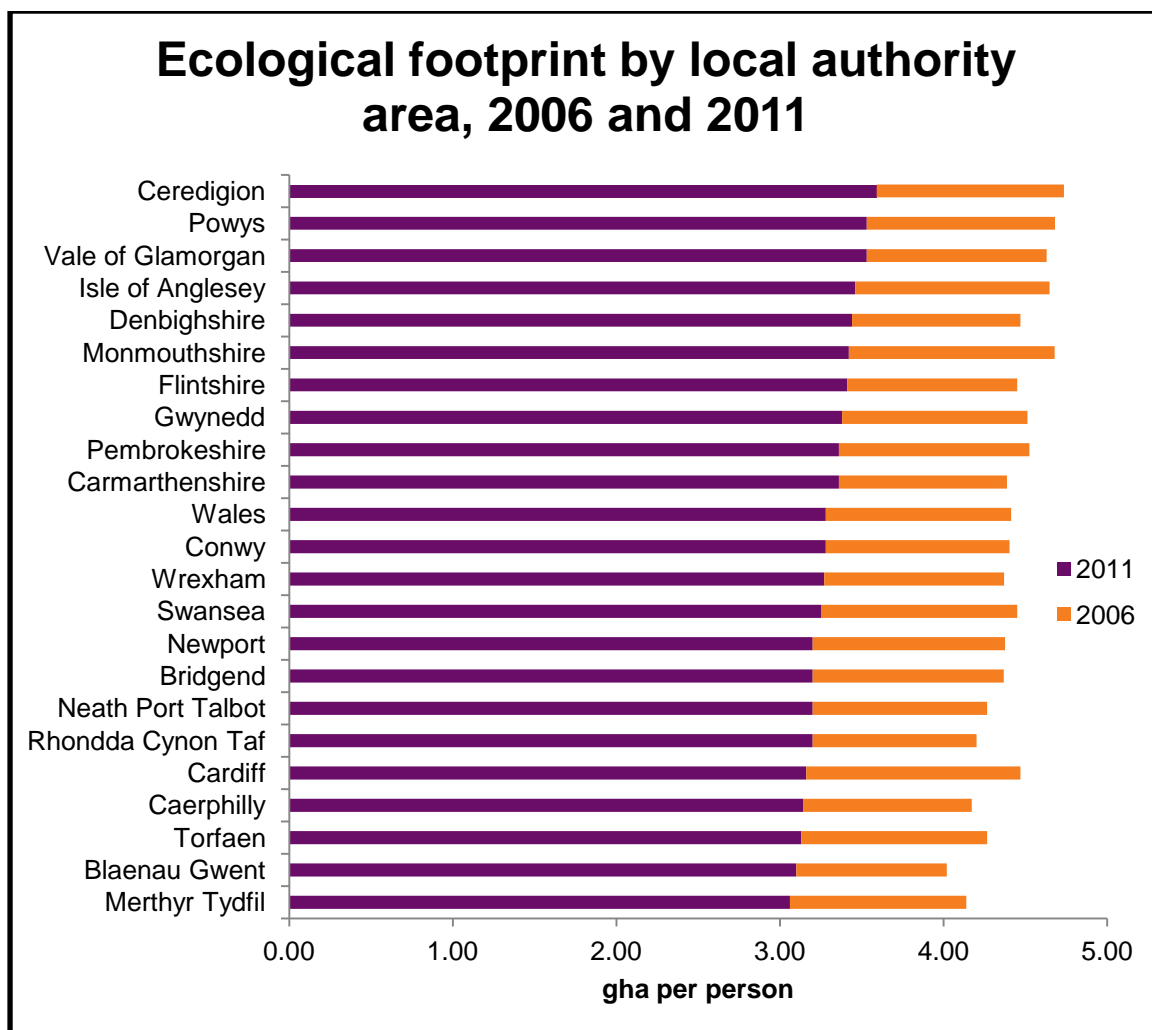
1. Ecological footprint

- 1.1. The ecological footprint is a calculation of how much water and land use we require to support the way we live, therefore assessing the impact we have on the Earth. It takes into account both consumption and waste levels.
- 1.2. An ecological footprint is measured in global hectares (gha) per person. The World Wildlife Fund states that a sustainable ecological footprint is 1.8 gha per person,¹ while the average for Wales is 3.3 gha per person.
- 1.3. On average, people in Wales use almost twice the amount of resources than are sustainably available, although resource usage appeared to be steadily declining during the period that data is available.



- 1.4. There is also regional variation in the size of the average ecological footprint. In Ceredigion, the average ecological footprint in 2011 was 3.6 gha per person, while in Merthyr Tydfil it was 3.1 gha per person.
- 1.5. Between 2011 and 2006, all bar one local authority (Blaenau Gwent) decreased the size of their ecological footprint per head by at least 1 gha per person.

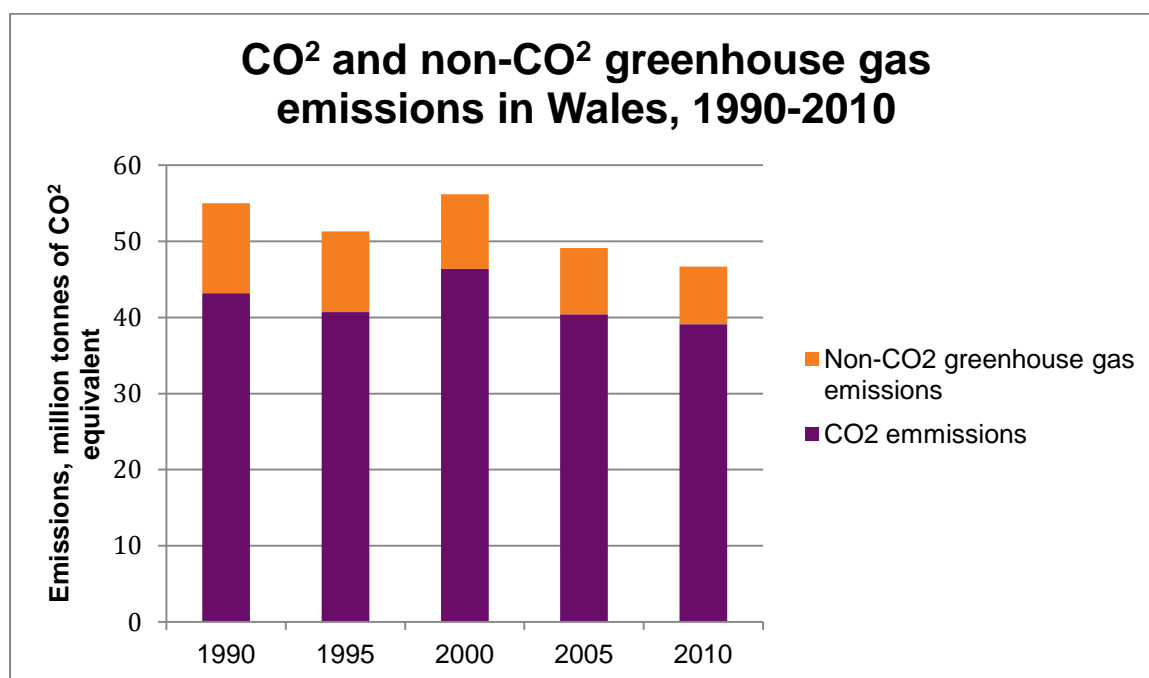
¹ WWF, 'What is a footprint?', <http://footprint.wwf.org.uk/static/faq> [accessed 22 January 2016]



Sources: Stockholm Environment Institute and GHD (2015), [Ecological and Carbon Footprints of Wales Update to 2011](#), Table 2; Welsh Government (2014), [Local Area Summary Statistics](#)

2. Emissions

- 2.1. Greenhouse gas emissions refer to the release of air pollutants including carbon dioxide, methane and nitrous oxide. Their name refers to the 'greenhouse' effect they cause by trapping heat within the earth's atmosphere.²
- 2.2. Greenhouse gas emissions are predominantly from industry and manufacturing, transport, households and agriculture.
- 2.3. Since 1990, greenhouse gas emissions have decreased. Only a minor decrease has been observed in CO² emissions, while there was a slightly bigger decrease in non-CO² greenhouse gas emissions.
- 2.4. Non-CO² greenhouse gas emissions decreased at every five year measurement point between 1990 and 2010. This is also the case for CO² emissions, except for 2000 where emissions increase by 5.7 million tonnes compared to 1995.



Source: StatsWales (2012), [Greenhouse Gas Emissions by Year](#)

² EPA, 'Overview of Greenhouse Gases', <http://www3.epa.gov/climatechange/ghgemissions/gases.html> [accessed 22 January 2016]

3. Forecast Changes

- 3.1. It is widely agreed that increases in carbon emissions are changing the climate, both globally and in Wales. The key changes are expected to be a rise in mean temperatures, increases in rainfall (especially in winter) and an increase in extreme weather.
- 3.2. The Met Office has generated projections of Wales' climate in the 2020s, 2050s and 2080s. For each time period, the projection varies depending on whether carbon emissions are low, medium or high. Each is equally plausible.
- 3.3. The central projection (with a 50:50 chance of occurring) is that the mean summer daily maximum temperature will increase by around 2 degrees C in the 2020s, by between 3.0 and 3.8 degrees C in the 2050s, and by up to 6.1 degrees C in the 2080s.
- 3.4. Winter mean temperatures are also projected to rise, by around 1.2 degrees in the 2020s and by between 2.4 and 3.3 degrees C in the 2080s, depending on emissions.
- 3.5. The largest increases in temperature are projected to be in south east Wales.

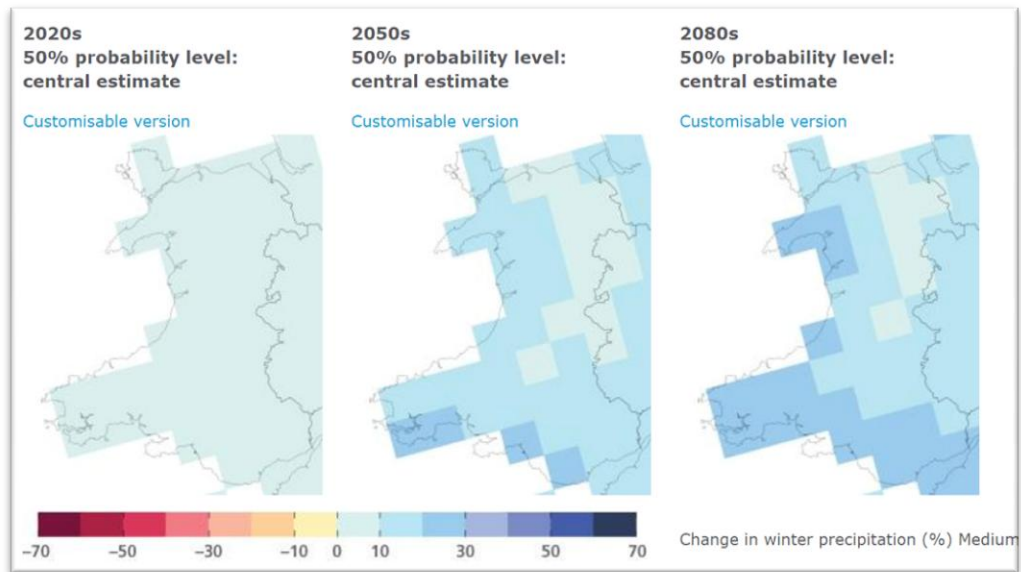
Table 1: Projected Changes in Temperature (°C) and Precipitation

	Emissions scenario	Summer mean daily maximum temp.	Winter mean temp.	Winter mean precipitation
2020s	Low	+2.0	+1.2	+5%
	Medium	+1.9	+1.3	+7%
	High	+1.8	+1.2	+5%
2050s	Low	+3.0	+1.8	+9%
	Medium	+3.4	+2.0	+14%
	High	+3.8	+2.3	+13%
2080s	Low	+3.7	+2.4	+17%
	Medium	+4.8	+2.8	+19%
	High	+6.1	+3.3	+26%

Source: Met Office (2016), [UK Climate Projections Maps and Key Findings – Wales](#)

- 3.6. Precipitation is also forecast to rise as a result of climate change. Low emissions are projected to generate an increase in winter precipitation of 5% in the 2020s rising to 17% in the 2080s. High emissions make little difference in the 2020s, with winter precipitation increasing by 5% but by the 2080s, winter precipitation could increase by 26%. The greatest increases in rainfall will

occur on the western coast and hills of Wales (the map below shows projected increases for medium emissions with 50:50 chance of occurring).



Source: Met Office (2016), [UK Climate Projections Maps and Key Findings – Wales](#)

4. Flood Risk

- 4.1. Approximately 90,000 people in Wales live in properties at significant risk of flooding (more than one in 75 years risk).³ More than a fifth of those at significant risk of flooding live in a deprived area, some 20,000 people today. The estimated annual damage of river and coastal flooding in Wales in 2009 was around £200 million, roughly 0.4% of Wales' GVA.⁴
- 4.2. Climate change is forecast to increase substantially the number of properties and number of people at significant risk of flooding because of rises in sea-level, increased river flow and greater surface water run-off.⁵ Coastal flooding is a particular risk for disadvantaged communities in south Wales (including Cardiff) and on the north Wales coast⁶.
- 4.3. The number of people and properties in deprived areas in Wales at significant risk of flooding is expected to increase by about the same percentage as Wales as a whole – more than double the current number by 2080.⁷
- 4.4. However the impact of flooding is much greater than the risk of exposure – people's ability to prepare for, respond to and recover from flood events is also important.⁸ This needs to be considered alongside the physical risks of flooding to get a full sense of vulnerability to flooding.
- 4.5. A study in 2011⁹ combined estimates of flood exposure with different measures of social vulnerability to flooding to generate a measure of 'flood disadvantage'. They concluded that 8% of communities (measured by Middle Super Output Area) in Wales had high levels of flood disadvantage, with particular concentrations in South Wales and coastal parts of North and West Wales (see map).

³ Sayers, P.B., Horritt, M.S., Penning-Rowsell, E and McKenzie, A (2015), [Climate Change Risk Assessment 2017: Projections of future flood risk in the UK](#), Tables 6-4

⁴ Committee on Climate Change (2013), [Progress reducing emissions and preparing for climate change in Wales](#), p.42

⁵ Sayers, P.B. et al (2015)

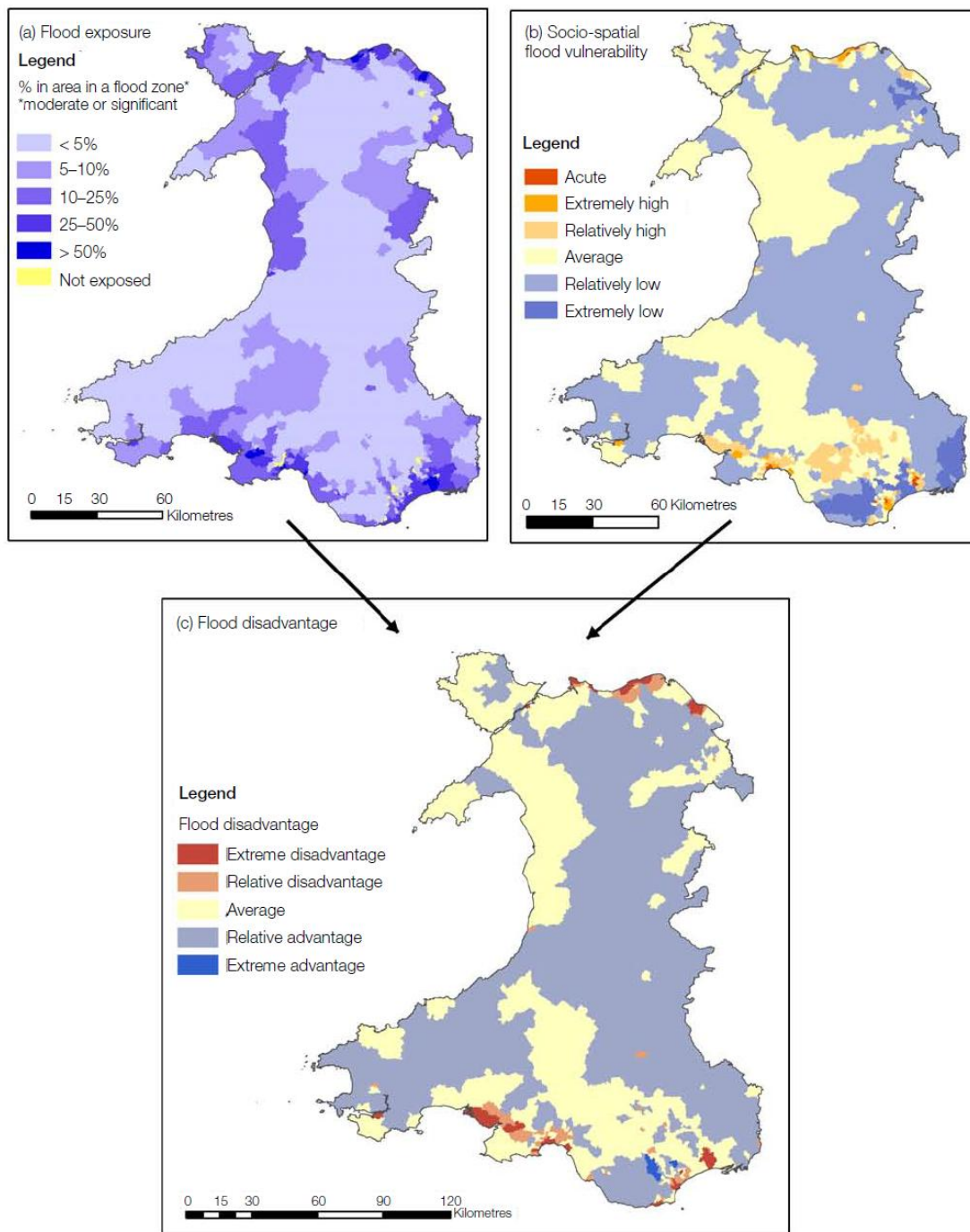
⁶ Zsomboky, M., Fernández-Bilbao. A., Smith, D., Knight, J. and Allan, J (2011), [Impacts of climate change on disadvantaged UK coastal communities](#)

⁷ Sayers, P.B. et al (2015)

⁸ Lindley, S., O'Neill. J., Kandeh. J., Lawson, N., Christian, R. and O'Neill, M. (2011), [Climate change, justice and vulnerability](#)

⁹ *ibid*

Figure 18: Relative flood disadvantage in Wales as a composite of (a) flood exposure and (b) socio-spatial flood vulnerability



Source: Boundary data: EDINA UKBORDERS, Flood-exposure data Environment Agency, Crown copyright (see Notes)

Equality and Social Justice Briefings

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We have made every effort to ensure that the data in this briefing is accurate and up to date at the time of writing. However we cannot be held responsible for any error or omission in the briefing or change in the source data.

All the data used in this briefing is publicly available. We hope that future briefings on health will include unpublished and bespoke data.

About the Bevan Foundation

The Bevan Foundation develops ideas to make Wales a fairer, prosperous and sustainable place. We are independent of government or any political party, and are funded by membership subscriptions, donations, grants from charitable trusts and foundations and commissions.



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